Selling sun protection to a youth audience: best practice guidelines for social marketing initiatives

Keryn Marie Johnson

University of Wollongong, kerynj@uow.edu.au

Recommended Citation

UNIVERSITY OF WOLLONGONG

COPYRIGHT WARNING

You may print or download ONE copy of this document for the purpose of your own research or study. The University does not authorise you to copy, communicate or otherwise make available electronically to any other person any copyright material contained on this site. You are reminded of the following:

Copyright owners are entitled to take legal action against persons who infringe their copyright. A reproduction of material that is protected by copyright may be a copyright infringement. A court may impose penalties and award damages in relation to offences and infringements relating to copyright material. Higher penalties may apply, and higher damages may be awarded, for offences and infringements involving the conversion of material into digital or electronic form.
CERTIFICATION

I, Keryn M Johnson, declare that this thesis, submitted in fulfilment of the requirements for the award of Doctor of Philosophy, in the Faculty of Health and Behavioural Sciences, University of Wollongong, is wholly my own work unless otherwise referenced or acknowledged. The document has not been submitted for qualifications at any other academic institution.

Keryn M Johnson
October, 2009
ABSTRACT

Skin cancer is viewed as a major public health issue throughout the western world. In Australia, skin cancer dominates cancer incidence, causing over 1,500 deaths per year, and costing the health system around AUD$300 million. Public health interventions and campaigns directed at decreasing skin cancer rates have focused on limiting people’s ultraviolet radiation (UVR) exposure through increasing their sun protection behaviours. Adolescents are a key target group for sun protection interventions, as this demographic has the lowest compliance with sun protection recommendations leaving many at high risk for skin cancer in later life.

Social marketing is a program planning process that applies commercial marketing concepts and techniques to promote voluntary behaviour change, however, while widely used in some public health areas, such as smoking cessation and physical activity promotion, little research has been published on its use in sun protection. There is, therefore, little guidance on the most effective strategies and approaches to use when developing social marketing interventions for sun protection.

Aims and objectives
This project aimed to provide an evidence-base for the specific application of social marketing and advertising communications theory to sun protection interventions, with the view to informing the development of social marketing programs for the prevention of skin cancer.

Methodology
The research aims were addressed through three stages of research. Stage One consisted of a systematic review of sun protection interventions targeting adolescents and young adults, and the results of this analysis were then used as an evidence-base for stage two of the project. Stage Two consisted of a Delphi consensus process with experts in the fields of social marketing and sun protection, conducted in order to develop operational guidelines for social marketing projects in sun protection for adolescents and young adults. Stage Three was conducted in response to a gap in research and practice highlighted through stages one and two, and consisted of
survey research into the segmentation of youth for sun protection interventions using the Rossiter-Percy model of advertising theory, incorporating comparisons with the ‘stage of change’ model (TTM).

Results

Fifteen guidelines for social marketing practice in sun protection interventions for adolescents and young adults were developed through stages one and two of the project. These guidelines cover recommendations on general structure, settings and timing of interventions, the importance of formative research and segmentation, and the need for strategies to target: the competition to sun protection that comes from social norms surrounding tanning and sun protection, perceived self-efficacy, and skin damage concerns in addition to skin cancer. Additional recommendations include the need for policy and environmental strategies, the use of a broad range of communication channels, and attention to the ‘products’ necessary for sun protection. Most notable among these guidelines is the recommendation of an appearance-based approach to sun protection highlighting the damaging effects of UVR on appearance, rather than a sole focus on a skin cancer prevention message.

Stage Three of the research found that Brand Loyalty segmentation can distinguish between groups as well as, or better than the TTM, and appears to be a better descriptor of the ‘how’ and ‘why’ of sun protection behaviour, providing more clues to appropriate intervention strategies.

Discussion

For sun protection interventions targeting adolescents and young adults, this research has suggested that there is a need to move the positioning of sun protection away from a singular focus on the ‘prevention of skin cancer’ to a positioning that includes the ‘prevention of skin damage’. This demographic is significantly different in how it perceives and performs sun protection; it therefore needs interventions which acknowledge this difference, developing messages and strategies to minimise the barriers to sun protection, and providing salient benefits which can be realised in the short rather than long term. At the same time, this study identified that there is a need to improve the methodology for evaluation of sun protection interventions,
including the standardisation of sun protection measurement, evaluation timing, follow-up, and reporting.
ACKNOWLEDGMENTS

This research was funded by an Australian Research Council linkage project with the The Cancer Council of NSW.

I would like to thank:

My supervisors Professors Sandra Jones and Don Iverson for their invaluable guidance and feedback on all aspects of this project.

Dr Elmer V Villanueva for his guidance in systematic review methodology.

Professor David Buller, Professor Robert Donovan, Professor Gerard Hastings, Dr Sara Hiom, Dr Kristina Jackson, Dr Chris Paul, Dr Sue Peattie, Dr Andrew Penman, Professor Michael Rothschild, Craig Sinclair, and Professor Melanie Wakefield for their time and expertise in responding to my Delphi protocol.

Professor Peter Caputi for statistical guidance.

My family and friends for putting up with the ups and downs of PhD process, and encouraging me to keep going.

My fellow PhD students for mutual encouragement and empathy during PhD low points.

Thank-you all.

Keryn
### CHAPTER 5: SYSTEMATIC REVIEW OF ADOLESCENTS’ AND YOUNG ADULTS’ SUN PROTECTION PROGRAMS

5.1 INTRODUCTION ........................................... 81
5.2 METHOD ...................................................... 81
5.3 RESULTS OF SYSTEMATIC REVIEW – PRE AND POST STUDIES WITH CONTROL GROUPS AND TIME SERIES WITH CONTROL GROUP ................................................. 83
   5.3.1 Study characteristics (first tier evidence) ............................................ 83
   5.3.2 Intervention characteristics ............................................................... 83
   5.3.3 Outcomes and follow-up ................................................................. 88
   5.3.4 Quality of studies ........................................................................... 90
   5.3.5 Use of theory .................................................................................. 90
   5.3.6 Use of formative research .............................................................. 92
   5.3.7 Use of segmentation ...................................................................... 92
   5.3.8 Environmental analysis ................................................................. 93
   5.3.9 Targeting of secondary audiences ................................................... 94
   5.3.10 Message features ......................................................................... 95
   5.3.11 Dissemination channels .............................................................. 96
   5.3.12 Length of campaign .................................................................... 97
5.4 RESULTS – OTHER STUDY DESIGNS (TIER TWO STUDIES) ................................................................. 101
   5.4.1 Study Characteristics (Second tier evidence) .................................. 101
   5.4.2 Interventions ................................................................................ 101
   5.4.3 Quality Assessment .................................................................. 103
   5.4.4 Other factors .............................................................................. 104
5.5 DISCUSSION .................................................. 108
   5.5.1 Judging the effectiveness of sun protection interventions aimed at adolescents and young adults .................................................. 108
   5.5.2 The use of social marketing ............................................................ 109
   5.5.3 The use of behavioural theory ....................................................... 110
   5.5.4 Appearance/skin damage focus ...................................................... 112
   5.5.5 Self-efficacy and planning ............................................................. 113
   5.5.6 Targeting social norms ................................................................. 113
   5.5.7 Segmentation of target audiences and tailoring of message content .................................................. 114
   5.5.8 Targeting secondary audiences .................................................... 114
   5.5.9 Exchange theory ....................................................................... 115
   5.5.10 The use of environmental strategies ............................................ 116
   5.5.11 Reactance ................................................................................. 116
   5.5.12 Intervention length ..................................................................... 117
   5.5.13 Contextual issues ..................................................................... 118
   5.5.14 Use of second ‘tier’ evidence ....................................................... 119
   5.5.15 Methodological issues ............................................................... 119
5.6 LIMITATIONS .............................................. 120

### CHAPTER 4: METHOD FOR SYSTEMATIC REVIEW

4.1 SYSTEMATIC REVIEW OF PUBLIC HEALTH INTERVENTIONS ................................................................. 61
4.2 OTHER METHODOLOGICAL ISSUES IN SYSTEMATIC REVIEW ................................................................. 64
4.3 METHOD FOR SYSTEMATIC REVIEW .................................................................................................. 65
   4.3.1 Social marketing framework: components ........................................ 65
   4.3.2 Selection Criteria ........................................................................ 72
   4.3.3 Development of Data Extraction Forms ....................................... 74
   4.3.4 Search procedure for systematic review ....................................... 75
   4.3.5 Search results ........................................................................... 77
   4.3.6 Data Coding ............................................................................. 77
   4.3.7 Data Analysis .......................................................................... 78
4.4 CONCLUSION .................................................. 79

### 3.8.1 Diffusion of Innovations Model

3.9 ADVERTISING THEORY .................................................................................................................. 53
3.10 ADVERTISING THEORY IN SOCIAL MARKETING CAMPAIGNS ................................................................ 58
3.11 CONCLUSION ............................................................................................................................... 60
CHAPTER SEVEN: THE USE OF BEHAVIOUR AND ADVERTISING THEORY TO SEGMENT SUN PROTECTION TARGET MARKETS........ 151

7.1 INTRODUCTION ................................................................. 151
7.2 SEGMENTATION IN COMMERCIAL MARKETING ................. 152
7.3 SEGMENTATION IN SOCIAL MARKETING ......................... 153
7.4 SEGMENTATION IN HEALTH PROMOTION ....................... 153
7.5 THE NEED FOR SEGMENTATION OF ADOLESCENT AND YOUNG ADULT SUN PROTECTION AUDIENCES ......................................................... 154
7.6 SEGMENTATION IN PREVIOUS INTERVENTIONS TARGETED AT ADOLESCENTS AND YOUNG ADULTS ................................................................. 156
7.7 BRAND LOYALTY SEGMENTATION AND SUN PROTECTION ......................................................... 158
7.8 AIMS OF RESEARCH .......................................................... 161
7.9 METHOD ................................................................. 162
7.10 TEST-RETEST FOR RELIABILITY ................................. 162
7.11 SURVEY VARIABLES ....................................................... 163
7.12 ANALYSIS ................................................................. 173
7.13 RESULTS ................................................................. 174
7.13.1 Aim One: How would the student population be categorised within these segments with a single five part question ............. 176
7.13.2 Aim Two: How inclusion in a Brand Loyalty category was related to skin type and demographic variables ............. 177
7.13.3 Aim Three: How inclusion in a Brand Loyalty category was related to attitudes and beliefs regarding sun protection and tanning including decisional balance, temptations to tan or not protect, confidence to sun protect, perceived risk for skin cancer, and thinking about sun protection .......... 181
7.13.4 Aim Four: How inclusion in a Brand Loyalty category related to actual incidence of sun burn and tanning behaviours over the previous summer .......... 190
7.13.5 Relationships between independent variables ......................... 193
7.13.6 Prediction of group membership for OBSs versus FBSs ........ 194
7.14 DISCUSSION ............................................................... 198
7.14.1 Sun protective behaviour .............................................. 198
7.14.2 Comparison with the Australian National Sun Survey .......... 199
7.14.3 Brand Loyalty as a segmentation tool ............................... 200
## LIST OF FIGURES

<table>
<thead>
<tr>
<th>Figure</th>
<th>Description</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>2.1</td>
<td>Behavioural factors in causation of skin cancer</td>
<td>11</td>
</tr>
<tr>
<td>3.1</td>
<td>The Health Belief Model: major components and linkages</td>
<td>42</td>
</tr>
<tr>
<td>3.2</td>
<td>Theory of Reasoned Action (shaded) and Theory of Planned Behaviour:</td>
<td>44</td>
</tr>
<tr>
<td></td>
<td>major components and linkages</td>
<td></td>
</tr>
<tr>
<td>3.3</td>
<td>PRECEDE-PROCEED framework</td>
<td>50</td>
</tr>
<tr>
<td>3.4</td>
<td>The communication process</td>
<td>51</td>
</tr>
<tr>
<td>3.5</td>
<td>Rossiter-Percy grid</td>
<td>58</td>
</tr>
<tr>
<td>4.1</td>
<td>Conceptualisation of elements needed to inform the marketing mix</td>
<td>71</td>
</tr>
<tr>
<td>6.1</td>
<td>Examples of propositions</td>
<td>132</td>
</tr>
<tr>
<td>6.2</td>
<td>Example of evidence presented for VAS</td>
<td>140</td>
</tr>
<tr>
<td>7.1</td>
<td>Brand Loyalty survey question</td>
<td>165</td>
</tr>
<tr>
<td>7.2</td>
<td>Bar chart showing Brand Loyalty segments</td>
<td>177</td>
</tr>
<tr>
<td>7.3</td>
<td>Bar chart showing skin type for Brand Loyalty segments</td>
<td>178</td>
</tr>
<tr>
<td>7.4</td>
<td>Bar chart showing skin colour for Brand Loyalty segments</td>
<td>179</td>
</tr>
<tr>
<td>7.5</td>
<td>Bar chart showing attitudes to sun protection and tanning for brand Loyalty</td>
<td>183</td>
</tr>
<tr>
<td></td>
<td>segments</td>
<td></td>
</tr>
<tr>
<td>7.6</td>
<td>Bar chart showing beliefs about skin protection and tan attractiveness for</td>
<td>185</td>
</tr>
<tr>
<td></td>
<td>Brand Loyalty segments</td>
<td></td>
</tr>
<tr>
<td>7.7</td>
<td>Graph showing standardised mean scores for pros and cons</td>
<td>187</td>
</tr>
<tr>
<td>7.8</td>
<td>Bar chart showing mean and median burns this summer for Brand Loyalty groupings</td>
<td>191</td>
</tr>
<tr>
<td>7.9</td>
<td>Graph showing summary of standardised mean scale scores</td>
<td>201</td>
</tr>
<tr>
<td>8.1</td>
<td>Scree plot from factor analysis of ‘processes of change’</td>
<td>227</td>
</tr>
<tr>
<td>8.2</td>
<td>Bar chart showing attitudes to sun protection and tanning for stage of</td>
<td>232</td>
</tr>
<tr>
<td></td>
<td>change</td>
<td></td>
</tr>
<tr>
<td>8.3</td>
<td>Bar chart showing beliefs about skin protection and tan attractiveness for</td>
<td>234</td>
</tr>
<tr>
<td></td>
<td>stage of change</td>
<td></td>
</tr>
<tr>
<td>8.4</td>
<td>Standardised graph showing standardised mean scores for pros and cons and</td>
<td>236</td>
</tr>
<tr>
<td></td>
<td>stage of change for sun protection showing the crossing of pros and cons</td>
<td></td>
</tr>
<tr>
<td></td>
<td>around Preparation</td>
<td></td>
</tr>
<tr>
<td>8.5</td>
<td>Bar chart showing confidence to sun protect for stage of change</td>
<td>237</td>
</tr>
<tr>
<td>8.6</td>
<td>Bar chart showing mean and median burns over the summer for stage of change</td>
<td>241</td>
</tr>
<tr>
<td>8.7</td>
<td>Graph showing processes of change for stage of change</td>
<td>245</td>
</tr>
<tr>
<td>8.8</td>
<td>Graph showing processes of change for Brand Loyalty segments</td>
<td>246</td>
</tr>
<tr>
<td>8.9</td>
<td>Graph showing scale standardised mean scores for scale variables</td>
<td>252</td>
</tr>
<tr>
<td>8.10</td>
<td>Pros and cons for stage of change</td>
<td>256</td>
</tr>
<tr>
<td>8.11</td>
<td>Pros and cons for Brand Loyalty segments</td>
<td>257</td>
</tr>
<tr>
<td>8.12</td>
<td>Cognitive-affective and behavioural processes across Brand Loyalty segments</td>
<td>260</td>
</tr>
<tr>
<td>8.13</td>
<td>Cognitive-affective and behavioural processes across stage of change</td>
<td>261</td>
</tr>
</tbody>
</table>
### LIST OF TABLES

| Table 3.1: | Assessment of VERB campaign against social marketing criteria by the national Social Marketing Centre .......................................................... | 38 |
| Table 3.2: | Constructs from Theory of Planned Behaviour .................................................. | 44 |
| Table 3.3: | Major concepts in social cognitive theory and implications for intervention .......................................................... | 48 |
| Table 3.4: | Brand Loyalty divisions of target markets .......................................................... | 54 |
| Table 3.5: | Eight fundamental purchase and usage motives ................................................. | 55 |
| Table 4.1: | Summary effect measures ................................................................................. | 79 |
| Table 5.1: | Theories used in published sun protection programs 1980-2007, aimed at influencing the sun protection of adolescents and young adults .................................................. | 91 |
| Table 5.2: | Summary of results for first tier of evidence ................................................. | 98 |
| Table 5.3: | Summary of results for second tier of evidence ............................................. | 105 |
| Table 6.1: | SIGN Grading System ......................................................................................... | 127 |
| Table 6.2: | Example of SOR and VAS grading ....................................................................... | 128 |
| Table 6.3: | Process and timeline of Delphi project .............................................................. | 130 |
| Table 6.4: | Percentage agreement for Rounds Four and Five ............................................. | 136 |
| Table 6.5: | Summary of recommendations with traditional SOR and VAS .......................... | 141 |
| Table 7.1: | Brand Loyalty divisions for sun protection behaviour ........................................ | 159 |
| Table 7.2: | Principal components analysis for attitude scales ............................................. | 166 |
| Table 7.3: | Principal components analysis for beliefs about sun protection and tanning ...... | 168 |
| Table 7.4: | Principal components analysis for decisional balance ...................................... | 170 |
| Table 7.5: | Skin type ............................................................................................................ | 175 |
| Table 7.6: | Skin colour ....................................................................................................... | 175 |
| Table 7.7: | Categorisation of sun protective behaviour ...................................................... | 176 |
| Table 7.8: | Brand Loyalty and attitudes to sun protection and tanning ................................ | 182 |
| Table 7.9: | Post hoc tests for Brand Loyalty and attitudes to sun protection and tanning .... | 182 |
| Table 7.10: | Brand Loyalty and beliefs about skin protection and tan attractiveness ........... | 184 |
| Table 7.11: | Post hoc tests for Brand Loyalty and beliefs about sun protection and tan attractiveness ............................................................................. | 184 |
| Table 7.12: | Mean scores of ‘pros’ and ‘cons’ ....................................................................... | 186 |
| Table 7.13: | Post hoc tests for Brand Loyalty and pros and cons of sun protection .............. | 186 |
| Table 7.14: | Brand Loyalty and confidence to sun protect .................................................. | 188 |
| Table 7.15: | Kruskal-Wallis and Mann-Whitney follow-up results for confidence to sun protect ............................................................................. | 188 |
| Table 7.16: | Brand Loyalty and temptations not to protect or to tan .................................... | 189 |
| Table 7.17: | Kruskal-Wallis and Mann-Whitney follow-up results for variables related to temptation not to protect and temptation to tan ........................................... | 189 |
| Table 7.18: | Brand Loyalty and thinking about sun protection ............................................ | 190 |
| Table 7.19: | Kruskal-Wallis and Mann-Whitney follow-up results for thinking about sun protection ............................................................................. | 190 |
| Table 7.20: | Mean and median score for burns this summer and Brand Loyalty groups .......... | 192 |
| Table 7.21: | Kruskal-Wallis and Mann-Whitney tests for sunburn this past summer ................ | 192 |
| Table 7.22: | Number attempting to tan through outdoor and indoor UV exposure ................ | 193 |
| Table 7.23: | Logistic regression analysis of variables predicting Brand Loyalty groupings for FBS and OBS including bivariate p values (full model) .......................................................... | 196 |
| Table 7.24: | Logistic regression analysis of variables predicting Brand Loyalty groupings for FBS and OBS including bivariate p values (final model) .......................................................... | 197 |
| Table 7.25: | Observed and predicted frequencies from logistic regression ............................ | 197 |
| Table 7.26: | Comparison of results from the Australian National Sun Survey ........................ | 200 |
| Table 8.1: | Stages of change for sun protection ................................................................. | 212 |
| Table 8.2: | Associations between stages of change and processes of change ...................... | 215 |
| Table 8.3: | Stage of change for sun protection survey question ......................................... | 221 |
| Table 8.4: | Staging algorithm for sun protection ............................................................... | 221 |
| Table 8.5: | Processes of change reliability and internal consistency .................................... | 224 |
| Table 8.6: | Principal components analysis of processes of change ...................................... | 224 |
| Table 8.7: | Principal components analysis on revised processes of change ........................ | 226 |
| Table 8.8: | Stages of change for sun protection ................................................................. | 228 |
Table 8.9: Stages of change and attitudes to sun protection and tanning

Table 8.10: Post hoc tests for stages of change and attitudes to sun protection and tanning

Table 8.11: Stage of change and beliefs about skin protection and tan attractiveness

Table 8.12: Kruskal-Wallis and Mann-Whitney U-tests for stage of change and beliefs about skin protection and tan attractiveness

Table 8.13: Mean scores of pros and cons for stages of change

Table 8.14: Kruskal-Wallis and Mann-Whitney U-tests for stage of change and pros and cons of sun protection

Table 8.15: Stage of change and confidence to sun protect

Table 8.16: Kruskal-Wallis and Mann-Whitney U-tests for stage of change and confidence to sun protect

Table 8.17: Stage of change and temptations not to protect or to tan

Table 8.18: Kruskal-Wallis and Mann-Whitney U-tests for stage of change and temptation not to protect and temptation to tan

Table 8.19: Stage of change and thinking about sun protection

Table 8.20: Kruskal-Wallis and Mann-Whitney U-tests for stage of change and thinking about sun protection

Table 8.21: Sunburn and stage of change

Table 8.22: Attempts to tan through outdoor and indoor UV exposure

Table 8.23: Stage of change and Brand Loyalty

Table 8.24: Mean scores for processes of change per stage of change

Table 8.25: Mean scores for processes of change per Brand Loyalty segment

Table 8.26: Kruskal-Wallis and Mann-Whitney U-tests for stage of change and processes of change

Table 8.27: ANOVA and Kruskal-Wallis tests with Mann-Whitney U-tests for Brand Loyalty and processes of change

Table 8.28: Logistic regression analysis of variables predicting stage of change including bivariate p values

Table 9.1: Interactive marketing Variables and Relevant Theory and Models, and Principles

LIST OF BOXES

Box 6.1: Examples of observations from systematic review

Box 6.2: Content analysis for recommendations relating to ‘competition’

Box 6.3: Round Three example

Box 6.4: Example of guideline presentation for practitioner use
Chapter One: Introduction

1.1 Skin cancer as a public health issue

Skin cancer has been identified as a major public health problem throughout the world, with between 2 and 3 million non-melanoma skin cancers (NMSC) and 132,000 melanoma skin cancers occurring globally each year (World Health Organization 2001, pg. 29). Incidence appears to be increasing world-wide at approximately 3% to 8% per annum, although rates vary between countries, with Caucasian populations having 50 times the incidence rate of darker skinned people (Diepgen and Mahler 2002).

In countries with predominantly fair skinned populations it is estimated that the incidence of all three types of skin cancer will double in the years 2000 to 2015, due to increases in UVB radiation through ozone depletion in the atmosphere, and as a result of behavioural changes due to more fair-skinned people living and holidaying in warmer climates (Diffey 2004; Grant et al. 2007; Norval et al. 2007; United Nations Environment Programme 2007).

In Australia, which has the highest skin cancer rates in the world, skin cancer dominates cancer incidence, causing over 1,500 deaths per year\(^1\), and costing the health system around AUD$300 million\(^2\) (Australian Institute of Health and Welfare 2005; Australian Institute of Health and Welfare 2007; Australian Institute of Health and Welfare & Cancer Australia 2008).

The recognition of the high social and economic costs of skin cancer has led to increasing numbers of health promotion programs over the past 30 years, most of

---

1 Total person deaths for melanoma in Australia for 2003, 2004 and 2005 were 1146, 1200 and 1273 respectively, total deaths for non-melanoma skin cancers for 2003, 2004, and 2005 were 390, 360, 405 respectively. (AIHW 2007; AIHW and Cancer Australia 2008)

these aimed at the prevention of skin cancer through increasing people's sun protective habits (Marks 2004). These programs have used a variety of strategies, many based on a range of theoretical frameworks or approaches, and have been implemented at individual, group and societal levels (Buller and Borland 1998; Glanz et al. 2004).

While many of these programs have achieved significant improvements in sun protection knowledge and attitudes, mixed results have been seen in regards to achieving behaviour change (Hill and Boutler 1996; Murphy 2002; Wesson and Silverberg 2003). If the public could be persuaded to adequately protect themselves from the sun, the majority of skin cancers could be prevented (Severi and English 2004). There is, therefore, a strong imperative to investigate ways of planning and implementing more effective programs to influence sun protective behaviours.

1.2 Sun protection in youth

Children and adolescents are seen as a particularly vulnerable group in regards to sun exposure. While melanoma at ages under 15 is rare, it has been estimated that up to two thirds of a person’s risk of melanoma is acquired in the first 15 years of life (NSW Health Department and The Cancer Council NSW 2001). However, the sun protection behaviours of older groups are also important with an estimated doubling of risk for melanoma in later years associated with five or more blistering sunburns between 15 to 20 years of age (RR =2.2 (1.2-3.8)) (Weinstock et al. 1989). In Australia, melanoma is the most common cancer in the adolescent and young adult age groups, with 227 Australians, aged 15 to 24 diagnosed with melanoma in 2004 (AIHW 2008).

This epidemiological evidence has led to a large number of primary prevention programs targeted directly at children and adolescents in a number of settings, including day care and pre-schools, primary schools, secondary schools, recreational areas, and community settings; as well as mass media campaigns targeting children and their parents (Saraiya et al. 2004). However, while there is some evidence that children’s sun protection has been positively influenced by primary prevention programs over the last 30 years, there is less evidence on the effectiveness of those
programs aimed at adolescents (Saraiya et al. 2004). Adolescence is generally seen as a time of poor sun protection practices, with improvement beginning in early adulthood (Schofield et al. 2001).

1.3 Social marketing

Social marketing, with its strong background in behavioural and communications theory, is well placed to guide the development of sun protection programs as it is orientated to achieving voluntary behaviour change at a group or community level. Over the past two decades social marketing has been increasingly used to tackle social and public health problems, particularly in areas of smoking cessation, healthy eating, drug use, and physical activity promotion (Peattie et al. 2001; Kotler and Lee 2008). Yet within health promotion circles, social marketing is often only equated with mass communication approaches (Lefebvre 2001). This, and the perceived emphasis on individual behaviour change, has led to an ideological divide between social marketing and its marketing background, and health promotion and its holistic health background. Also, while one of social marketing’s strengths is its reliance on research and evaluation to develop and refine individual campaigns, there is often a neglect of what has gone before in terms of other health promotion approaches. There is thus a need to integrate the advantages of a social marketing approach more wholly within its public health context, and at the same time utilise the accumulated knowledge base that has developed over years of public health initiatives.

1.4 Research Aims

This project aimed to provide an evidence-base for the specific application of social marketing and advertising communications theory to sun protection interventions, and was conducted with the view to informing the development of social marketing programs for the prevention of skin cancer. Due to their poor sun practices, and the lack of evidence on effective strategies, adolescents were chosen as the specific focus of this research. This was later widened to include young adults due to a lack of specific review evidence for adolescents identified in the first stage of the project.
Specific aims were:

(1) To examine the extent to which Australian and overseas sun protection interventions targeting adolescents and young adults utilised social marketing theory and practice;

(2) To identify, via an extensive literature review and consultation with experts in the fields of public health and marketing communications, current best-practice in the development and implementation of social marketing campaigns aimed at sun protection behaviours in the specified demographic; and

(3) To produce evidence-based guidelines for the development of comprehensive social marketing campaigns to promote sun protection for the specified demographic.

1.5 Methodology

The project used a three-staged approach based on a research paradigm of ‘pragmatism’. It was, therefore, orientated to real-world practice with an emphasis on ‘what works’ (Creswell and Plano Clark 2007). Within this, a social marketing and communications theory framework was used to identify variables for investigation and guide analysis.

**Stage One**

Stage one consisted of a systematic review of sun protection interventions targeting adolescents and young adults. Sun protection campaigns were analysed in terms of the use of models or theories guiding planning, processes and evaluation; the use of formative research; the settings and audience for interventions; message factors; channels used for dissemination of information; and campaign length. The results of this analysis were then used as an evidence-base for stage two of the project.

**Stage Two**

Stage two consisted of a Delphi consensus process with experts in the fields of social marketing and sun protection, conducted in order to develop operational guidelines for social marketing projects in sun protection for adolescents and young adults.
Stage Three
The gap in evidence and practice highlighted by the first two stages formed the basis for stage three of the project. This consisted of primary research into the segmentation of young adult audiences for sun protection interventions using the Rossiter-Percy model of advertising theory.

1.6 Outline of the thesis
The thesis is organised into nine chapters which follow the iterative development of the project.

Chapter One provides an introduction to the research area with a description of the aims and an outline of the project.

Chapter Two provides background to the topic of sun protection with a discussion of issues surrounding skin cancer incidence and primary prevention, and a detailed description of adolescent and young adult sun protection behaviours.

Chapter Three discusses a social marketing approach to health promotion which is used as the theoretical basis for this research. Additionally, background information is provided on behavioural theories and models commonly used in public health research and practice, along with information on advertising theory, specifically the Rossiter-Percy Model.

Chapter Four describes the specific social marketing framework used as a basis for this project’s planning and analysis, as well as outlining the process used for systematic review, describing search strategies, inclusion and exclusion criteria, the development of data coding forms and information sheets, and analysis.

Chapter Five presents the results of the systematic review of sun protection interventions targeting adolescents and young adults.

Chapter Six discusses the development and use of evidence-based guidelines in public health, and describes the method and results of stage two of the research
which consisted of a Delphi consensus process conducted with experts in the fields of social marketing and/or sun protection.

**Chapter Seven** presents the background, methods and results of the third stage of the research project which involved primary research into the use of the Rossiter-Percy Model of advertising theory as a segmentation tool for sun protection audiences.

**Chapter Eight** presents further analysis and results from the primary research described in Chapter Seven, comparing the applicability of ‘stages of change’ from the Transtheoretical Model to Brand Loyalty categorisation from the Rossiter-Percy Model as a segmentation tool for young adult sun protection audiences.

**Chapter Nine** discusses the research process and cumulative results of the three research stages, and provides conclusions and implications for practice and research.

**1.7 Conclusion**

In light of the substantial risk to public health that is presented by poor sun protective behaviour, there is a strong imperative to investigate ways of planning and implementing more effective programs to influence these behaviours. As social marketing is orientated to achieving voluntary behaviour change at a group or community level, its conceptual framework is well placed to guide the development of these programs. This doctoral research was conducted to provide evidence of the utility of social marketing theory within sun protection campaigns, highlight effective elements currently used within sun protection programs and elements with potential for use in future campaigns, and establish guidelines based on ‘best practice’ within marketing and sun protection health promotion.

It should be noted that for this project adolescence is defined as the period between 12 to 18 years of age, and young adulthood as 18 to 24 years of age (Peterson 2004; Breinbauer and Maddelano 2005). For systematic review some interventions with older participants were included if the average age of the sample fell within the defined age limits.
The following chapter provides background on skin cancer and its prevention, and the current practices, predictors, barriers and facilitators of sun protection among adolescents and young adults.
Chapter Two: Background

‘There is strong evidence that exposure to solar ultraviolet radiation can have adverse effects on health, notably an increased risk of potentially fatal cancers of the skin. There is equally convincing evidence that limiting outdoor exposure, especially intense, intermittent exposures when solar UV levels are high, can reduce this risk’ (Diffey 2004, pg. 256).

2.1 Skin cancer incidence

Skin cancers or skin neoplasmas include malignant melanoma and non melanoma skin cancers (NMSC), of which the most common types are squamous cell carcinoma (SCC) and basal cell carcinoma (BCC) (Severi and English 2004; Madan et al. 2010). While NMSC are rarely lethal, they often require disfiguring and painful surgical procedures. Melanoma, while accounting for only 1% to 3% of all skin cancers internationally, causes more than 75% of all skin cancer mortality (Harris and Alberts 2004).

2.2 Causes of skin cancer

Exposure to sunlight has been established as the major environmental risk factor for melanoma and NMSC, being linked to 80% to 95% of all skin cancers (Baum and Cohen 1998; Marks 2000; Diepgen and Mahler 2002; Reichrath 2009). However the patterns of exposure giving rise to morbidity differ between skin cancers, with melanoma and BCCs thought to be associated with incidents of sunburn, particularly in childhood, and SCCs associated with chronic sun exposure (Elwood and Jopsen 1997; Elwood and Gallagher 1998; Marks 2000; Madan et al. 2010).

The rising incidence rates of skin cancers throughout the world have thus been attributed to people’s increased exposure to sunlight, and more specifically to ultraviolet radiation (UVR) (Madan et al. 2010). Behavioural and social factors, such as increased leisure time and outdoor activities, increased vacationing in warmer
climates, changes in clothing styles, and the rising social desirability of tanned skin, have been suggested as probable mediating factors; as well as increased longevity and ozone depletion (Garvin and Eyles 2001; Diepgen and Mahler 2002; Reichrath 2009). In order to reduce skin cancer rates, people's exposure to the sun must be reduced (Armstrong and Kricker 2001; Sinclair and Foley 2009).

2.3 Primary prevention strategies

Throughout the world, the primary prevention of skin cancer has sought to alter the sun exposure of people through a variety of means, including: increasing individual’s sun protection practices; affecting social norms in regards to tanned skin; environmental changes aimed at improving shade provision; policy changes for schools such as ‘No Hat, Play in the Shade’; and legislative changes such as reducing sales tax on approved sunscreens and developing acceptable standards for such (Garvin and Eyles 2001; Wesson and Silverberg 2003; Marks 2004; Sinclair and Foley 2009). Other more indirect strategies have been directed at advocacy to reduce the release of ozone depleting substances into the atmosphere (Marks 2004).

While these strategies cover a broad spectrum of policy, environmental, social and behavioural changes, many of them see behaviour change as the ultimate aim, as it is the individual’s choice, or their parents’ in the case of young children, to utilise available shade or use sunscreen or other protective clothing. Therefore many of those strategies not primarily directed at behaviour change are still ultimately aimed at enabling or facilitating behaviour change to occur.

This emphasis on individual behaviour is justified by research showing that behavioural factors strongly predict sunburn, independent of other predictor variables such as ultraviolet radiation (UVR) levels and skin-type (Hill and Boutler 1996). Thus the simple behavioural changes that many programs have as their ultimate aim – minimising exposure to the midday sun and the wearing of protective clothing, hats and/or sunscreen – could dramatically reduce incidence rates of skin cancers (Saraiya et al. 2004; Rigel 2008).
Figure 2.1: Behavioural factors in causation of skin cancer (Hill and Boutler 1996)

Figure 2.1 shows a conceptualization of the role of behavioural factors in the development of skin cancer, and how these behavioural factors are in turn influenced by a variety of factors including: a person’s skin type; predispositions (attitudes and beliefs); the social norms in that person’s peer group or wider society; and factors in their physical environment such as the amount of shade, or their ability to purchase items to reduce UV exposure such as hats or sunscreen.

Any health promotion approach to the primary prevention of skin cancer thus needs to be able to incorporate this understanding of sun protective behaviours within its framework.

2.4 Sun protection behaviours

The behaviours promoted by sun protection initiatives are aimed at reducing the amount of UV exposure an individual’s skin receives. While the specific recommendations differ on some details, they generally include: avoiding the sun in
the middle of the day when UV levels are highest (times vary for different countries or regions); seeking shade; the wearing of hats (broad brimmed), long sleeved shirts and pants; and the wearing of sunscreen of a high SPF (Sun Protection Factor) (Kasparian et al. 2009; Sinclair and Foley 2009). More recent recommendations include the use of protective eyewear and avoiding sunlamps and tanning parlours (SunSmart Victoria 2010; World Health Organisation 2010). However, while recommendations support the use of a combination of sun protection behaviours with an emphasis on the more uniform or ‘complete’ protection that comes from avoidance of high UV exposure, use of shade or clothing, the combination of behaviours that the public actually utilise tends to differ according to age and gender. In general, older age groups are more likely to avoid UV exposure and utilise shade, hats and clothing; adolescent and young adult groups are more likely to use sunscreen as their major form of sun protection; and children (or more specifically their parents) clothing and sunscreen (Hill et al. 2004). Additionally, men are more likely to wear hats than women (Hill et al. 2004). Further discussion on adolescent and young adult sun protection behaviours is presented in Section 2.10.

Sunscreen use, while always included in recommendations, is generally a less preferred option than shade or clothing due to contention on its effectiveness in preventing skin cancer (Osterwalder and Herzog 2010). SPF is a measure of how effective a sunscreen is in protecting against sunburn; however sunscreen’s effectiveness in protecting against carcinogenesis is still not proven (International Agency for Research on Cancer Working Group 2001). Additionally, variations in frequency and efficacy of application, and potential changes in its effective coverage due to the effects of perspiration or immersion in water, and whether the sunscreen is broad spectrum (protects against UVA and UVB radiation), mean its protective value can vary from time to time, individual to individual, or situation to situation (Osterwalder and Herzog 2010). Recommended SPF for sunscreen varies from 15+ to 30+ for different countries, with Australian sun protection organisations recommending the use of a 30+ broad spectrum applied 20 minutes before sun exposure and reapplied every two hours when outdoors (Centres for Disease Control and Prevention 2009; Cancer Society 2010; SunSmart Victoria 2010; World Health Organisation 2010).
Recommendations may also vary from season to season, and region to region within countries due to varying UV radiation levels (Samanek 2006). Within Australia, daily sun protection recommendations are provided by the Australian Radiation Protection and Nuclear Safety Agency (ARPANSA) for major cities, based on estimated UV levels and exposure risks as calculated for fair-skinned people (ARPANSA 2010).

2.5 Socio-ecological considerations

It should be noted that much of preventative health promotion directed at individual risk behaviour has been seen to be largely ineffective in improving health in those groups most at risk (Chu 1994). This is because those groups most at risk of ill-health, from any cause, throughout Australia and the world, tend to be those that are disadvantaged socio-economically (Whitehead 1991). This means their ability to react to a perceived health threat is often constrained by forces they are unable to control. It is important therefore that any health issue is considered in this light, and the interplay of social structure and individual agency be recognised as a strong mediator of the effectiveness of any primary prevention strategies. However, while sun protective behaviours have been shown to be strongly influenced by social norms regarding tanned skin, skin cancer incidence has historically always been higher in those groups of higher socio-economic status (Smith et al. 1996; Severi and English 2004). While this does not negate the necessity of ensuring any skin cancer primary prevention strategies do not disadvantage one group over another, it does lessen the imperative to tackle social disadvantage as a means of reducing skin cancer incidence, and allow an increased emphasis on targeting individual risk behaviour, facilitated by social and structural strategies.

2.6 Primary prevention campaigns for skin cancer

In Australia, skin cancer prevention campaigns began in the late 1950s, after epidemiological analysis highlighted Australia’s unenviable position as a leader in skin cancer incidence (NSW Health Department and The Cancer Council NSW 2001; Marks 2004; McCarthy 2004). While initial efforts were aimed at secondary prevention through the early detection of skin cancers, there was an obvious need for
primary prevention strategies to reduce incidence rates, and ultimately reduce health care costs (Marks 2004). These began in the 1980s with the first recognised, widespread, primary prevention intervention commencing in 1981 with the Victorian Cancer Council’s ‘Slip, Slop, Slap’ campaign (Garvin and Eyles 2001; Montague et al. 2001; Sinclair and Foley 2009).

These campaigns have continued over the following 30 years throughout Australia as the brand of ‘SunSmart’ campaigns which operate under the control of individual state and territory ‘Cancer Councils’ (Sinclair and Foley 2009). This is a multi-faceted approach to sun protection primary prevention, combining mass media campaigns alongside policy and environmental strategies, which has been, and continues to be, targeted at a population-wide level (Hill et al. 1993; Sinclair and Foley 2009)3.

Of the SunSmart and other sun protection campaigns which have been conducted in Australia over this period, a few notable campaigns were adolescent or young adult-specific. These were: ‘Leave your hat on’ which ran from 1991-1992 and was targeted at young men; ‘Me No Fry’ which ran from 1990 to 1995 and targeted adolescents; ‘How to remove a skin cancer’ which ran from 1996 to 1998 with a target of youth 18 to 24 years; ‘Timebomb’ which ran from 2000 to 2001 and targeted young men; and ‘Tattoo’ which ran from 2003 to 2005 targeting 17 to 24 year olds (particularly females) (SunSmart Victoria 2009; Cancer Council NSW 2010). While mostly remembered for strong messages concerning skin cancer risks, these advertising campaigns were also embedded within the continuing SunSmart policy, school education and environmental strategies4. The long term presence of these campaigns over the past 30 years has lead to Australians generally, and adolescents and young adults specifically, having a high awareness of the need for skin cancer prevention (Sinclair and Foley 2009), although this does not necessarily, as shown in Section 2.10, transfer over to optimal sun protective behaviours.

---

4 SunSmart now considers these campaigns as social marketing campaigns, although this was not apparent in earlier descriptions of these campaigns.
Other countries have been slower to begin primary prevention strategies; however the recognition of rising incidence rates throughout the Western world has led to an increasing number of campaigns throughout not just Australia, but New Zealand, the United States, Canada and Europe (Garvin and Eyles 2001; Murphy 2002; Wesson and Silverberg 2003; Marks 2004; Goulart and Wang 2010). It should be noted that during this period there has also been increasing marketing of sunscreens by for-profit organisations (Wolf et al. 2001). However, while these advertising campaigns could be viewed as supplementary to primary prevention efforts, there is a lack of academic literature on the effects of this marketing on sun protection behaviours or skin cancer awareness.

2.7 Campaign effects

While skin cancer is seen as one of the most preventable of cancers (Baum and Cohen 1998; Peattie et al. 2001; Wesson and Silverberg 2003), reviews of sun protection interventions that have been implemented over the last twenty-five years have documented mixed results in those programs in regards to achieving behaviour change (Hill and Boutler 1996; Morris and Elwood 1996; Buller and Borland 1998; Buller and Borland 1999; Murphy 2002; Wesson and Silverberg 2003; Saraiya et al. 2004). Saraiya et al. (2004), in a recent systematic review, found evidence for the effectiveness of sun protection interventions only in education and policy approaches targeted at primary schools and recreational and tourism settings. The review cited insufficient evidence available to determine effectiveness in child-care settings, secondary schools and colleges, and occupational settings.

However Bellamy (2005), also in a systematic review, concluded that a wide range of educational interventions in different settings with a variety of target groups can be effective in promoting sun protection knowledge, attitudes, intended and actual behaviour. Both reviews included randomised and non-randomised controlled, and quasi-experimental designs. In contrast to these findings, Stoebner-Delbarre et al. (2005, pg. 641) in a systematic review of sun protection programs from 1982 to 2002 which included only randomised-controlled designs, reported ‘no methodologically correct trial clearly reported any change in behavior.’
Other narrative reviews of sun protection interventions have supported a view of equivocal effects. Many interventions are seen that have resulted in significant increases in knowledge, fewer have seen positive changes in attitudes and intentions, and fewer still have resulted in actual behaviour change (Buller and Borland 1999; Peattie et al. 2001; Murphy 2002). Morris and Elwood (1996) in an earlier review cite only a few successful interventions occurring in: population-wide strategies (Borland et al. 1990; Hill et al. 1993); school-based (Girgis et al. 1993); and occupational settings (Girgis et al. 1994). However they, and Buller and Borland (1999) in a later review, also cite the lack of experimental study design in many programs as being a major problem in evaluating the effectiveness of many sun protection interventions.

This is still apparent in the Saraiya et al. (2004) systematic review, where the lack of evidence for effectiveness in certain settings may be seen as a function of fewer interventions in some settings, but is also due to the low numbers of interventions with control or comparison groups. This leaves many programs unsuitable for use in quantitative analysis.

While evidence on the effectiveness of sun protection interventions in changing behaviours is unclear, questions can also be raised as to whether sun protection programs are influencing the right behaviours. Most sun protection programs encourage the use of a mix of sun protective behaviours, such as staying out of the sun during the hottest part of the day, wearing broad-brimmed hats, wearing protective clothing, and wearing sunscreen. However sunscreen use is often the behaviour most positively influenced in interventions (Glanz et al. 2004). As the efficacy of sunscreen in preventing melanoma has not been proven, and the use of sunscreen may encourage longer sun exposure, the efficacy of interventions that only improve sunscreen use is debatable (International Agency for Research on Cancer Working Group 2001; Livingston et al. 2003; Osterwalder and Herzog 2010).  

---

5 For this reason, the systematic review in Chapter Four attempts to delineate between outcomes where possible, although this is often impossible when only composite sun protection scores are used as outcome measurements.
2.8 Successful strategies

Despite the inconsistencies and questions regarding the effectiveness of sun protection interventions, the reviews described above have also suggested a variety of elements which appear to increase the effectiveness of sun protection programs. Some of these elements include: the use of multiunit interventions; the use of settings approaches; interventions that target policy; targeting of parents to improve children’s sun protection; specific message styles dependent on the level of involvement or ‘stage of change’ of particular audience segments; and widespread community approaches (Buller and Borland 1998; Buller and Borland 1999; Melia et al. 2000; Wesson and Silverberg 2003).

Also, contrary to the lack of documented behaviour change in many programs, there is preliminary evidence of a slowing of skin cancer incidence rates in younger cohorts, particularly in Australia, where primary prevention programs have also been established for longer (Staples et al. 1998; Armstrong and Kricker 2001; Sinclair and Foley 2009). This suggests that there may have been some long term beneficial effect from programs. Australia is generally seen to have had the most successful population-wide interventions to date, with some countries adapting components from Australian programs for their own populations (Murphy 2002; Wesson and Silverberg 2003; Glanz et al. 2004; Goulart and Wang 2010). As noted previously, these population-wide approaches to sun protection campaigns have, within Australia, lead to a very strong awareness of the need for skin cancer prevention; although this does not, necessarily, transfer into optimal sun protection behaviours, particularly for adolescent and young adult groups (Sinclair and Foley 2009).

There is thus a body of evidence accumulating in regards to some of the successful elements to incorporate into sun protection campaigns. However, more detail is needed on specific strategies for specific audiences, and how best to develop and implement these elements within campaigns.
2.9 Potential adverse effects of sun protection interventions

Some possible adverse effects of sun protective behaviours have been suggested, such as: a lack of sun/UV exposure leading to vitamin D deficiency which has been associated with bone and cardiovascular health effects in people; possible mental health effects such as seasonal affective disorder; and, problems arising from decreased physical activity through avoiding outdoor activities (Ness et al. 1999; Helfand and Krages 2003; Saraiya et al. 2004). There is also increasing evidence that exposure to sunlight may decrease the risk of cancers of the colon, rectum, breast, prostate, and non-Hodgkin’s lymphoma, as well as autoimmune diseases such as multiple sclerosis and type 1 diabetes (Grant 2006; Kricker and Armstrong 2006; van der Rhee et al. 2006; Grant and Mohr 2009). While some of this decreased risk may be mediated through sunlight’s role in vitamin D production, and could thus be facilitated through vitamin D supplementation, it is not clear if this can account for all of these effects (Lucas and Ponsonby 2006). Building evidence in regards to the benefits of vitamin D, has lead some researchers to suggest the moderating of sun protection messages according to the season, and locale (Reichrath 2006; Sinclair 2006; Sliney and Wengrattis 2006), which as noted in Section 2.4 is now the case in Australia through the daily UV index (ARPANSA 2010).

It has also been argued that primary prevention campaigns, by raising awareness of skin cancer, may inadvertently promote increased excisions of benign lesions, thereby increasing the ‘cost’ of the campaign in terms of added pressure on health resources (Del Mar et al. 1997). Other authors have suggested that unless carefully planned and targeted, health communication campaigns generally could exacerbate health disparities if health information is more easily accessible to those with greater resources (Tichenor et al. 1970; Viswanath reported by Kim 2002)\textsuperscript{6}.

While it is beyond the scope of this review to discuss fully the arguments surrounding these potential adverse effects, it is well established that excessive UVR exposure increases the risk of skin cancers and eye disease in many countries of the world (Gallagher and Lee 2006; Lucas et al. 2006). There is still, therefore, a

\textsuperscript{6} Report on a speech by Dr K. Viswanath given at a symposium on health communication to promote healthy lifestyles for the prevention of skin cancer.
pressing need for effective sun protection programs to encourage a minimisation of UVR exposure. However, the evidence of potential adverse effects of stringent sun protection indicates the need for sun protection programs to be based on current best evidence, and always be reviewed for possible negative effects.

2.10 Adolescents and young adults’ sun protective behaviours

As noted in Chapter One, adolescence is generally seen as a time of poor sun protection practices, with improvement beginning in early adulthood (Schofield et al. 2001).

Adolescence can be seen as a transitional process through which children develop into adults; it is characterised by a number of physical, biological, psychological, and social changes (Peterson 2004). Cole et al. (2005) describe it as a time of four major changes in social life: more time is spent with peers; adult guidance is reduced and becomes more indirect; cross-sex interactions increase markedly; and participation in large social groups becomes more important. These changes, and the increased risk behaviours that also characterise adolescence, have significant repercussions for health promotion programs aimed at this group (Jackson and Derbyshire 2006). Within sun protection research, authors have noted the growing importance of social norms, appearance concern and peer relationships (Arthey and Clarke 1995). Yet parents continue to exert an influence on behaviour during this time, albeit less than in childhood (Cole et al. 2005).

Young adulthood sees a stabilization of physical and biological changes, however emotional and social changes continue as youth achieve greater autonomy emotionally, economically and legally (Breinbauer and Maddelano 2005). This continues to be a time of risk behaviour in regards to alcohol, drugs, sexual practices and road safety (Galambos and Tilton-Weaver 1998; Palmer et al. 2009), and while sun protection behaviours improve on adolescent figures, they continue to be poorer in comparison to older groups (Schofield et al. 2001).
2.10.1 Overall sun protective behaviours

Dobbinson and Hill (2004), in their review of studies on sun protection behaviours, reported that while the studies reviewed on adolescent behaviours were not directly comparable to population data on adults, the available data suggested that adolescents generally engage in sun protective strategies less than adults. There is evidence that the decline from the higher levels of protection in childhood begins in pre-adolescence, troughs around 15 to 17 years of age, and then improves as adolescents move into young adulthood (Dixon et al. 1999; Coogan et al. 2001; Schofield et al. 2001; Sjoberg et al. 2004).

In reviewing the most recent Australian data, the Australian National Sun Survey (2006/07) of 652 young people aged 12 to 17 years reported that 82% of adolescents spent longer than 15 minutes outdoors during peak UV times (10am to 2pm or 11am to 3pm daylight saving time) on the previous summer weekend (Dobbinson et al. 2008). Of these adolescents, 33% wore some form of headwear, 9% wore a top with sleeves at least to the elbow, 37% used some form of sunscreen, and 20% primarily used shade. In the 18 to 24 age group (sample size 759), 71% spent longer than 15 minutes outdoors during peak UV times, with 74% wearing some form of headwear, 19% wearing three-quarter or long sleeved tops, 37% using sunscreen, and 27% using shade (Dobbinson et al. 2008).

There is some evidence that sun protective behaviours in Australian adolescents are worsening. Livingston et al. (2003) described trends in sun protection behaviours from 1993 to 1999 in Australian adolescents, and noted a significant increase from 18% to 23% (p< 0.01) in the percentage of students who did not routinely practice any of the three protective behaviours of wearing a hat, using sunscreen, and wearing clothes covering the body. An additional survey in 2002 by the same authors, confirmed these trends, with the levels of routine sun protective behaviour (usually or always wearing a hat, covering clothes and sunscreen) the lowest reported over that period (9% males, 6% females) (Livingston et al. 2007). This is also supported by a state-wide South Australian survey of 3000 adolescents in 2002, which reported

---

7 No figures were presented on the percentage of adolescents or young adults not using any of these sun protective behaviours.
significant decreases in the regular use of maximum protection sunscreen, regular hat wearing, and regular shade use by 12 to 14 year olds between 1990 to 2002 (Beckmann and Conor 2004).

International results report similar patterns of behaviour. A 1997 New Zealand survey of 203 12 to 17 year olds found 86% reported spending more than 15 minutes outdoors over the previous weekend, of which 28% wore hats and 39% wore sunscreen (Richards et al. 2001). A 1996 Canadian national survey of 574 15 to 24 year olds found 38% ‘always’ or ‘often’ wore hats, 35% ‘always’ or ‘often’ wore sunscreen, and 31% ‘always’ or ‘often’ used covering clothing (Lovato et al. 1998). A US national survey from 1999 found that only one-third of adolescents reported routine use of sunscreen (Geller et al. 2002), however this may have improved in later years with national surveys of 11 to 18 year olds in 1998 (n=1196) and 2004 (n=1613) showing an improvement in respondents reporting they often or always apply sunscreen when going outdoors from 31.4% to 39.4% (Cokkinides et al. 2006). Kristjansson et al. (2004) in a 1999 survey of 3599 Stockholm county adolescents, reported approximately 38% not using any sun protection.

2.10.2 Tanning behaviours

The desire for a tan appears to be a strong influence on poor or inadequate sun protection practices, particularly within adolescent and young adult groups. The Australian National Sun Survey (2006/07) found 39.5% of the adolescent survey population indicated that they preferred a moderate to very dark tan, and 22% had attempted to get a tan in the current season; in addition 23% of young adults reported a preference for moderate to very dark tans, and 11% had attempted to get a tan in the current season (Dobbinson et al. 2008).

Swedish data from 1903 adolescents and 1273 adults in Stockholm county also reported high levels of tanning, with the most frequent outdoor tanners being girls aged 17 to 19 (50% reported frequent tanning) (Boldeman et al. 2001). Self-reported sunburn as a result of outdoor tanning was reported by one-third of the total study population, and almost half of the female adolescents. This relationship between tanning and sunburn was also seen in US data, where youths with a high reported
desire for a tan were twice as likely to have experienced one to four sunburns as those with a low desire for a tan (Davis et al. 2002).

Indoor tanning is also becoming increasingly popular among adolescents and young adults. US national survey data on adolescents reported 10% of respondents using indoor tanning facilities during the previous year (Geller et al. 2002). The Stockholm county data found 37% of females and 19% males reporting current sunbed use, with the majority of users being 17 to 29 year olds (Boldeman et al. 2001). Australian figures on indoor tanning are comparatively low but still show 2% of 12 to 14 year olds, 3% of 15 to 17 year olds, and 10% of 18 to 24 year olds reporting that they have ever used a solarium (Dobbinson et al. 2008). Indoor tanning is also associated with sunburn, with Boldeman et al. (2001) reporting one-fifth of indoor tanners received burns after sunbed use.

2.10.3 Incidence of sunburn
Livingstone et al. (2003), in an investigation of national Australian survey data from 78,032 students aged between 12 and 17 years, reported that from 1993 to 1999 there was a significant increase in the number of students who reported sunburn at least once during the previous summer; rising from 68% in 1993 to 80% in 1999 (p<0.01). A South Australian sample of secondary school students in 2002 also showed similar levels with 78% reporting at least one sunburn during the previous summer, and 10% reporting being burnt on four or more occasions (Beckmann and Conor 2004). This report also noted significant differences between sunburn incidences based on gender, with females having higher rates than males; and age, with 15 to 17 year olds having higher rates than 12 to 14 year olds. The Australian National Sun Survey data, where adolescents reported on sunburn on the previous weekend, found 24% sunburnt and 4% ‘red, tender and blistered’(Dobbinson et al. 2008). Of those sunburnt many had tried to protect the area that was sunburnt but the ‘sunscreen wore off’ (15%) or they ‘stayed in the sun too long’ (26%), whereas 29% had forgotten to sun protect and 10% ‘couldn’t be bothered’(Dobbinson et al. 2008, pg. 10). The same survey of young adults found 19% reported being burnt the previous weekend.
International data on sunburn also shows high rates among adolescents and young adults. US national surveys in 1998 and 1999 found 72% and 83% respectively, of adolescents reported at least one sunburn the previous summer (Davis et al. 2002; Geller et al. 2002)\(^8\), although this had reduced slightly by the 2004 survey to 69% (Cokkinides et al. 2006). New Zealand surveys found 31% of 12 to 17 years olds reported sunburn the previous weekend (Richards et al. 2001). Swedish surveys found 39% of 13 to 29 year olds burnt in the previous summer whilst sunbathing (Boldeman et al. 2001). Davis et al. (2002) also reported 39% of a sample of US youths 11 to 18 had applied sunscreen before receiving their most serious sunburn. Of 2692 secondary school students surveyed in England in 1999, 21% reported their skin being red and sore before the summer holidays, and over half of these said their sunburn peeled (Horsley et al. 2002). The majority of this sunburn happened while at school lunch break or school sports day.

2.10.4 Gender effects
Unlike children, adolescent and young adult’s patterns of sun protection differ greatly with gender, with females tending to have higher rates of sunscreen use and males tending to have higher rates of hat wearing (Richards et al. 2001; Geller et al. 2002; Livingston et al. 2003; Beckmann and Conor 2004; Dobbinson and Hill 2004). While females generally appear to have higher awareness or knowledge regarding skin cancer, and often higher rates of overall sun protection, over a number of studies they have shown a greater tendency to deliberately tan indoors and outdoors (Boldeman et al. 2001; Coogan et al. 2001; Richards et al. 2001; Geller et al. 2002; Lazovich et al. 2004). Murray (2001) in a survey of 100 adolescents 11 to 14 years and their parents, found females more likely to be outside specifically to tan, more likely to believe friends notice when they have a tan, and more likely to believe that most of their friends get a tan. Livingston et al. (2003) also noted a higher tendency for females to deliberately wear less clothing in order to expose their skin to the sun.

In contrast to this, Schofield et al. (2001) found young adult males to have higher tan levels. As other studies have reported higher levels of UV exposure among males,

---

\(^8\) The 1998 report was based on surveys of 11 to 18 year olds, the 1999 report was based on surveys of 12 to 18 year olds.
this inconsistency suggests that males allow more incidental tanning whilst doing other activities (Davis et al. 2002; Centre for Behavioural Research in Cancer 2005a; Centre for Behavioural Research in Cancer 2005b). This is also supported by focus group research with NSW adolescents where males and females reported that deliberate tanning by males was seen as ‘unmasculine’ and vain, and it was preferable for males to tan whilst surfing or exercising (Lupton and Gaffney 1996).

While the most recent Australian national survey data showed higher rates of weekend sunburn by males, other studies⁹ have reported higher rates of sunburn in females (Geller et al. 2002; Livingston et al. 2003; Beckmann and Conor 2004; Dobbinson et al. 2008).

2.10.5 Comparison of sun protective measures

Many of the figures quoted above can often not be directly compared due to differences in the types of questions asked, as well as the timing of surveys. Sun protection requirements differ on a seasonal basis, and reporting of some behaviours can be greatly affected by environmental characteristics of the period, especially when looking at incidents of sunburn which are highly related to UV levels and temperature (Dobbinson 2004a). The data above does, however, show adolescent and young adult’s sun protection as generally poor, with high levels of sunburn and attitudes conducive to tanning.

2.11 Barriers and facilitators to sun protection

A number of barriers to sun protection have been articulated by adolescents and young adults through quantitative and qualitative research. They include:

- Forgetfulness.
- Laziness.
- Unpreparedness.
- Inconvenience.
- Indifference.

⁹ US National survey data, Australian secondary school data, South Australian state survey
• Lack of attention.
• Lack of prompting by authority figures
• Dislike of sunscreen
• Sun protection uncomfortable
• ‘Uncool’ image
• Unfashionable to wear hats/sun protective clothing
• Desire for a tan for appearance
• Desire for a tan for health
• Desire for a tan for accomplishment
• Tan as part of identity
• Acceptance by peers


It can be noted that while many of these barriers could be related to a lack of self-efficacy, or a perceived lack of susceptibility to, or severity of, skin cancer by youth; the latter half relate to the social norms surrounding sun protection and the perceived benefits of tanned skin. Qualitative research in this area shows sun protection to be strongly driven by social norms on appearance, and the need to ‘fit in’ and be accepted by peers.

While a number of barriers have been articulated by adolescents and young adults, fewer facilitators or positive influences on sun protective behaviours have been noted.

They include:

• The need to prevent the embarrassment of sunburn
• The need to prevent aging such as wrinkles and sun damage
• Health knowledge regarding skin cancer
• Parental insistence/prompting
• Positive role modelling – particularly parental, but also celebrity.
• The influence of girlfriends (for young adult males)
• Sun protection policies by sporting organisations (Lupton and Gaffney 1996; Abroms et al. 2003; Cancer Research UK 2003; Mikati 2005; Calder and Aitken 2008; Paul et al. 2008; White et al. 2008).

Again the influence of social norms in regards to facilitation of sun protection is apparent. It should also be noted that while knowledge of skin cancer is articulated by some youth as a reason for their sun protective behaviours, knowledge has been found to be a weak predictor of behaviour in other research (discussed in Section 2.12.2).

The barriers and facilitators listed above are also seen to differ according to gender. Abroms et al. (2003), in qualitative research with young adults regarding sunscreen use, noted that males tended to describe more barriers to sunscreen use, whereas females reported greater concerns with aging effects of the sun, and stronger parental influences.

2.12 Predictors of sun protective behaviour

A number of factors have been shown to be predictive of sun protective behaviours in adolescents and young adults, and these are discussed below.

2.12.1 Demographic factors

Age and gender, as discussed previously, are associated with different levels and patterns of sun protective behaviour. However, other demographic factors, such as skin type, also show a relationship, with youth with fair or sensitive skin tending to have higher sun protective and less tanning behaviours, but higher sunburn rates (Lowe et al. 2000; Schofield et al. 2001; Davis et al. 2002; Geller et al. 2002; Cokkinides et al. 2004).
2.12.2 Knowledge and attitudes

While higher knowledge has been seen to be associated with sun protective behaviour on occasion, most studies report knowledge as a weak predictor of sun safe practices, and have noted a poor correlation between increased knowledge on the dangers of sun exposure and intentions to sun protect (Arthey and Clarke 1995; Adams 1996; Lower et al. 1998; Payne 2004; Lazovich and Foster 2005; Swindler et al. 2007; Dadlani and Orlow 2008; Asvat et al. 2010).

Unlike knowledge, attitudes to tanning appear to be strongly predictive of sun protective practices with perceived desirability of a tan shown to predict poor sun protective behaviours in a number of studies (Wichstrom 1994; Davis et al. 2002; Geller et al. 2002; Lazovich and Foster 2005; Gordon and Guenther 2009). Additionally, Geller et al. (2002) found the attitude that ‘it was worth burning to get a tan’ was associated with sporadic sunscreen use, more frequent sunburns, and increased use of tanning beds. LaBat et al. (2005) followed up a cohort of fifth and sixth grade children, four years after an educational intervention, to ascertain changes in attitudes and behaviours relating to sun protection over the four year period. They found that while the students’ knowledge that the sun can cause skin cancer had increased over the period, sun protective behaviours had decreased markedly associated with an increase in positive attitudes to tans.

The strong influence of attitudes to tanning is also supported by Pagoto et al. (2004) in a study of adult beach goers (average age 27 years), which created risk profiles based on skin type, risk perception, and tan importance. They found that people with moderate to high levels of actual and perceived risk were largely in pre-action stages for sun protection if they placed a high value on having a tan. The authors suggest that the desire for a tan may be sufficient to move motivational stages from Action to Contemplation stages even in the presence of factors that are typically associated with protective behaviours. While the age range of participants in this study was older than the demographic in this review, the high levels of tanning in

---

10 These stages are from the Transtheoretical Model where an individual’s sun protection behaviour is categorised into Precontemplation, Contemplation, Preparation, Action or Maintenance dependent on their current or intended sun protection behaviour. The first three stages are pre-action stages.
adolescence and young adulthood suggest that this evidence is likely to be relevant for younger age groups.

Tanning behaviours may be mediated by other attitudes to health or appearance. Turrisi et al. (1998) examined the relationship between attitude to sunbathing and cognitive variables theoretically related to attitude through a confirmatory factor analysis with US undergraduates. They found five factors – appearance orientation; health orientation; outdoor orientation; social-normative orientation; and perceived consensus – accounted for 30% of the variance in the attitude toward sunbathing. As the participants’ orientations towards appearance, the outdoors, social norms and perceived consensus increased, attitudes towards sunbathing became more positive, while an increased health orientation decreased positive attitudes to sunbathing.

Additionally, Sjoberg et al. (2004), in a survey of 2615 Swedish teenagers, reported that the increase in tanning that was seen with increased age among those surveyed appeared to occur without a corresponding increase in positive attitudes to tanning or a change in perceptions of the benefits of tanning. They suggest that the increase in tanning occurs more from an increased sensitivity to cosmetic concerns with increasing age, with girls more responsive than males, (i.e. while tanning attitudes may stay the same, increased concern with appearance causes adolescents or young adults to act on those attitudes and consciously seek a tan). Cosmetic motives or ‘appearance concern’ may thus directly influence tanning behaviours as well as indirectly through tanning attitudes. Wichstrom (1994), in a study of Norwegian high school students, also found sunbathing predicted by ‘valuing physical appearance’ and ‘favourable physical self-concepts’.

2.12.3 Unrealistic optimism

Unrealistic optimism, where people estimate their own risk from certain behaviours as less than that of others, has also been examined as a reason for the lower sun-protective behaviours of adolescents compared to other age groups. Sjoberg et al. (2004), in the survey previously noted, reported personal risks for tanning to be perceived as smaller than risks to others, in Swedish youths 13, 15 and 17 years old. The authors state that this suggests some degree of unrealistic optimism in youth’s
judgements of their personal sun-related risk. This is also supported by Wichstrom (1994) finding that ‘playing down the risk for skin cancer’ was a predictor of sunbathing; and qualitative research with 18 to 22 year old New Zealand youths that present quotes of ‘but it seems like its not going to happen’ and ‘but it is not going to stop me from doing it, because until it happens to me, which here’s hoping it doesn’t’ (Calder and Aitken 2008, pg. 584).

2.12.4 Social influences

As previously discussed, social influence factors have been found to be important contributors to the decision-making process that occur among adolescents and young adults when performing sun protective behaviours. Numerous studies have shown an association between sun protection behaviours and: having friends that tan; perceptions of the attitudes of friends; and/or concerns regarding one’s image to peers (Lowe et al. 1993; Wichstrom 1994; Geller et al. 2002; Lazovich and Foster 2005). Lazovich and Foster (2005), in the review of adolescent indoor tanning previously noted, suggest that social influences may be more important predictors of indoor tanning use among adolescents than individual psychosocial characteristics and attitudes.

Robinson (2004) suggests that sun protective behaviours occur in situational contexts that are influenced by both social and personal normative factors, with group norms\textsuperscript{11} being significant predictors of sun protective behaviour among Caucasian women aged 17 to 35 years who visited Queensland beaches. This is supported in research by Tsang (1999) which also found normative beliefs\textsuperscript{12} to be strongly predictive of behaviours and intentions to wear wide-brimmed hats and long sleeved shirts among 101 Canadian students aged 13 to 19 years of age. The latter author suggests that normative beliefs, especially regarding peers, play an important role in these behaviours, and may be a better measure than subjective norm\textsuperscript{13} for capturing normative influences.

\textsuperscript{11} A function of beliefs about whether specific salient reference groups approve or disapprove of the behaviour
\textsuperscript{12} Belief about whether each referent approves or disapproves of the behaviour
\textsuperscript{13} A function of beliefs about whether referents approve or disapprove of the behaviour and a persons motivation to comply with these referents
2.12.5 Parental influences

While parental factors continue to be associated with sun protective behaviours from childhood to adolescence, and even into young adulthood, this influence appears to lessen with increasing age. Cokkinides et al. (2004) examined the correlation between sun safe practices in youth 11 to 18 and those of their parents, and found three parental factors to be independently associated with children’s frequent sunscreen use: parental insistence that their child uses sunscreen; parental self-efficacy for their child’s sunscreen use; and parental frequency of (their own) sunscreen use. This is supported by Lazovich and Foster (2005) who reviewed a number of studies on indoor tanning, and found indoor tanning to be significantly associated with youths (11 to 19) having parents who ‘allow’ it, or parents who they perceive to be unconcerned about indoor tanning; and Olson et al (2003) who, in a survey of 750 sixth to eighth graders in New Hampshire, found ‘more complete’ sun protection was related to having parents who advocated it.

While no literature was found that reported on parental factors as a predictor of young adults’ sun protection, qualitative research has suggested that parents continue to affect sun protection behaviours into young adulthood (Abroms et al. 2003; White et al. 2008).

2.12.6 Risk personalities

A number of studies have examined the association between poor sun protection behaviours and other risk behaviours. Keesling and Friedman (1987), in an early study on Californian sunbathers, found sunbathing to be associated with risk-taking attitudes and a lack of harm avoidance. This has been supported by other research including: Wichstrom (1994) who studied Norwegian high school students and found smoking was associated with high-risk sunbathing; Lazovich and Foster (2005) who reviewed indoor tanning studies and found relationships to tobacco and other substance use; Ames (2002) who found a greater likelihood to sunbathe among college students who scored higher on a sensation-seeking scale; and Coogan et al. (2001) who found that high school students who did not use sun protection were
more likely than those who did to report other risk behaviours such as smoking, rarely using a seatbelt or bicycle helmet, alcohol and marijuana use. This has led other researchers to examine tanning (and indoor tanning) as a type of dependency behaviour similar to other alcohol, drug or tobacco addiction (Zeller et al. 2006; Mosher and Danoff-Burg 2010).

2.12.7 Socio-ecological factors

While little information is available on the influence of socio-ecological factors on adolescents’ and young adults’ sun protection behaviours, Lower et al. (1998) reported a number of factors as having a significant association with the protection status of a sample of 3642 adolescents (p<0.05): a lower number of new melanoma cases for those aged 45 years in the student’s postcode area; English being spoken at home; schools providing enough shade in the playground for students who want to be in the shade; and schools providing enough information about the harmful effects of the sun. The first two factors, particularly, suggest there may be cultural or community factors which are influencing sun protective behaviours in adolescents, whereas the latter factors point to the importance of structural and policy elements in providing an environment that facilitates sun protective behaviours.

2.13 Conclusion

Skin cancer is a major public health issue within Australia, and adolescents and young adults are seen as a particularly ‘at risk’ group due to their poor sun protection behaviours. Age, gender, skin type, attitudes to tanning, appearance and risk, social and parental influences, and socio-ecological factors have all been identified as influencing sun protection behaviours in this demographic, yet evidence on the best approach for sun protection interventions for this audience is still lacking. The following chapter outlines a social marketing approach to health promotion, incorporating background information on behaviour change and advertising and communication theory. Social marketing is used as the methodological framework for this project.
Chapter Three: Theoretical background

3.1 Introduction

This research was conducted to provide an evidence-base for the specific application of social marketing and advertising communications theory to sun protection interventions. It has, therefore, used a social marketing framework to guide analysis in stages one and two, and incorporated advertising theory as a basis for stage three of the research project. The following chapter provides essential background information for the three research stages. It firstly describes the essentials of a social marketing approach and its use in public health, as an aid for understanding the framework used in Chapters Five and Six. It then provides a brief discussion of common health behaviour theories and models in order to allow clearer understanding in the discussion of behavioural theory within the systematic review of sun protection interventions, and in the final discussion chapter. Lastly, it presents an outline of communication theory, with a description of the Rossiter-Percy model as it is used in advertising. The theoretical extension of this model to sun protection is the basis for Chapter Seven and Eight of this thesis.

3.2 A social marketing approach

Social marketing is a concept that has developed from commercial marketing, with an underlying difference of being driven by a non-profit motivation that seeks to change customer\(^{14}\) behaviour for the social or individual ‘good’, rather than company profits (Kotler and Roberto 1989). It has been defined as a ‘program planning process that applies commercial marketing concepts and techniques to promote voluntary behaviour change’ (Grier and Bryant 2005, pg. 1). Coming from commercial marketing it shares many identifying features with it including:

\(^{14}\) There is continued debate on the most appropriate term to identify the ‘target’ of social marketing programs – this chapter has used ‘customer’ as it was most commonly used in the social marketing literature reviewed.
• **A focus on customer behaviour as the ultimate aim.**
  While interim factors such as knowledge or attitude change may be used as initial goals within campaigns, social marketing is a process geared towards behaviour change at a group or community level (Andreason 1995).

• **The concept of exchange.**
  Exchange can be seen as the act of obtaining a desired item from someone by offering something in return (Kotler et al. 2003). Exchange theory thus recognises that behaviour change will only occur if the customer perceives the benefits of change to equal or exceed the costs of change (Kotler et al. 2002). Some debate the usefulness of this concept for social marketing, saying the exchange of money for products found in commercial marketing is vastly different to the behaviour change for health found in social marketing (Elliot 1995 cited in Donovan and Henley 2003; Peattie and Peattie 2003). However, Grier and Bryant (2005) state that the use of this concept reminds social marketers that they must offer benefits the customer really values, understand the costs associated with changing behaviours (such as time, inconvenience, stress, money) and recognise that all involved in the exchange must receive valued benefits in return for their efforts.

• **A customer orientation, where the customer is central to all decisions.**
  This feature highlights the necessity for social marketers to understand their target audiences’ wants, values and perceptions, in order to make informed decisions throughout the development, implementation and evaluation of campaigns (Kotler and Roberto 1989; Andreason 1995).

• **The use of the ‘marketing mix’ or 4 Ps of product, price, place and promotion to develop and implement campaigns.**
  Product refers to the set of benefits associated with the desired behaviours (core product) and the desired behaviours themselves (actual product) (Kotler et al. 2002). For sun protection campaigns, sun protective behaviours are the actual product, while the benefits that will accrue from performing those behaviours, such decreased skin cancers or delayed skin aging, are the core product.
Price is the customers’ perceived costs or sacrifice exchanged for the promised benefits (Grier and Bryant 2005). In the context of sun protection, it refers to the cost that the target market associates with adopting sun protective behaviours, such as the expense of sun protection clothes, sun shelters or sunscreen; the time and inconvenience involved in using sunscreen; the inconvenience of staying out of the sun during certain times of the day; or the perceived decrease in social desirability from not having a tan.

Place is where and when the target audience will perform the behaviours, receive any tangible products or associated services, and the channels used to disseminate the message (Kotler et al. 2002). Tangible products may include products such as sunscreen, hats or other sun protection items.

Promotion is the communications designed around the product, price and place strategies, and includes any communication efforts directed at informing, reminding or persuading the target audience (Kotler et al. 2002).

- **Extensive use of research to develop, monitor and revise campaigns.**
  To develop ‘actionable insight’ on the market’s needs, perceptions and behaviours, customer research is essential (National Social Marketing Centre 2010). Formative research gains customers’ perceptions of the products, benefits and costs of behaviours, as well as providing information on the physical and social environments in which people perform these behaviours (Grier and Bryant 2005). Research is also necessary for continuous monitoring, revision and evaluation of interventions in order to achieve maximum effectiveness (Grier and Bryant 2005).

- **The use of market segmentation.**
  The focus on customer orientation leads to another essential element of social marketing – the division of the market into distinct segments (segmentation). Donovan and Henley (2003, pg. 211) state that this feature of social marketing acknowledges that: ‘differences in sub-groups exist, the differences occur on a
variety of dimensions, (and) different strategies and approaches are necessary to reach, communicate with, or motivate different sub-groups’. This segmentation can occur through demographic, geographic, psychographic or behavioural division, singly or in combination, in order to create smaller, more well defined groups that should respond similarly to program strategies (Kotler et al. 2002).

- **The emphasis on competition, or the principle of differential advantage.**
  Social marketers need to identify the competing influences which affect an individual’s ability or desire to engage in a particular behaviour. They also need to monitor and understand competitive activity, and determine whether to emulate and follow, or to pre-empt or counter, competitor's activities (Donovan and Henley 2003). Within sun protection campaigns, competitors may be seen as, for example, fashion magazines promoting a tanned skin or the influence of tanning salons (George et al. 1996).

- **The use of theory**
  Social marketers make use of a variety of theories and models within the social marketing framework. The use of these models affect judgments on the selection of target audiences, questions posed during formative research, selection and implementation of strategies, and selection and measurement of outcomes (Lefebvre 2001).

While all these features are not solely distinctive to social marketing as opposed to other related public health planning processes, it is the emphasis marketers place on the integration of these elements in marketing’s conceptual framework that distinguishes social marketing from these other planning processes (Grier and Bryant 2005). These elements are considered as ‘benchmarks’ for social marketing and it is, therefore, the overt presence of all elements in combination, that leads to a program, initiative or intervention being described as ‘social marketing’ (National Social Marketing Centre 2010).
3.3 The use of social marketing in public health

While social marketing has not been extensively used within skin cancer primary prevention\textsuperscript{15}, it has seen widespread use in public health areas of smoking cessation, healthy eating, drug use and physical activity promotion (Peattie et al. 2001; Kotler and Lee 2008). In the main these interventions are characterised by the use of communication campaigns targeted to large audiences. This has led many people to see social marketing as predominantly concerned with promotional and advertising strategies (Grier and Bryant 2005). However the communication campaign is only one component of the marketing mix.

The difference can be seen in the ‘VERB™ It’s what you do’ campaign, launched in 2002 by the Centers for Disease Control and Prevention (CDC) in the United States, and conducted through four phases over four years (National Social Marketing Centre 2010). This social marketing campaign is aimed at maintaining or increasing physical activity in children nine to 13 years of age (Wong et al. 2004). While having a strong communications and promotions strategy which utilised paid television and print media, sponsorship and celebrity and community promotions, the campaign also utilised partnerships within the community to provide increased opportunities for physical activity and influence environmental changes that support participation in physical activity (Wong et al. 2004).

When assessed against benchmark criteria by the National Social Marketing Centre in the UK, shown in Table 3.1, it can be seen how social marketing elements have been utilised within the VERB™ campaign. It is this use of multiple strategies (methods mix) to target barriers and facilitators to behaviour change identified through formative research and competitive analysis, with a focus on the cost and benefits (exchange) for specific audiences, that demonstrates the use of a social marketing process, as opposed to a communication campaign. This analysis also shows how, in order to assist the understanding of certain behaviours, social

\textsuperscript{15} Few sun protection campaigns reported in the academic literature prior to 2007 were described as, or reported the use of ‘social marketing’, however many early population-wide campaigns are being self-described now as ‘social marketing’ campaigns. Without analysis of the development and process of these campaigns it cannot be ascertained whether these campaigns meet benchmark criteria for social marketing. This is discussed further in Section 5.5.2.
marketers may also utilise behavioural models. Commonly used behavioural theories/models are described in Sections 3.5 to 3.6.

**Table 3.1:** Assessment of VERB campaign against social marketing criteria by the National Social Marketing Centre (National Social Marketing Centre 2010)

<table>
<thead>
<tr>
<th>Criteria</th>
<th>Description</th>
</tr>
</thead>
</table>
| Customer orientation    | • Review of research literature to understand the target audience and other campaigns reaching them  
• Audience research with tweens, parents, and influencers  
• Review of commercial marketers selling products to the target audience |
| Insight                 | • Pressure to perform, excel and achieve  
• Change creates tension  
• Self-esteem and self-confidence are vital  
• Children think short-term  
• Setting and achieving goals helps tweens maintain a healthy lifestyle  
• Tweens more independent and self-defining  
• Tweens looking to improve themselves  
• Tweens associate the word ‘activity’ with organised sports  
• Staying active and involved helps tweens make good choices  
• Family and friends are important influencers  
• Positive role models encourage tweens to be their best |
| Behavioural goals       | • To increase and maintain physical activity among tweens (youth aged 9-13)                                                                                                                                 |
| Segmentation            | • **Primary audience:** tweens (youth aged 9-13)  
• **Secondary audience:** parents and adult influencers, including teachers, youth leaders and health professionals |
| Exchange                | • **Benefits:** children explore their goals and develop their skills; VERB is tweens own brand – not imposed by adults  
• Positioned physical activity as easy to do, readily accessible, and inexpensive  
• Identified and addressed barriers to exercise (e.g. dislike of competition associated with team sports |
### Competition
- Complex, crowded media environment - VERB
  - harnesses commercial marketing techniques
- Competing lifestyle choices

### Methods mix
- Four-phase advertising campaign
- Added-value opportunities via media partners
- Contests and sweepstakes (e.g., pedometer-based middle-school competition)
- Public relations agenda
- Web site, including blog and ‘VERB recorder’ where tweens record physical activity and become eligible to win prizes
- Custom developed materials for schools
- Turn Key Kits
- Activity promotions within communities, including toolkits and small grants
- Community-based event sponsorship
- Verb yellowball

### Theory
- **Theory of Planned Behaviour**: Behaviour determined by intention to perform and attitudes towards a behaviour; influenced by social norms and perceived behavioural control
- **Social Cognitive Theory**: Emphasises the interplay of interpersonal factors, environment, and behaviour
- McQuire’s **hierachical steps of information processing**: Impact of persuasive communication is mediated by attention, comprehension, and
- **Branding theory**

It should be noted that many past public health campaigns, including those aimed at improving sun protection, have encompassed many of the elements of social marketing programs and are, retrospectively being described as ‘social marketing’ campaigns. In Australia, the long running ‘Quit’ campaign for smoking cessation (established in 1985) and SunSmart sun protection (established in 1987) campaigns have built strong ‘brand’ recognition and have included multiple methods or strategies including advertising, school education programs, environmental strategies and policy advocacy (Sinclair and Foley 2009; Quit Victoria 2010). These campaigns could be viewed as precursors of social marketing in Australia, and SunSmart in more recent academic literature is now being described as social marketing (Sinclair and Foley 2009). However, as defined previously, social marketing is a planning process – without knowledge of the campaign’s
development, specifically in terms of competition and exchange analysis, it is
difficult to correctly label a campaign as social marketing or not. For this reason, the
systematic review of sun protection interventions in Chapter Five focuses on
effective elements which may be used within social marketing interventions, rather
than identifying which interventions can be labelled ‘social marketing’.

3.4 Behavioural theories or models

A theory can be defined as:

‘a set of interrelated concepts, definitions, and propositions that present
a systematic view of events or situations by specifying relations among
variables in order to explain and predict the events or situations.’

Theories assist researchers or health promoters to develop a comprehensive
understanding of why people act in certain ways, what factors are acting to influence
these behaviours and what factors may be amenable to change (Glanz et al. 2002).
However, due to the complexity of health behaviours, the use of one theory is often
inadequate to explain all the influences acting on individuals. Social marketers may
thus call on a number of ‘models’ which ‘draw on a number of theories to help
understand a specific problem in a particular setting or context’ (Glanz et al. 2002,
pg.27). In health promotion practice, the definition between ‘model’ and ‘theory’ is
often blurred, thus the terms will be used interchangeably in this review.

Many models have been developed to conceptualise the influences on behaviour, and
are generally known as ‘knowledge-attitude-behaviour’ (KAB) models or ‘social
cognition’ models (Donovan and Henley 2003). This includes theories such as the
Health Belief Model, Theory of Planned Behaviour/Reasoned Action,
Transtheoretical/ Stages of Change Model and Social Cognitive Theory (Glanz et al.
2002). Other models seek to explain health behaviour at a community or population
level, with a view to understanding how social systems function and change, and
how communities and organisations can be activated to facilitate this change (Glanz
et al. 2002). This includes models of Community Organisation, Organisational
Change, and Diffusion of Innovations. Glanz et al. (2002) identified 66 different
theories and models mentioned in a review of 526 articles in health education, medicine, and behavioural sciences journals from mid 1992 to mid 1994. The following review discusses some of the theories and models which have been used, or have potential for use, in sun protection programs or research within strategy development. This list is not exhaustive but rather includes some of the most commonly used theories in health behaviour literature.

3.5 Models of individual health behaviour

3.5.1 Health Belief Model

The Health Belief Model (HBM) was developed in the 1950s by social psychologists in the U.S. Public Health Service to explain the failure of people to attend to preventive health behaviours, especially in the area of screening and detection of disease (Rosenstock 1974). It is based on value-expectancy theory where behaviour to control for an ill-health condition is seen as a function of whether a person sees themselves as susceptible to the condition, how serious they believe the condition and its sequelae are, their belief in the efficacy of actions available to them to reduce the risks or seriousness of the condition, and their beliefs on whether the benefits of taking action outweigh the costs or barriers (Janz et al. 2002). While originally developed to explain why individuals participate in health screening and immunisation programs, it has been further refined for application to more complex health behaviours such as HIV/AIDS preventive health, and reproductive health (Murray-Johnson et al. 2000; Janz et al. 2002; Nutbeam and Harris 2004). These refinements have acknowledged various modifying factors such as demographic, socio-psychological, and structural variables which may affect an individual’s perceptions; the impact of cues to action which may arise from media publicity, or personal or environmental events; and the concept of self-efficacy where the belief in one’s competency to take appropriate action becomes an important predictor of behaviour change (Janz et al. 2002; Nutbeam and Harris 2004). Figure 3.1 describes the model’s major components and linkages.
While these refinements have strengthened the model’s capacity to predict behaviour change, Nutbeam and Harris (2004) state the model is still most useful when applied to the behaviours for which it was originally developed, with less utility for more long term, complex and socially determined behaviours. Sheeran and Abraham (1996) in a review of HBM found all the model’s variables correlated only weakly with behaviour. They suggested this was due to poor construct definition, lack of combinatorial rules, and lack of discriminant validity between HBM components. However Murray-Johnson et al. (2000), in a post-hoc analysis, compared the Health Belief Model, Theory of Reasoned Action, Extended Parallel Process Model, and Social Cognitive Theory in regards to predicting and guiding strategies for behaviour change related to reproductive health in Ghana, Nepal, and Nicaragua. The authors stated that while no one model could account for all behaviour change, all theories had strong predictive power and proved useful in guiding intervention strategies, and that the Health Belief Model and Extended Parallel Process Model may be particularly useful for behaviours or audiences in which perceived threat or fear are operant factors.
3.5.2 Theory of Planned Behaviour/ Reasoned Action

The Theory of Reasoned Action (TRA) (Fishbein and Azjen 1975; Azjen and Fishbein 1980) was developed to better understand the relationship between attitudes and behaviour, and is predicated on the assumption that intention to act is the most immediate determinant of behaviour, with all other factors influencing behaviour being mediated through it (Nutbeam and Harris 2004). This conscious and rational decision-making is influenced by attitudes to the behaviour, and subjective norms, or the belief about whether most people approve or disapprove of the behaviour (Montano and Kasprzyk 2002). This theory has been shown to be successful in predicting many behaviours where people have a high degree of control over the behaviour (Montano and Kasprzyk 2002). However because other behaviours are performed in situations where people do not have high degrees of volitional control, Azjen and colleagues (Azjen and Madden 1986; Azjen 1991; Azjen and Driver 1991) expanded the theory to add perceived behavioural control as a third influence on behavioural intentions, becoming the Theory of Planned Behaviour (TPB) (Montano and Kasprzyk 2002; Nutbeam and Harris 2004). This addition accounts for factors outside of an individual’s control that may affect his or her intention and behaviour, and recognises that a person’s intentions will be greater if they feel they have greater personal control over a given behaviour (Nutbeam and Harris 2004). Figure 3.2 (overleaf) shows the relationships between these major components. Other constructs within this model are shown in Table 3.2.
Table 3.2: Constructs from Theory of Planned Behaviour (Montano and Kasprzyk 2002, pg. 69)

<table>
<thead>
<tr>
<th>Construct</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Behavioural beliefs</td>
<td>‘Belief that behavioural performance is associated with certain attributes or outcomes’</td>
</tr>
<tr>
<td>Evaluation of behavioural outcomes</td>
<td>‘Value attached to a behavioural outcome or attribute’</td>
</tr>
<tr>
<td>Normative beliefs</td>
<td>‘Belief about whether each referent approves or disapproves of the behaviour’</td>
</tr>
<tr>
<td>Motivation to comply</td>
<td>‘Motivation to do what each referent thinks’</td>
</tr>
<tr>
<td>Control beliefs</td>
<td>‘Perceived likelihood of occurrence of each facilitating or constraining condition’</td>
</tr>
<tr>
<td>Perceived power</td>
<td>‘Perceived effect of each condition in making behavioural performance difficult or easy’</td>
</tr>
</tbody>
</table>

Figure 3.2: Theory of Reasoned Action (shaded) and Theory of Planned Behaviour: major components and linkages (Montano and Kasprzyk 2002, pg.68)
These two theories are seen to have had a major influence on research and practice in regards to health issues, and have been used to guide programs in mammogram promotion, smoking cessation, weight-loss, family planning, and AIDS prevention (Glanz et al. 2002). As reported previously, Murray-Johnson et al. (2000) found support for TRA in a post-hoc analysis of programs aimed at reproductive health, along with the Health Belief Model, Extended Parallel Process Model, and Social Cognitive Theory. They suggest TRA may be of most use for behaviours or audiences where the decision-making process is more rational, and less emotionally loaded. Armitage and Connor (2001), in a meta-analysis of 185 independent studies, provide support for the efficacy of the TPB in predicting intention and behaviour, although they state that prediction is superior for self-reported than observed behaviour. The review also provides support for the construct of perceived behavioural control, stating that it accounted for significant amounts of variance in intention and behaviour, independent of TRA variables. It did, however, find the subjective norm construct to be a weak predictor of intentions, but states this to be partly attributable to poor measurement of the construct.

### 3.5.3 Transtheoretical Model

The Transtheoretical Model (Prochaska and Clemente 1983) integrates processes and principles from a number of psychotherapy and behaviour change theories to view behaviour change as a ‘process-involving progress through a series of six stages’ (Prochaska et al. 2002). These stages are:

1) Precontemplation: where people have no intention to take action within the next six months.

2) Contemplation: where people intend to take action within the next six months.

3) Preparation: where people intend to take action within the next 30 days and have taken behavioural steps in this direction.

4) Action: where people have changed overt behaviour for less than six months.

5) Maintenance: where people have changed behaviour for more than six months.

6) Termination: where people no longer succumb to temptation and have total self-efficacy.
This progress may not necessarily proceed in a linear fashion, as people often ‘revolve’ through stages, regressing a number of times before achieving stability in their behaviour.

Allied with this temporal view of change are the constructs of decisional balance and self-efficacy which reflect the individual’s relative weighing of the pros and cons of changing and their confidence in their ability to change behaviour without relapsing (Prochaska et al. 2002). The model also identifies ten processes of change which are said to be ‘covert and overt activities’ that people use to progress through stages (Prochaska et al. 2002, pg. 103). The use of these ten processes of change gives practical guidance to the formulation of strategies within an intervention.

This model has become one of the most commonly used models in health promotion, and while originally defined by its use in smoking cessation, has been used successfully in dietary change and mammography screening programs (Lefebvre 2001; Prochaska et al. 2002). However, some authors have raised doubts about the utility of the model in describing and achieving effective behaviour change (Whitelaw et al. 2000; Littell and Girvin 2002; Riemsma et al. 2003; Adams and White 2005; Bridle et al. 2005; West 2005). Littell and Girvin (2002) see a lack of consistent evidence for the discrete stages which are fundamental to the model, and disagree with the orderly, cyclical progression through these stages that the model posits for behaviour change. Difficulties in classification of people into stages is also noted by van Sluijs et al. (2004) and Adams and White (2005). They suggest that classification may be easier for behaviours that can be viewed as dichotomous, such as smoking/non-smoking, rather than behaviours more readily viewed as a continuum, such as physical activity. Rosen (2000) also cautions against generalising relationships that exist between stages and processes of change within smoking cessation to other health problems. Bridle et al. (2005) in a recent systematic review of health behaviour interventions found limited evidence for the effectiveness of stage-based interventions as a basis for behaviour change or facilitating stage progression, but suggest this may be partly due to poor model specification, or inappropriate development and implementation of interventions.
3.6 Models of interpersonal health behaviour

3.6.1 Social Cognitive Theory

Social cognitive theory (Bandura 1986) explains human behaviour in terms of a dynamic model, where factors of behaviour, personal, and environmental influences all interact simultaneously. A change in any one component thus has implications for the others (Baranowski et al. 2002). The theory contains a number of constructs (concepts developed for use in a particular theory) which are used to understand health behaviour and also suggest strategies for intervention. These are shown in Table 3.2 taken from Baranowski et al. (2002, pg. 169).

This theory is seen as one of the most comprehensive efforts to explain behaviour, although Armitage and Conner (2000) state the model only accounts for small to medium proportions of variance in behaviour, with the construct of self-efficacy being the predominant predictor. The construct of self-efficacy has also been adopted by a number of other theoretical models (Lefebvre 2001).

Social Cognitive Theory has been used successfully to guide a number of interventions. An investigation into the effectiveness of smoking cessation programs for adolescents by an evidence review panel in 2003 found Social Cognitive Theory was at the core of eight out of nine studies that increased cessation, and was used in combination with motivation enhancement in the ninth study (McDonald et al. 2003). The authors concluded that interventions using SCT were the most ‘promising approach for helping young smokers quit smoking’ (pg, S144). Murray-Johnson et al. (2000) concluded that Social Cognitive Theory may be useful in those behaviours where social influences are particularly strong.
<table>
<thead>
<tr>
<th>Concept</th>
<th>Definition</th>
<th>Implications</th>
</tr>
</thead>
<tbody>
<tr>
<td>Environment</td>
<td>Factors physically external to the person</td>
<td>Provide opportunities and social support</td>
</tr>
<tr>
<td>Situation</td>
<td>Person’s perception of the environment</td>
<td>Correct misperceptions and promote healthful norms</td>
</tr>
<tr>
<td>Behavioural capability</td>
<td>Knowledge and skill to perform a given behaviour</td>
<td>Promote mastery learning through skills training</td>
</tr>
<tr>
<td>Expectations</td>
<td>Anticipatory outcomes of a behaviour</td>
<td>Model positive outcomes of healthful behaviour</td>
</tr>
<tr>
<td>Expectancies</td>
<td>The values that the person places on a given outcome; incentives</td>
<td>Present outcomes of change that have functional meaning</td>
</tr>
<tr>
<td>Self-control</td>
<td>Personal regulation of goal-directed behaviour or performance</td>
<td>Provide opportunities for decision-making, self-monitoring, goal setting, problem solving, and self-reward</td>
</tr>
<tr>
<td>Observational learning</td>
<td>Behavioural acquisition that occurs by watching the outcomes and actions of others’ behaviour</td>
<td>Include credible role models of the targeted behaviour</td>
</tr>
<tr>
<td>Reinforcements</td>
<td>Responses to a person’s behaviour that increase or decrease the likelihood of reoccurrence</td>
<td>Promote self-initiated rewards and incentives</td>
</tr>
<tr>
<td>Self-efficacy</td>
<td>The person’s confidence in performing a particular behaviour and in overcoming barriers to that behaviour</td>
<td>Approach behaviour change in small steps to ensure success; seek specificity about the change sought</td>
</tr>
<tr>
<td>Emotional coping responses</td>
<td>Strategies or tactics that are used by a person to deal with emotional stimuli</td>
<td>Provide training in problem solving and stress management; include opportunities to practice skills in emotionally arousing situations</td>
</tr>
<tr>
<td>Reciprocal determinism</td>
<td>The dynamic interaction of the person, behaviour, and the environment in which the behaviour is performed</td>
<td>Consider multiple avenues to behaviour change including environmental, skill, and personal change</td>
</tr>
</tbody>
</table>
3.7 Planning frameworks

3.7.1 PRECEDE-PROCEED framework

While social marketing is a planning framework, other planning frameworks can also be embedded within the social marketing process. One planning framework which has been much used within health promotion is the PRECEDE-PROCEED framework. This framework was originally developed in the 1970s as a model for developing interventions under the acronym PRECEDE – standing for Predisposing, Reinforcing and Enabling constructs in Educational/Environmental Diagnosis and Evaluation (Gielen and McDonald 2002). This approach requires the planner to examine the multiple factors that shape health status in order to arrive at a focused subset of those factors as targets for intervention (Green and Kreuter 1991). These factors are broadly grouped into: **predisposing factors** – ‘a person or population’s knowledge, attitudes, beliefs, values and perceptions that facilitate or hinder motivation for change’; **enabling factors** – ‘those skills, resources or barriers that help or hinder the desired behavioural changes as well as environmental changes’; and **reinforcing factors** – ‘the rewards received, and the feedback the learner receives from others following adoption of the behaviour (which) may encourage or discourage continuation of the behaviour’ (Green and Kreuter 1991). Fundamental to this approach is that the intended audience participates in defining their own priorities in terms of problems and solutions.

PROCEED (Policy, Regulatory, and Organisational constructs in Educational and Environmental Development) was added in 1991 by the developers in recognition of the importance of environmental factors as determinants of health (Gielen and McDonald 2002). For this phase, program planners are required to assess budgetary and staff resources needed, policies that can be used to support the program and barriers that need to be overcome in implementing the program (Green and Kreuter 1991).

This framework’s strength is its systematic approach to development and evaluation, with the process conducted for development ‘reversed’ for evaluation. This creates an inherent logic to every process in development, implementation and evaluation, with transparent objectives/outcomes at each phase. See Figure 3.3.
This model is one of the most widely recognised and used models within health promotion, however, it comprehensiveness is also a hindrance to immediate action, which can be a drawback when mobilising community participation (Gielen and McDonald 2002; Jones and Donovan 2004).

**Figure 3.3:** Precede-proceed framework (Green and Kreuter 1991, pg. 24)
3.8 The communication process

Communication is a complex process, dependent on many factors incorporating: the nature of the message; the audience’s interpretation of it; their perceptions of the source as well as the environment in which it is received; and the medium used to transmit it (Belch and Belch 1998). To ensure effective communication, marketers must understand the meanings that words and symbols take on and how they influence consumers’ interpretation of products and messages, as well as the process consumers go through in responding to marketing communications. (Belch and Belch 1998).

Kotler et al. (2003) describe the communication process with a model involving nine elements (See Figure 3.4). This model is generally standard to communication theory as utilised in marketing (Belch and Belch 1998; Dibb et al. 2001).

**Figure 3.4:** The communication process (Kotler et al. 2003)

Within this process, there are a number of input factors which are under control of the message senders, and output factors which are dependent on the receivers of the message (McQuire 2001).
Factors under control of the message senders are:

1. **Source**  The person, group or organisation from whom the message is perceived to have come.
2. **Message factors**  The type of appeal, style and tone of the message.
3. **Channel factors**  The form and impact of the medium through which the message is transmitted.
4. **Receivers**  The characteristics, circumstances, attitudes and behaviours of the target audience.
5. **Destination**  The desired outcome of the communication such as changes in attitude, behaviour or policy.

(Egger et al. 1993; Nutbeam and Harris 1999; McQuire 2001).

In this model, two elements represent the major parties in the communication process (the sender and receiver), two are the major communication tools (message and media), and four are the major communication functions (encoding, decoding, response and feedback). The last element is noise in the system, which incorporates those extraneous factors working against effective communication (Belch and Belch 1998).

It is these input factors, in particular the message and channel factors, which are manipulated by marketers when planning the communication campaign. To do this they must make decisions on: who is their target audience; what is the response being sought; what message to use; what media to use; where will the message come from; and how to collect feedback (Kotler et al. 1994). Theories such as Prospect Theory (Tversky and Kahneman 1981), Language Expectancy Theory (Burgoon 1995), and the Extended Parallel Process Model (Witte 1992), as well as selected other behavioural theories can be used to inform this process. Another model, which is becoming more commonly acknowledged in public health campaigns is the Diffusion of Innovations Model (Glanz et al. 2002).
3.8.1 Diffusion of Innovations Model

Diffusion of innovations is a model which describes the process by which ideas, practices, or objects which are perceived to be new (innovations) are communicated through certain channels among members of a social system (Rogers 1983; Nutbeam and Harris 2004). Work by Rogers (1983) and others has identified five stages in a typical process of diffusion (innovation development, dissemination, adoption, implementation, and maintenance), and five factors which influence the speed and success of this diffusion (the characteristics of the potential adopters, the rate of adoption, the nature of the social system, the characteristics of the innovation, and the characteristics of the change agents) (Oldenburg and Parcel 2002; Nutbeam and Harris 2004). An understanding of this process, and the influences on it, potentially allows the change agent to identify ways of speeding up the process, or to identify facilitators and barriers to the diffusion process. The recognition of adopter categories – innovators, early adopters, early majority adopters, late majority adopters, and laggards – allows a basis for tailoring interventions for particular groups of individuals (Oldenburg and Parcel 2002).

3.9 Advertising theory

While marketers can never ultimately be sure of how each individual will receive and respond to a sent message, advertising theory prescribes systematic processes to plan communication campaigns, which work to more closely tailor message content to specific target groups, and thus allow an increased predictability of response to the sent message.

Rossiter and Percy (1997) describe four steps in planning an advertising communication campaign: target audience selection and action objectives; communication objectives and positioning; creative idea and execution tactics; and media planning. The following information on advertising theory is sourced from Rossiter and Percy (1997), unless otherwise attributed.

1) **Target audience selection** is the process of deciding ‘which prospect group will be most responsive to advertising communications or promotion .... in relation to the cost (of advertising and promotion)’ (Rossiter and Percy 1997, pg. 72). Rossiter and
Percy prescribe initial segmentation of the target market on a Brand Loyalty approach, which they define as the regular purchase of a brand based on a continued awareness of it, and a favourable (price- and promotion-resistant) attitude towards it. This approach divides potential purchasers of products (or brands) into the target audience segments described in Table 3.4.

Table 3.4: Brand Loyalty divisions of target markets

<table>
<thead>
<tr>
<th>Category</th>
<th>Behaviour</th>
</tr>
</thead>
<tbody>
<tr>
<td>1) New Category Users (NCUs)</td>
<td>People who have not previously used a product from this category</td>
</tr>
<tr>
<td>2) Brand Loyals (BLs)</td>
<td>People who regularly buy that brand</td>
</tr>
<tr>
<td>3) Favourable Brand Switchers (FBSs)</td>
<td>People who occasionally buy that brand and also buy other brands</td>
</tr>
<tr>
<td>4) Other Brand Switchers (OBSs)</td>
<td>People who buy a variety of other brands, but not that brand</td>
</tr>
<tr>
<td>5) Other Brand Loyals (OBLs)</td>
<td>People who regularly buy one other brand.</td>
</tr>
</tbody>
</table>

Commercial marketers would choose one of these groups as the primary target audience dependent on the leverage of each group, that is, the expected increase in the brand's sales divided by the advertising or promotions expenditure needed to get those increased sales.

Once a prospect group has been selected as the primary target group for the communication campaign (a secondary target may also be selected), action objectives for that target group are specified. These are the measurable behaviours expected to result from the campaign. For commercial products this may be trialling a product, buying more per occasion, or buying more often. Key role players in the decision-making process are also identified so they can be advertised to within their role in that decision – as initiator, influencer, decider, purchaser, or user of the advertised product.

2) Communication objectives for the campaign are then selected from five communication effects. These are the mental associations, connected to the brand,
which must be fully established in a buyer’s mind in order to act on a purchase; and are necessary to create the brand’s position and predispose action. The five communication effects are: category need; brand awareness; brand attitude; brand purchase intention; and purchase facilitation.

While all these associations must be fully established in a buyer’s mind in order to act, all associations may not need to be established specifically by the campaign. Formative research is thus needed to identify which communication effects are necessary for each target group, although brand awareness and brand attitude are always seen as objectives for any advertising and promotions campaign, even if only for maintenance of levels within the target group.

Brand attitude is the most complex of the communication effects, but at its simplest can be seen as the overall summary judgement about the brand, in the buyer's mind, that connects the brand to a purchase or usage motive. Rossiter and Percy identify eight fundamental motives for purchase or usage, which they see as either negatively originated (informational motives) or positively motivated (transformational motives). These are shown in Table 3.5.

**Table 3.5: Eight fundamental purchase and usage motives**

<table>
<thead>
<tr>
<th>Negatively originated (informational motives)</th>
<th>Positively motivated (transformational motives)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1) Problem removal</td>
<td>6) Sensory gratification</td>
</tr>
<tr>
<td>2) Problem avoidance</td>
<td>7) Intellectual stimulation or mastery</td>
</tr>
<tr>
<td>3) Incomplete satisfaction</td>
<td>8) Social approval</td>
</tr>
<tr>
<td>4) Mixed approach-avoidance</td>
<td></td>
</tr>
<tr>
<td>5) Normal depletion</td>
<td></td>
</tr>
</tbody>
</table>

The marketer must thus identify the purchase or usage motive on which the brand attitude depends. An additional consideration with brand attitude is the level of involvement the consumer has in the decision to buy that brand. This is defined as
the risk perceived by the typical target audience member, in choosing this brand, on this purchase occasion (Rossiter et al. 1991). These aspects of brand attitude are important in choosing creative execution tactics.

Once the communication objectives have been defined for a campaign, the marketer must then decide on a **positioning** strategy, which is a summary of why a particular target audience, in a particular category need, should buy a particular brand. This would take the format of: To the (target audience), (the product) is the brand of (category need), that offers (benefits). This results in an overall communication effect which tells the buyer what the brand is for, who it is for, and what it offers.

3) The creative idea and execution tactics are used to create the actual advertising campaign in order to achieve the communication objectives and positioning strategy selected for the product. While the creative idea or concept is based on the creativity and experience of whoever is developing the advertising campaign, advanced persuasion theory can prescribe, to some degree, the tactics used to execute the concept, utilising the Rossiter-Percy grid16 (Jones and Rossiter 2002) (See Figure 3.5).

This grid can be used to help guide development of ads by recommending creative execution tactics for ads in all media. As shown, it differentiates execution tactics on the two main communication objectives of brand awareness and brand attitude. A discussion on the recommended execution tactics for each cell is important but beyond the scope of this review.

4) **Media planning** is used to deliver the message to the target audience, and comprises two main decisions – where to advertise (media selection), and who to reach and how often to advertise (media strategy). **Media selection** is based on the brand's communication objectives – whether the medium has the capacity to carry the message content required to achieve that communication effect. The abilities and limitations of different media to carry messages, based on whether communication objectives are brand recognition or brand recall, and message strategies are low or

---

16 More recently called the Rossiter-Percy-Bellman grid
high-involvement, informational or transformational, can be sourced in Rossiter and Percy (1997), and are again beyond the scope of this review.

**BRAND AWARENESS**

<table>
<thead>
<tr>
<th>Brand recognition</th>
<th>Brand recall</th>
</tr>
</thead>
<tbody>
<tr>
<td>At point of purchase</td>
<td>Prior to purchase</td>
</tr>
</tbody>
</table>

Brand → Category need → brand

**BRAND ATTITUDE**

- **Low involvement**
  - Low-risk, ‘relief’ purchases
  - Familiar target audience

- **High involvement**
  - Low-risk, ‘reward’ purchases
  - High-risk, ‘relief’ purchases
  - New target audience

- Problem removal
- Problem avoidance
- Incomplete satisfaction
- Mixed approach avoidance
- Normal depletion

- Sensory gratification
- Intellectual stimulation or mastery
- Social approval

**Figure 3.5:** Rossiter-Percy grid (Rossiter and Percy 1997, pg.213)
Media strategy involves the concepts of effective frequency and reach pattern. Effective frequency is the number of exposures in an advertising cycle, thought to be able to maximise a target audience individual's disposition to act, and is expressed as minimum effective frequency (MEF). The number of target individuals reached at this MEF, in an advertising cycle, is the effective reach. Reach pattern, then, is the pattern of time-distribution of exposures to an advertisement or promotion, by target audience individuals over the advertising period, in order to maximise the effective reach during this period.

A number of reach patterns have been identified, dependent on variables such as whether the product is a new or established product, a high or low involvement decision, a long or short purchase cycle or decision time, and the purchase motive behind the product. The MEF can be estimated for a product based on: the attention given to the media vehicle, for example prime time TV is high attention while radio is low attention; the type of target audience; communication objectives; and the extent of social diffusion of the advertising message (personal influence). The marketing manager makes media scheduling decisions based on these two concepts.

The planning of advertising communication campaigns by the four steps outlined (i.e., target audience selection and action objectives; communication objectives and positioning; creative idea and execution tactics; and, media planning), thus aims to maximise buyer response for the brand being advertised.

3.10 Advertising theory in social marketing campaigns

Jones and Rossiter (2002), have previously shown the applicability of the advanced advertising theory, discussed previously, in social marketing campaigns based on an analysis of two national Australian campaigns concerned with illicit drug and alcohol use. The Australian Commonwealth Government’s National Illicit Drugs Campaign (NIDC) targeted parents of 8 to 17 year old children, as initiators and influencers of their children, to ‘sell’ an anti-drug message. Jones and Rossiter view the campaign as identifying a category need of ‘keeping your children drug-free’, and highlight the campaign strategies for raising brand awareness and attitude for the brand ‘talk to
your children about drugs’. Execution tactics, as taken from Rossiter and Percy (1997), are for a new brand category with high involvement, informational persuasion, and use accurate emotional portrayals of parents talking to their children about drugs, building self-efficacy, and using convincing claims as to the benefits which would ensue from parents acting on the persuasion message. Media strategy included television, print, and billboard ads, brochures, a campaign web-site, free-call information line and direct mail of materials to general practitioners and school principles. No analysis was presented on the actual reach pattern or effective frequency for the campaign; however the authors presented the reach pattern and MEF which would, in theory, be suitable for the campaign.

Jones and Rossiter (2002) argue that advertising theory, while developed for a commercial business context, can transfer effectively to the development of social marketing campaigns by:

1) conceptualizing ‘good behaviour’ as a brand that can be promoted just as a commercial brand of product is promoted;
2) targeting participants in the decision as role players (initiators, influencers, deciders, purchasers, users);
3) developing clear ‘positioning’ statements and specific communication objectives for the campaign;
4) using creative execution tactics appropriate to the way the brand is chosen; and
5) planning media on the basis of the right reach pattern and minimum effective frequencies for the advertising cycles.

It can thus be seen that commercial advertising theory can transfer effectively to social marketing, however there has been no in-depth analysis of its use, or potential use, within sun protection campaigns.
3.11 Conclusion

While many planning frameworks exist within health promotion, one framework that is increasingly being used to target public health issues is social marketing (Kotler et al. 2002). While seen as a theoretical approach in itself, social marketing also draws on behavioural, communication and advertising theories in order to more fully explain and predict human behaviour, and as a basis for strategy and message development. The following chapter outlines how social marketing was utilised as a framework for the systematic review of sun protection interventions targeting adolescents and young adults.
Chapter Four: Method for systematic review

4.1 Systematic review of public health interventions

Systematic review is a process of systematic search, examination, and synthesis of all available research utilising strict inclusion and exclusion criteria, in order to derive new information from an existing knowledge base, often through the use of meta-analysis or the quantitative synthesis of effect sizes (Mulrow and Cook 1998; Harden and Thomas 2005). While often used to combine studies in order to estimate an ‘average effect’, it can also be used as a method for exploring heterogeneity between studies (Rosenthal and DiMatteo 2001). Its use in providing a comprehensive examination of the available literature, with a transparent process undertaken in order to minimise bias and ensure the reproducibility of findings, has led to it being viewed as a cornerstone of evidence-based practice. However, while it has been utilised effectively for a number of years in the clinical context for which it was initially developed, a number of debates continue to be argued on its use in a public health context (Nutbeam 1999).

One core debate with the use of systematic review for public health interventions is the appropriateness of systematic review as a process for examining this field. Waters et al. (2001) question the type of ‘reductionist’ approach inherent in the traditional form of systematic review which they state is often incongruent with the approach used in health promotion as it removes the context within which public health interventions are developed and implemented. As many public health interventions are strongly influenced by their social context, to disallow or ignore contextual evidence may be to miss valuable insights which aid an understanding of why some interventions ‘work’ while others do not, and how interventions and strategies may need to differ for different populations. This has led many authors to suggest the need for more emphasis on process detail, and the use of qualitative evidence to aid understanding within the review process, when working in this field (Harden and Thomas 2005; Roen et al. 2006).
There is also much debate as to the types of study designs which should be included for systematic reviews of public health interventions. Randomised-controlled trials are generally acknowledged as inappropriate for many public health interventions, yet they are regarded as the ‘gold standard’ in regards to evidence. Victora et al. (2004) state that while RCTs are essential in determining the efficacy of a clinical intervention where the causal chain between the agent and outcome is relatively short and simple, and results safely extrapolated to other settings, public health interventions have complex causal chains making RCT results subject to effect modification in different populations. This is particularly noted for larger scale communication efforts, where multiple sources and channels interact to produce behaviour change. Hornik (reported in Kim 2002)\(^\text{17}\) states the evaluation of these large scale communication campaigns need to be undertaken in ways that respect the complex nature of the diffusion processes responsible for behaviour change. This is difficult, if not impossible, to achieve using randomised-controlled designs.

By looking only to randomised-controlled trials, where researchers seek to eliminate context, there is also the danger that the design and strategies used within public health interventions can become dictated by the needs of research, rather than the needs of the issue which is being addressed. Examples of this can be seen in a randomised-controlled trial looking to improve children’s sun protective behaviours at a swimming pool (Mayer et al. 1997) where the authors state they were unable to use environmental strategies at the pool due to the risk of contaminating the control groups with the intervention. The authors feel improved results may have been obtained if these environmental strategies had been used. This is also seen in the National Cancer Institute’s Community Intervention Trial for Smoking Cessation (COMMIT) study involving 22 cities, where the channels used to communicate the program’s messages were dictated by the study’s design, again to reduce the risk of contaminating control groups. While the program showed no differences between treatment and control groups on heavy smoking, process results showed little differential exposure to the program’s messages between these groups (Hornik reported in Kim 2002). This could ultimately lead to a decline in the quality and

\(^{17}\) Report on a speech given by Hornik at a Symposium on Health Communication to Promote Healthy Lifestyles for the Prevention of Cancer.
effectiveness of public health interventions, through a drive to improve their evidence base.

It is thus becoming increasingly recognised that systematic review must widen its inclusion criteria to allow a broader range of study designs. However, there is still debate whether this should include studies without control groups. Green and Tones (1999), while noting the usefulness of systematic reviews for planners and practitioners, state that exclusion of those studies which lack controls but are otherwise methodologically sound, stands to distort rather than strengthen the evidence base. Yet the way this evidence is incorporated into a review needs to be carefully considered. Peersman et al. (1999, pg. 88), in a review of effectiveness reviews of workplace health promotion interventions, found estimates of effectiveness higher in outcome evaluations which lacked control groups, stating that a hierarchy of evidence does exist and that ‘the results from well designed and well executed RCTs are necessarily more reliable than those from other studies’. Seeing the need to incorporate available evidence, however, they do not dismiss the use of studies lower on the evidence hierarchy tree, or of poorer quality execution, but state that these studies need to be clearly highlighted within the review text, and contribute less to conclusions about effectiveness.

The National Health and Medical Research Council’s Health Advisory Committee (HAC) and National Public Health Partnership (NPHP) sponsored two expert workshops in 1999 to consider the difficulties that arise when using established methods from evidence-based medicine, when evaluating research from public health interventions (Rychetnik and Frommer 2002). The workshops concluded that while established methods of evidence appraisal were a useful starting point for evaluating evidence on all types of public health interventions, these methods should be:

‘expanded or adapted to take account of the diversity of public health interventions, the different evaluations that are conducted in public health settings, and the importance of contextual factors in public health research and practice’

(Rychetnik and Frommer 2002, pg. 1).
There is, therefore, a growing appreciation that systematic review of public health interventions should encompass the totality of available evidence, whether quantitative or qualitative, and that methods for guideline development should allow the complexities of public health research and practice to be considered.

4.2 Other methodological issues in systematic review

In considering a totality of evidence, a major difficulty for systematic review is the inclusion of grey literature, which is recommended in all systematic reviews. Grey literature includes unpublished reports, dissertations, conference abstracts, policy documents, reports to funding agencies, rejected or un-submitted manuscripts, non-English language articles and technical reports (Conn et al. 2003). While some authors have argued that only published studies should be included for review, as this means the studies have undergone peer review, the majority of authors emphasise the importance of grey literature in any systematic review (Cook 1992; Chalmers and Altman 1995; Glasziou et al. 2001; Conn et al. 2003). It has been stated that the exclusion of grey literature can expose the analysis to publication bias which is said to inflate effect sizes by including more statistically significant, and generally positive, results over the smaller, less positive results of grey literature (Cook 1992). McAuley et al (2000) state the exclusion of this literature could result in an overestimation of an intervention effect by an average of 12%.

Another difficulty in using a variety of study designs in the systematic review comes in judging the quality of the evaluations, and then the use of this quality rating in the synthesis of results. Saunders et al. (2003) identified 18 instruments used for assessing the quality of non-randomised studies (ten scales and eight checklists). However at the time of development of the data forms for this project no consensus had been reached on which method should be used or how quality assessments should be used in the interpretation of results (Alderson et al. 2004; Moja et al. 2005).

A systematic appraisal of sun protection literature requires a framework in order to identify variables for investigation and guide analysis. As previously stated this
project utilised a social marketing framework to guide analysis via systematic review. As the aim of this project was to provide an evidence-base for social marketing programs in this field, it thus sought to investigate how elements from a social marketing framework were utilised in, and influenced the effectiveness of, sun protection interventions.

4.3 Method for systematic review

Systematic review was undertaken on primary prevention interventions that had been implemented over the past 25 years, in order to examine the extent of use of social marketing and communication theory in practice within sun protection programs. In this review, an intervention was seen as any:

> ‘coherent series of activities, which together make up one strategy or more than one strategy, carried out with a group of participants for the purpose of improving the health status of the target group’

(Hawe et al. 2002, pg. 211).

The review utilised a social marketing framework developed by this researcher and presented below.

4.3.1 Social marketing framework: components

As a conceptual model, the underlying fundamentals driving social marketing process are those of behaviour change, customer orientation and exchange theory. However the framework with which to plan a comprehensive and integrated campaign is provided by the marketing mix. These are the main variables that are manipulated in marketing to formulate the social marketing campaign (Kotler et al. 1994).

In order to develop the marketing mix, a large body of information is needed from a number of elements, which is used to develop a greater understanding of the target market and the forces acting on it, as well as how to most effectively influence
market behaviours. It is those elements which inform the marketing mix which in turn formed the framework for this review.

**i) Formative research**

As a customer orientation is central to social marketing, social marketers define and analyse health problems from the target market’s viewpoint and develop strategies accordingly (Maibach et al. 2001). This means that formative research is essential so that the market’s (audience’s) attitudes to, and perceptions of, the problem can be understood, and inducements and barriers to the behaviour in question identified (Grier and Bryant 2005). Seen within the context of sun protection campaigns, the use of formative research should thus predict more effective interventions.

**ii) Segmentation**

The use of segmentation allows any intervention to be more closely aligned to the needs and wants of specific audiences. While many campaigns are seen that segment an audience on age, especially campaigns targeted at children, social marketing encourages further segmentation of the target market, often on attitudinal or psychographic divisions. It is this secondary division of the market that allows messages to be tailored to individuals and improves the marketer’s ability to predict the response to strategies (Kotler et al. 2002). Therefore sun protection campaigns utilising market segmentation, or messages orientated to specific audiences, should achieve greater success than those that generate a generic campaign aimed at a mass audience.

**iii) Use of behavioural change theory**

While social marketing is in itself a model, the process of social marketing also utilises models and theories of behaviour and social change to inform practice (Andreason 1995). As stated previously, the use of these models affect judgments on the selection of target audiences, questions posed during formative research, selection and implementation of strategies, and selection and measurement of outcomes (Lefebvre 2001). While the use of these models is generally acknowledged to produce more effective interventions, and numerous models have been identified within social marketing, little consensus is seen on which types of models are best
used for particular social problems or particular situations (Nutbeam and Harris 1999; Lefebvre 2001).

**iv) Environmental analysis**

As commercial marketing sees the importance of an accurate analysis of the environment in which a product is being marketed, so social marketing campaigns need to look at the environment in which individual behaviours occur (Donovan and Henley 2003). Individual behaviour is a complex interplay of individual agency\(^{18}\) and its structural or social context, so while social marketing campaigns see behaviour change as the ultimate aim, social theory and empirical research suggest that this is best achieved when social and environmental conditions are favourable (Baum 2002; Naidoo and Wills 2003).

Structural or social barriers are those elements within the physical or social environment which prevent or hinder the adoption of the desired behaviour (Naidoo and Wills 2003). In the primary prevention of skin cancers, barriers may occur due to: monetary costs; elements within the physical environment such as lack of shade; factors to do with policy or routine such as school or sporting fixtures that require participants to be out in the middle of the day; or social norms that favour tanned skin or more skin exposing clothing styles. Thus strategies to decrease or remove their influence on behaviours could include altering the physical environment, changing policy, trying to influence social norms, or altering the cost of sun protection items.

The recognition of the role of people’s social environment on their behaviour can also be seen in the targeting of secondary audiences. These are people who have influence over the primary audience, such as parents and teachers (of children), spouses, friends, bosses, lifesavers or sporting coaches. They may thus be used to impart knowledge, model behaviour or change rules or routines that impact on behaviour.

---

\(^{18}\) The term agency is used here to describe an individuals capacity for willed (voluntary) action. (Scott and Marshall 2005).
A combination of these strategies can be utilised within a ‘settings’ approach. Interventions within a settings approach implement a variety of strategies to influence the whole environment in which behaviours are practiced, whether school, workplace or neighbourhood (Naidoo and Wills 2003). These strategies include examining policy, physical environment, social norms, or people other than the primary target group, to influence behaviour (Naidoo and Wills 2003). As such, no one strategy can be said to define a settings approach – it is the combination of many strategies intended to influence to the whole environment where the target behaviours occur.

Therefore, for the context of this study, the use of environmental analysis was explored by examining the effect of: targeting strategies towards structural or social barriers to sun protective behaviours; targeting of secondary audiences to influence behaviour change in a primary audience; and the use of a ‘settings’ approach within sun protection campaigns.

v) Use of communication theory
Theory is also utilised by social marketing to guide the message content of campaigns. While a number of elements within the communication strategy can be manipulated to ensure an intervention is specifically targeted to the audience segment (as described in the literature review), within the context of the systematic review, the variables explored concern those related to message and channel factors.

vi) Message factors
Message factors concern the content of the message and how it is communicated to the audience (Kotler et al. 2002). Communication theory dictates that message content should be tailored to a target audience based on segmentation, formative research and environmental assessment, so as to ‘enhance acceptability, uptake and impact in each target group’ (Donovan and Henley 2003, pg. 228). Messages can be tailored for individuals through the use of secondary segmentation, normally based on behavioural, attitudinal or psychographic grounds, that allows messages be developed to specifically address the needs and attitudes of those individuals (Donovan and Henley 2003). Thus tailored messages should be more effective at
influencing behavioural change than merely targeted messages which treat the target group as a more homogenous entity.

Content can also be altered through the use of secondary detection messages alongside primary prevention messages. This may alter the way in which the message is processed by the target audience, as it has been suggested that those messages promoting behaviours that carry an element of psychological risk, such as skin examination which may find a cancerous lesion, are processed differently from behaviours that are seen as low risk, such as sun protection to prevent skin cancer (Rothman et al. 1993). Messages may therefore need to be ‘framed’ differently depending on the content of the message, with different emphasis on the positive or negative consequences of an action (Tversky and Kahneman 1981; Detweiler et al. 1999).

Once the message has been developed, the selection of dissemination channels for communication of the message is needed. Again this choice should be driven by a combination of prior knowledge and formative research into the mix of channels which will most effectively convey the message to the target audience within budget allocation (Kotler et al. 2002).

In this review, therefore, the variables explored related to message factors were: the use of tailored message content to specific target groups; the use of secondary detection messages with primary prevention messages; the use of negative versus positive persuasion appeals (i.e., framing); and the choice of dissemination channels to promote the sun protection message.

vii) Campaign length

The length of a campaign has been identified as another variable influencing campaign effectiveness, with continuity seen as a major factor in sustaining long-term behaviour change (Montague et al. 2001). However, Snyder and Hamilton (2002) found mass media health promotion campaigns lasting one year or less had larger effect sizes than those lasting longer. This apparent conflict reflects the variability that comes from differing types of health interventions, and how they are
promoted. This review thus explored the effects of campaign length on sun protection interventions.

Figure 4.1, overleaf, conceptualizes the input of theory and formative research in developing the marketing mix. This framework does not intend to show the process of developing a social marketing campaign as other models, such as PRECEDE-PROCEED, are best used for this purpose, but rather show some of the inter-relationships between the elements used in this framework. The elements highlighted in bold print are those which were examined via systematic review.

The following section outlines the specific processes which were utilised to provide a systematic review of previous sun protection interventions along a social marketing framework.
Figure 4.1: Conceptualisation of elements needed to inform the marketing mix
4.3.2 Selection Criteria

Selection criteria were established prior to commencing the search for interventions in order to minimise potential bias. The overall inclusion criterion was designed to identify sun protection interventions aimed at influencing behaviour change at a group or community level, and that could be generalised to a wider community.

i) Specific inclusion criteria were:

**Populations:**
- Programs targeted at adolescents (12 to 18 years) and young adults (18 to 24 years). Programs with older participants were included if the average age fell within the defined limits for the two groups.

**Interventions:**
- Any organised effort aimed at influencing the sun protective behaviours of groups or communities (some campaigns may incorporate individual elements within a group focus).
- The main focus of campaigns must be primary prevention strategies, not secondary prevention through early skin cancer detection, although some campaigns may include some secondary prevention strategies.
- The evaluation design must have some quantitative measure of the effect size or enough information for the effect size to be calculated.
- Programs that can be generalised to the wider community, that is, not so narrowly focused or culturally distinct as to be unsuitable for other target audiences.

**Outcome measures:**
- Behaviour change measured by self-report, caretaker report or observation at: a) less than 12 weeks – short term, and b) greater than 12 weeks – long term, for:
  1. Overall sun protective behaviour;
  2. Incidence of sunburn;
  3. Outdoor tanning behaviour;
  4. Use of sunscreens;
  5. Use of hats;
  6. Use of sun protective clothing (excluding hats); and/or
7. Use of shade/staying out of the sun.

*Types of study design:* (Note: definitions from Hawe et al. (2002)).

- Randomised controlled trials, including cluster-randomised controlled trials, which include two or more alternative health promotion strategies, or one strategy compared with no strategy.
- Non-equivalent control group pre and post-test studies, in which a strategy is compared with either no strategy or an alternate strategy.
- Non-equivalent groups time series studies which assess the effect of a strategy against either no strategy or an alternate strategy, with at least three points of data collection before and after the intervention.
- Single group time series studies, which assess the effect of a strategy against either no strategy or an alternate strategy, and at least three points of data collection before and after the intervention.
- Single group, pre and post-test.
- Post-test designs with control groups.

*Other:*

- Campaigns initiated from 1980 onwards, as there were few primary prevention campaigns before this time (Garvin and Eyles 2001; Marks 2004).
- Studies restricted to English language.

**ii) Specific exclusion criteria were:**

*Populations:*

- Culturally distinct populations – specific ethnic groups, armed forces, healthcare workers.
- Medically distinct populations – people with previously detected/treated skin cancers, people with genetic or familial predispositions to skin cancers, people with lowered immunity.

*Interventions:*

- Individual counselling/health education.

*Study design:*

- Post test only designs (without control group).
4.3.3 Development of Data Extraction Forms

Data extraction forms Part A, B, C and D were constructed with reference to Zaza et al. (2000) and other generic forms. Form A provided general details on the study such as title, author, journal, as well as inclusion/exclusion data. Form B examined specific intervention characteristics utilising the social marketing framework as described previously. Form C examined details of study quality, and Form D provided the results of outcome evaluations. See Appendix 1 for samples of data extraction sheets.

A data extraction information sheet was also compiled, also with reference to Zaza et al. (2000). This sheet provided a guide with which to make decisions on data extraction in order to standardise decision-making. While originally pilot tested with the coding of five papers by multiple coders, this information sheet was continually refined as issues emerged requiring further clarification. Three areas of special note within this data extraction sheet are the definition of random-controlled trials, the assessment of quality for the papers to be analysed, and the behavioural outcomes to be taken.

i) Definition of RCT

Interventions have been defined as random-controlled trials based on the Cochrane Reviewer’s Handbook (Alderson et al. 2004, pg.187) which states:

‘If the author(s) state explicitly (usually by some variant of the term ‘random’ to describe the allocation procedure used) that the groups compared in the trial were established by random allocation, then the trial is classified as an ‘RCT’ (randomised controlled trial).’

This classification is based on what the author has written, not the reader’s interpretation.

Other studies were defined as quasi-experimental if they did not fit the above definition.
ii) Assessment of quality

Critical appraisal of the methodological quality of studies is seen as an essential feature of systematic reviews (Moja et al. 2005). However no consensus has been reached on which method should be used or how quality assessments should be used in the interpretation of results (Alderson et al. 2004; Moja et al. 2005). This review used a simplified checklist derived from Zaza et al. (2000), incorporating a interpretation of results derived from the Cochrane reviewers handbook which divides studies into 3 categories: low risk of bias; moderate risk of bias; and high risk of bias. These categories were re-stated as: high quality; moderate quality; and low quality on data spreadsheets.

iii) Behavioural outcomes

Seven primary outcome measures were chosen that described appropriate sun protective behaviours as identified earlier in outcomes criteria. The outcomes that best described these designated behavioural outcomes were taken, based on subjective assessment by the coder. When there were multiple measures, a decision was made on the most appropriate measure to use. While there was much variation in the behavioural outcomes and how they were measured, the use of seven primary outcomes minimised the combining of widely variant outcomes, thus providing more valid results.

4.3.4 Search procedure for systematic review

The search strategy was conducted in the following order:

i) Electronic databases for published literature

In order to ensure coverage of a wide range of marketing, medical, educational, sociological, psychological and public health sources, databases accessed were: MEDLINE (medical/health content), CINAHL (nursing/health content), ERIC (educational content), PROQUEST 5000 (multidisciplinary), Science Direct (multidisciplinary), PsycInfo (psychology content), Meditext (Australian content), Web of Science (multidisciplinary), and ABI-Inform (marketing content).
As health promotion covers a wide range of strategies, from mass media advertising to school curricular education, an exhaustive list of keywords was required to cover all permutations. The search strategy below was used specifically with MEDLINE (OVID); searches with other databases altered the combinations of keywords or excluded some keywords dependent on the requirements of the databases. Note many of these search terms come from a protocol devised by Naldi et al. (2004) formulated for a systemic review of educational programs for skin cancer prevention.

The keywords to locate sun-related interventions (used as title, abstract or MeSH terms) were: Melanoma/prevention and control OR Skin Neoplasm/prevention and control OR Sunburn/ prevention and control OR Sunlight/ adverse effects OR Photoprotection OR Sun Protection OR Sun Exposure OR Sun Prevention OR Ultraviolet Rays/adverse effects.

The keywords to locate health promotion interventions (used as title, abstract and MeSH terms) were: Advertising OR CD-ROM OR Community Health OR Curriculum OR Education OR Environmental Exposure/prevention & control OR Health Behaviors OR Health Promotion OR Knowledge, Attitudes, Practice OR Mothers/education OR Marketing OR Mass Media OR Multimedia OR Parents/education OR Persuasive Communication OR Primary Prevention OR Program Evaluation OR Radiation Protection/education OR School Health Services OR Teaching19.

Results from the above searches were combined with the Boolean operator ‘AND’, and limited to 1980 onwards.

ii) Review references from retrieved articles and review articles

Review articles were searched via Cochrane systematic reviews, and the above databases via the following search terms: ‘sun protection’; ‘skin cancer’ OR ‘skin neoplasm*’; AND ‘prevention’ OR ‘review’.

---

19 Note that the search strategy was conducted to retrieve all sun protection interventions targeted at all populations. Studies targeting adolescents and young adults were then taken from this wider search.
iii) Contact of experts in the field to identify other known programs not already identified

As this project was part of a larger joint project with The University of Wollongong and Cancer Council NSW (CCNSW), the list of interventions gathered was reviewed by the overall project’s Chief Investigators and CCNSW sun protection team in order to identify any omission of known sun protection articles or reports.

iv) Search for ‘grey literature’

After the first search for published literature, it was decided to widen the scope of the review by including unpublished or grey literature. Grey literature was then searched for using the above search terms via search engines Scirus, ANZWERS, and Google (limited to .org and .edu.); Dissertations Abstracts and Australian Digital Theses; databases ISI Proceedings, and Current Contents. A request for evaluations was also posted on a sun protection list-serve, and a number of Cancer Organisations approached via letters and telephone calls.

4.3.5 Search results

Approximately 2000 titles were scanned for sun protection interventions, with abstracts reviewed if the content of the study was in doubt. This procedure retrieved around 180 articles which were subsequently reviewed via abstract or full text to gain first hand reports of interventions, leaving a potential 147 published studies on sun protection interventions targeting all populations.

Those excluded involved secondary prevention programs and those which did not report evaluated campaigns or were reviews of a mix of campaigns. The studies were then further divided dependent on their target population.

4.3.6 Data Coding

Studies were examined and coded by two researchers for Part A of the data collection forms to classify included and excluded studies, with included studies then classified by study design. The included studies were then coded by two researchers, for Part B and C of the data sheets. Disagreements were reconciled by consensus, or
third party opinion by the overall project supervisor. Previous papers on baseline or pilot studies of the same interventions were referred to for coding if they were mentioned in the paper under review. However the researchers only used information as it was explicitly reported by the study authors and did not attempt to interpret the papers, except in the case of theory used. For this, the data information sheet gave instructions on a number of terms, or combination of terms, that could be taken instead of explicit statement to indicate the use of a particular theory. The outcomes measures for Part D were coded by this researcher.

4.3.7 Data Analysis

Due to the diverse nature of the data and behavioural outcomes, valid quantitative synthesis of the outcome measures via meta-analysis was inappropriate. Instead absolute and relative effect measures for all outcomes were calculated by a method utilised by the Task Force on Community Preventive Services in its systematic review of interventions to prevent skin cancer (Saraiya et al. 2004). A further measure of effect for post studies with a comparison group was also devised. While these studies produce a lower level of evidence, to omit their effects would lose valuable information. Table 4.1 illustrates the formulae for these calculations.

This information was presented via spreadsheets, and combined via narrative synthesis to provide an examination of the studies via the social marketing framework previously defined.
Table 4.1: Summary effect measures (adapted from Saraiya et al. 2004)

<table>
<thead>
<tr>
<th>Before and after only design</th>
<th>Post design with comparison group</th>
<th>Study with comparison group (RCT, non-randomised trial)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Absolute effect measures</td>
<td></td>
<td></td>
</tr>
<tr>
<td>I_{post} - I_{pre}</td>
<td>I_{post} - C_{post}</td>
<td>ΔI - ΔC</td>
</tr>
<tr>
<td>Relative effect measures</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(I_{post} - I_{pre})/ I_{pre}</td>
<td>((I_{post} - C_{post}) / C_{post})</td>
<td>(ΔI / I_{pre} – ΔC / C_{pre}) X 100</td>
</tr>
</tbody>
</table>

C= control; I= intervention; RCT = randomised controlled trial

### 4.4 Conclusion

Systematic review is regarded as a corner-stone of evidence-based practice, but evokes a number of issues when transferring to a public health area. This review utilised a transparent, systematic, standardised process to review the evidence on adolescent and young adults’ sun protection interventions. However, the review was mindful of the debates surrounding systematic review in this area as it allowed a range of study designs to be included. The review is still, however, approached from a largely ‘reductionist’ positivist paradigm, in that it sought to use quantitative methods and deductive reasoning to measure and explain an objective reality (May 2001). The next chapter presents the results from this review.
Chapter 5: Systematic review of adolescents’ and young adults’ sun protection programs

5.1 Introduction

This chapter presents the results of a systematic review of the literature on adolescent’s and young adult’s sun protection interventions that have been undertaken from 1980 to 2005.

The following discussion illustrates how behavioural theory and other elements of a social marketing framework have been utilised in sun protection programs for adolescents and young adults, up to the present time, and points to promising directions for sun protection interventions to this target group.

5.2 Method

A systematic search was undertaken to retrieve all program evaluations that had been reported in the literature on interventions aimed at changing the sun protective behaviours of adolescents or young adults.

The original search for program evaluations ceased in May, 2005 (See Chapter 4 for search and selection criteria). This search retrieved 147 published papers that were aimed at the primary prevention of skin cancer in all populations. Initial coding by two researchers aimed to find any programs targeted at adolescent sun protection utilising pre and post-test study designs with control groups; only three programs met this criterion.

To allow a broader examination of elements which may inform social marketing for adolescents, the review was expanded to include programs targeted at young adults, unpublished program evaluations, and studies with designs seen as ‘lower’ on the evidence hierarchy table (such as pre and post test, and post-test with control group). This allowed the inclusion of some experimental interventions targeted at university
students that reported behavioural outcomes, as well as the inclusion of community-wide mass media campaigns that reported on behavioural outcomes for the defined groups. Those excluded interventions were targeted at different populations or did not report on behavioural outcomes. The widened search ended December, 2005, and was repeated in June 2007\textsuperscript{20}. See Appendix 2 for included and excluded studies and the reason for their exclusion.

A review was then undertaken on the 23 programs identified. Papers were coded by two researchers with disagreements reconciled by consensus or third party adjudication. The data were synthesised narratively.

Presentation of the results was undertaken in a two tiered approach. Those program evaluations using randomised-controlled designs (RCT), non-randomised pre and post designs with control, or time series design with a control group, were considered as first or higher tier of evidence. Those evaluations utilising pre and post designs without a control group, post-only designs with a control group, or time series design without a control group, were considered as second tier evidence. This second tier of evidence is discussed later in relation to how it supports or differs from the first tier of evidence, or if it adds new insights into strategies for sun protection. Where studies had intervention arms which differed on a particular characteristic under review, such as the use of environmental strategies or the targeting of parents, the arms are discussed separately for those sections.

As many programs have two or more papers written on them, this review only cites the paper most used in data coding; however, all papers are referenced in the ‘included studies list’ in Appendix 2.

\textsuperscript{20} This search found three additional papers targeting the defined age groups.
5.3 Results of systematic review –pre and post studies with control groups and time series with control group

5.3.1 Study characteristics (first tier evidence)

Twelve studies concerned with improving the sun protection behaviours of adolescents or young adults were included for analysis within this review. Of these studies nine were coded as randomised controlled studies, two were coded as non-randomised before and after designs with a control group, and one was coded as a time series design. Three studies were randomised at a group or community level (Lowe et al. 1999; Buller et al. 2006; Olson et al. 2007).

Of these studies two were based at secondary schools, six at universities, two in tourist or recreational settings, one was community-wide and one targeted adolescents with no specific setting noted. Sample sizes varied from 30 to 3,400 participants. Nine studies originated from the United States of America, two from Canada and one from Australia. See Table 5.2 and Appendix 3.

5.3.2 Intervention characteristics

i) Secondary school interventions

Two secondary school interventions met the inclusion criteria. Lowe et al. (1999) used a settings approach with curriculum lessons over a four to six week period before summer vacation. The intervention was delivered over a three year period. Lessons utilised participatory learning principles, role playing and student-directed activities, looking at societal images and peer influence. School policy was also targeted. After one year of intervention in Grade 8 students there was a significant 44% relative change in sun protection (p<0.001); however no significant effects were seen by program end in Year 10 (p=0.984). Buller et al. (2006) used six 50-minute curriculum lessons that focused on increasing students’ perceived personal risk for skin damage and skin cancer, and increasing positive outcome and self-efficacy expectations. It also included activities to teach prevention skills, goal setting,

---

21 p levels are stated as the actual figures recorded by authors.
22 A settings approach is the combination of many strategies to try and influence the whole environment where behaviours occur.
monitoring of progress and overcoming barriers to sun protection. Results at one month follow-up showed small but significant effects (4% relative change) in overall sun protection compared to control school participants (p=0.0035). See Table 5.2 and Appendix 3.

ii) University-based interventions
Six interventions were targeted at young adults in universities. While the ages of participants included in these studies was occasionally beyond the defined target group inclusion criteria, the studies were included for review if the average age and majority of participants fell within the target range.

Mahler et al. (2005), in an intervention based on the Theory of Alternative Behaviours, achieved significant changes (160% and 550% relative change respectively for standard and enhanced interventions) in the use of sunscreen by participants when not sunbathing (p<0.05). The intervention included a 12 minute video focused on photoaging, as well as a UV photograph taken of participants to show current skin damage. The enhanced intervention group was also provided with a sunless tanner and information on its use. Significant, positive effects were shown on sunscreen use. The intervention’s effect on the number of hours sunbathed by participants was unexpected, with the standard intervention group increasing the number of hours spent sunbathing by 44% compared to controls (2.05 hours, 1.42 hours respectively) and the enhanced group decreasing the sunbathing hours by 38% (0.88 hours). These sunbathing differences were not statistically significant. A further study (Mahler et al. 2007) separating the photo-aging component from the UV photo component found significant decreases in incidental sun exposure at four to five months and one year follow-ups (177% and 182% relative change respectively, p<0.02), and substantial increases in sun protection at four to five months follow-up (173% relative change, p<0.045) in those receiving the photo-aging videotape. Conversely, those viewing the UV photograph showed non-significant increases in sunbathing at four to five months and one year follow-ups (p=0.09), and non-significant increases in incidental exposure at one year follow-up (p =0.29).
Bernhardt (2001), in an intervention based on Social Cognitive Theory and the Elaboration Likelihood Model, utilised a tailored web page created from over 30 pieces of data from each participant that focused on outcome expectations and self-efficacy for using sunscreen. The web page was tailored to message design preferences previously chosen by participants. No significant differences in behaviour were found between treatment and comparison groups at short-term follow-up, although more intervention group individuals (81%) reported reading their tailored web page than comparison group individuals who could access a generic web page (61%) \((p<0.05)\). Intervention group individuals were also less likely to report that it was very important for them to be tanned \((p<0.01)\) or that they felt more attractive when they were tanned \((p<0.05)\).

Jackson (1997), using a multi-theoretical framework, compared a stress reduction intervention against a sun protection intervention consisting of three segments. The target group included female undergraduates. The first segment comprised a threat component which included a video on skin cancer, slides of unattractive skin cancers and their removal, a testimonial from a survivor of a malignant melanoma, and information and photos on photo-aging. The second segment looked at sun protection strategies with an emphasis on the use of sunscreen, including visualization and planning tasks for its use. The third segment looked at subjective norms and image norms\(^{23}\) for tanning. Short-term follow-up found relative increases of 11% and 25% in overall sun protection for the face and body respectively \((p<0.05)\). Changes in specific behaviours did not reach significance levels, presumably since individuals used differing strategies to improve their sun protection, diluting the effects on specific strategies.

Dukeshire (1996a; 1996b) reported on two small studies which investigated fear appeals, based on the Theory of Reasoned Action and Protection Motivation Theory. Undergraduates were shown an audio-visual presentation containing high, low, or no fear materials; they then completed a number of written exercises in order to enhance the focus or involvement of participants. The first study achieved non-significant changes in all intervention groups at 4 to 6 week follow-up \((p\text{ level not recorded})\) –

\(^{23}\) Perceived norms on society and the media’s views on paleness
whether receiving a high fear appeal with an enhancer, an enhancer alone, or information alone – compared to the control group. The second study revealed non-significant negative changes in sun protective behaviours (i.e. participants reported poorer sun protection). Low fear appeals tended to have greater negative but non-significant results than the high fear appeals. See Table 5.2 and Appendix 3.

iii) Tourist or recreational interventions
Two interventions implemented at tourist or recreational settings were reviewed. Weinstock et al. (2002) targeted youth and adults and reported outcomes for the age division 16 to 24 years, while Novick (1997) targeted 13 to 18 year old girls.

Weinstock et al. (2002) reported on a multi-component intervention based on the Transtheoretical Model, where messages were tailored to individuals’ assessed stage of change in relation to sun protection. The intervention was initially delivered at the beach and included educational pamphlets, personalised sun sensitivity assessments with written and verbal feedback, sunscreen, and UV photographs taken of participants. Follow-up interventions included two feedback reports matched to the individual’s stage of change. At the 12 month follow-up evaluation, small but significant effects on overall sun protective behaviours were noted (9%, p<0.004).24 The intervention was most effective for younger individuals, people with low sun sensitivity, and lower income individuals.

Novick (1997) reported on a time series design in which Caucasian female high school students aged 13 to 18, and working at day camps were shown photographs of themselves that were modified to make the image age by 25 years. A further group was shown the aged photographs with additional skin cancers transposed onto the image. All participants were supplied with sunscreen for the duration of the intervention period. Weekly logs were completed to monitor their sunscreen use. Follow-up over the two and a half weeks post intervention found substantial increases in sunscreen use for both the standard and enhanced intervention groups.

24 This study had an attrition of 38% with non-completers having lower baseline levels of sun protection; however analysis of completers found no differences between intervention groups at baseline.
(50% and 80%, respectively) compared to the control group (p=0.000). See Table 5.2 and Appendix 3.

iv) Adolescent interventions - general
Karnatz (1993) used tailored feedback for an enhanced intervention arm, similar to that used by Weinstock et al. (2002), in an intervention based on the Transtheoretical Model, Health Belief Model, and Theory of Reasoned Action. Adolescents (13 to 17 years) in the standard intervention were given three non-personalised pamphlets over a period of three weeks that focused on: information regarding the dangers of sun exposure; a checklist of personal risk factors related to skin cancer, and instructions on how to reduce risk through the use of protective behaviours. The enhanced arm received the same pamphlets as well as information and feedback letters that were individually tailored to each participant’s current sun protection and stage of change. Follow-up at two weeks post intervention found moderate increases for both intervention arms for sunscreen use (p<0.02), but inconsistent results with the use of protective clothing and shade use. The standard intervention saw females substantially increase their use of protective clothing by a relative 1075%, but decrease their use of shade by a relative 114%25. Males similarly increased time in shade by 17% but decreased the use of protective clothing by a relative 33%. The enhanced intervention saw females substantially increase their use of protective clothing by 475% but decrease their time in the shade by 65%. Males in the enhanced intervention decreased both time in shade and use of protective clothing. All these changes were statistically insignificant, but are useful in identifying trends and understanding program effects on behaviour. See Table 5.2 and Appendix 3.

v) Community-wide interventions
Olson et al. (2007) reported on a community-based group randomised trial for adolescents in grades six to eight. The multi-component intervention targeted teens at school through curriculum lessons with interactive slide shows plus the viewing of Dermascan images of their own face to highlight skin damage. ‘Sun teams’ were formed at schools with one teacher and a number of students working together to

25 Use of protective clothing was calculated on a percentage of body protected. As both female intervention groups had low baseline levels of clothing use (2% and 4%), this may account for the large relative increases noted in the results.
develop peer education activities, contests and sun protection announcements. The intervention also targeted teachers, lifeguards, athletic coaches, and primary care clinicians in the community in terms of their functioning as role models and facilitators of sun protection for adolescents. This intervention resulted in a 15% relative change in overall sun protection compared to control communities (p<0.01), although both control and intervention adolescents reduced their sun protection over the trial’s duration. See Table 5.2 and Appendix 3.

5.3.3 Outcomes and follow-up

Outcomes were viewed as short-term for those taken before 12 weeks, and long term at 12 or more weeks. As it was predicted that behavioural effects would lessen with longer follow-up, the first results reported after 12 weeks were used for comparison with other interventions. Follow-up periods for post testing ranged from immediate testing upon completion of an intervention, to 12 months post intervention; however, most studies reported 2 to 8 week follow-ups. Those studies which were seen to utilise ‘settings’ approaches, targeting policy or structural change, were taken as ongoing campaigns until follow-up, unless a distinctive end to the program was cited earlier. They are therefore coded as short-term follow-ups for this review. This pattern is seen in Lowe et al. (1999) and Olson et al. (2007) where short educational programs were given at some point each year for three years, but other strategies were ongoing throughout the year.

Where a longer term follow-up was recorded, outcomes from immediate follow-up after short duration interventions were not considered for this review. Two studies (Karnatz 1993; Novick 1997) followed participants through daily diaries for 2 to 3 weeks post intervention. The Dukeshire (1996b), Mahler et al. (2007), and Weinstock et al. (2002) studies were coded as having long-term follow-ups, at 10, 12 and 12 months respectively.

All but one study used self-report via interviews or written questionnaires to assess behavioural outcomes, with four studies utilising diaries (Karnatz 1993; Novick 1997; Lowe et al. 1999; Buller et al. 2006) and one study using a web survey (Bernhardt 2001). Olson et al. (2007) used observation and interviews.
Eight studies used some form of sun protection index which combined a number of behaviours into a summary mean score. Four studies also reported on specific behaviours within the index. Three studies used sunscreen use as the major behavioural outcome, with Mahler (2005) also reporting on hours spent sunbathing. Karnatz (1993) reported outcomes on sunscreen, shade and protective clothing use. Ten studies reported results via mean scores, one via percentages, and one gave no actual figures stating there were no significant behavioural effects. Of those reporting mean scores, three did not report standard deviations.

Overall, eight out of the 12 studies had some positive effect on sun protective behaviours with three (two high quality, one moderate quality) achieving substantial effects of over 100% relative change (Novick 1997; Mahler et al. 2005; Mahler et al. 2007). Two high quality studies achieved moderate effects of 20% to 100% relative change (Karnatz 1993; Jackson 1997). Three (two high quality, one moderate quality) studies achieved small effects of between 1% to 20% (Weinstock et al. 2002; Buller et al. 2006; Olson et al. 2007). Four studies achieved no significant effect. Lowe et al. (1999) achieved a 44% relative increase in Grade 8 students’ sun protection during the intervention, but no effect at the intervention finish when those students were in Grade 10. Dukeshire (1996a) reported positive but non-significant effects in one study on fear appeals; non-significant effects were reported in a similar study (1996b). Bernhardt (2001) reported no behavioural effect.

It should be noted that while Mahler et al. (2005) achieved substantial increases in sunscreen use, the standard intervention on photo-aging appeared to have a negative influence (non-significant) on the amount of time participants spent sunbathing with a relative increase of 44%. Participants in the enhanced intervention who were given sunless tanner and instructions on its use reported a 38% decrease in sunbathing time (non-significant). This pattern was also seen in Mahler et al. (2007) where those viewing the UV photograph showed non-significant increases in sunbathing at four to five months and one year follow-ups, and non-significant increases in incidental exposure at one year follow-up. See Table 5.2 and Appendix 3.
5.3.4 Quality of studies

Four studies were rated of moderate quality or as having a moderate risk of bias (Dukeshire 1996a; Dukeshire 1996b; Novick 1997; Weinstock et al. 2002). Reasons for this rating stemmed largely from a combination of high attrition rates, lack of demographic information or comparison of study participants pre-study, lack of validation of measurement tools for behavioural outcomes, and a lack of detail in the reporting of results. While many studies had low scores on one or more on one or more quality coding questions, they could still retain a high quality rating if it was judged that those factors had not contributed to a decrease in validity of results. See Table 5.2 and Appendix 3.

Ten of the 12 studies were coded as lacking in sufficient description of participant characteristics with three providing inadequate demographic information, and seven giving no breakdown of demographics between control and intervention groups. This did not allow the reviewers to judge the comparability of groups under evaluation, although some reports subsequently stated no significant differences between groups. Three studies had poor descriptions of the seasonal timing of interventions. While this did not necessarily alter the validity of results, it did not allow the reviewer to judge the appropriateness of follow-up questions and timing.

5.3.5 Use of theory

All but one study utilised behavioural theory to aid development and evaluation of the intervention, with six studies using a combination of two or more theories. As shown in Table 5.1, five theories were commonly used: the Theory of Reasoned Action, Social Cognitive Theory, the Health Belief Model, the Transtheoretical Model, and Protection Motivation Theory. See Table 5.2 and Appendix 3.

Novick (1997) did not state the use of any theory but based the strategies for his intervention on the concept of ‘appearance concern’ whereby female adolescents were shown aged or skin damaged photographs, and supplied with sunscreen. This intervention is similar to other interventions using Protection Motivation Theory.
where the photographs are seen as a threat, and the sunscreen given as a way to avert the threat (coping response).

**Table 5.1: Theories used in published sun protection programs 1980-2007, aimed at influencing the sun protection of adolescents and young adults**26

<table>
<thead>
<tr>
<th>Theory</th>
<th>Used</th>
<th>Effective</th>
</tr>
</thead>
<tbody>
<tr>
<td>Social Cognitive Theory</td>
<td>4</td>
<td>2</td>
</tr>
<tr>
<td>Theory of Reasoned Action/Planned Behaviour</td>
<td>5</td>
<td>3</td>
</tr>
<tr>
<td>Health Belief Model</td>
<td>4</td>
<td>3</td>
</tr>
<tr>
<td>Transtheoretical Model</td>
<td>3</td>
<td>2</td>
</tr>
<tr>
<td>Theory of Alternative Behaviour</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Protection Motivation Theory</td>
<td>5</td>
<td>3</td>
</tr>
<tr>
<td>Elaboration Likelihood Model</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Triandis Theory of Attitude-Behaviour Relations</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Unspecified communication theories</td>
<td>1</td>
<td></td>
</tr>
</tbody>
</table>

Three studies utilised the Transtheoretical Model, either alone or in combination with other behavioural theories. Karnatz (1993) and Weinstock et al. (2002) used the model to segment the target audience and tailor materials to these segments. On the other hand, while Lowe et al. (1999) noted the need for a variety of strategies to target people at different stages of sun protection, they did not use the model to assess the proportion of the audience within different stages nor evaluate their movement through stages.

---

26 This table reports the number of times specific theories were used within interventions and the number of times specific theories were used in interventions that changed behaviour. It does not imply a judgement on whether the theory was or was not used effectively within the intervention. Where more than one theory was used in an intervention, no judgement can be made on which theory contributed to that effectiveness.
5.3.6 Use of formative research

Three studies reported formative research undertaken with target audiences to inform the development of strategies. Bernhardt (2001) used two focus groups with undergraduate students exploring beliefs about skin cancer, risk behaviours, settings, barriers to protective behaviours, preferred language, sources for skin cancer information, and design of images and message presentation. The author indicated this information was used to guide the development and design of the tailored skin cancer prevention message, and to pilot test study measures. Lowe et al. (1999), as reported in Gillespie et al. (1998), used results of a cross-sectional survey of 3655 secondary students from across Queensland. They found that while relevant knowledge and some attitudinal aspects were positive (except for pro-tan attitudes), this did not translate into higher levels of sun protection. The authors stated that this information informed the development of an intervention which moved away from traditional approaches of knowledge acquisition towards an approach which challenged attitudes, supported skills acquisition and focused on immediate effects of the sun such as sunburn and skin damage rather than long-term outcomes such as skin cancer. Weinstock et al. (2002) stated that research from three years of pilot studies on Rhode Island beaches was used to inform strategy and measurement development within the Rhode Island Project. Information gathered through interviews with beachgoers which focused on current sun protective practices and stages of change was later used to provide tailored feedback to study participants. See Table 5.2 and Appendix 3.

5.3.7 Use of segmentation

Six studies were coded as using some type of secondary segmentation, other than age, to divide the target audience. Both Karnatz (1993) and Weinstock et al. (2002), utilising the Transtheoretical Model, segmented the target audience based on the participants’ self-reported stage of change. Tailored feedback was provided to participants on how to reduce personal risk; this was done by utilising the behavioural and cognitive processes of change that have been postulated as assisting in movement through stages. Both interventions were successful in achieving some significant behavioural changes (p<0.02; p<0.004 respectively).
Bernhardt (2001) also used segmentation to provide tailored messages; the tailoring was based on multiple factors including the participants’ self-reported level of involvement, the sun exposure risk behaviours participants were likely to perform in the next 30 days, self-efficacy for using sunscreen, and preference for message source and message design. This intervention did not achieve statistically significant changes in sun protective behaviours.

Dukeshire (1996b) could also be viewed as using segmentation based on pre-assessed sun behaviours of participants. He preselected participants for the study based on self-reported sunbathing over the previous summer, but did not use this segmentation to tailor messages or strategies. Rather, he investigated the effects of fear appeals on a ‘high risk’ target audience. Novick (1997) and Jackson (1997) also pre-selected participants, targeting their interventions only at Caucasian females. See Table 5.2 and Appendix 3.

### 5.3.8 Environmental analysis

Six interventions were coded as using some form of environmental strategy. Three studies provided sunscreen to intervention groups, and all achieved small to moderate changes in sun protective behaviour (Novick 1997; Weinstock et al. 2002; Olson et al. 2007). Mahler et al. (2005) did not use environmental strategies in a standard intervention arm, but provided sunless tanner with instructions on its use to an enhanced intervention arm. While both interventions achieved significant changes in the use of sunscreen when not sunbathing (p<0.02), the enhanced intervention reported a relative increase of 550% as compared to the standard intervention at 160%.

Additionally, the enhanced intervention showed a positive trend towards decreased sunbathing whereas the standard intervention showed a negative trend towards increased sunbathing.

---

27 Mahler et al. (2005) also provided sunscreen to the interventions groups but viewed this as a gift rather than a strategy.

28 Frequency of sunscreen use on the face was measured on a scale of 0% to 100%.
Three interventions attempted to target social norms within interventions. Lowe et al. (1991) used participatory discussion and role playing to look at social images, media, peer influences, and reinforcement in society for the ‘bronzed Aussie’ look. The intervention achieved small positive changes at preliminary follow-up but no significant changes by program end. Jackson (1997) used a video of television show segments and magazine advertisements that portrayed the change in the stylishness of tanning in the 1970s compared to the 1990s, in order to highlight changing norms away from tanned skin. The intervention was successful in changing behaviours (p<0.05); mediational analyses showed significant changes to attitudes and norms (p<0.001). Olson et al. (2007) targeted adults, clinicians, coaches and lifeguards within their community intervention – educating them on their important influence as role models and information givers. They were also shown a Dermascan of their own faces to highlight UV damage. A significant positive effect of the intervention on sun protection was noted (p<0.01).

Only two interventions could be seen to take a ‘settings’ approach where a variety of strategies were implemented to influence the whole environment in which the target behaviours are practiced such as school, workplace and neighbourhood. Lowe et al. (1999) used structural and policy change to provide more shade, enforce sun protection rules within the school, and reschedule school events out of high UV times. Olson et al. (2007) also used a school setting with specific student ‘SunSafe’ education, sun protection education within other classes, and ‘Sun Teams’ which organised peer education activities, public service announcements, contests and other activities within the school setting. They also extended this setting approach into the wider community, with the targeting of role models as well as utilising posters at stores, beaches, pools and primary care sites, bookmarks at libraries, and community fairs to promote a sun protection message. See Table 5.2 and Appendix 3.

5.3.9 Targeting of secondary audiences

Only two interventions targeted secondary audiences as well as the primary audience of adolescents or young adults. Lowe et al. (1999) targeted parents by requesting home exercises to be completed by children and parents; however, it is difficult to
assess how involved parents may have been in these activities. This intervention achieved small behavioural changes one year from baseline, but no effect at three years. Olson et al. (2007) targeted primary care providers, teachers, school staff, recreation and sports staff. While the authors stated that parents were also targeted as change agents and role models, no specific strategies appeared to be directed at this group. See Table 5.2 and Appendix 3.

5.3.10 Message features

A number of studies utilised differing message strategies in promoting a sun protective message. The two studies by Dukeshire (1996a; 1996b) investigated the use of fear appeals and found no evidence as to their utility over information or enhancers only. Additionally, a non-significant finding of a negative effect on sunbathing was seen at long term (10 month) follow-up, with the high fear appeal appearing to have a more negative effect than the low fear appeal (p level not recorded). The studies used audio-visual appeals which combined a short narration about the sun and its effects on people’s health, with written and pictorial information lasting 2.5 to 3.5 minutes. The high fear appeal began with a warning of the sun’s role in skin cancer and the risk of developing cancer in one’s lifetime, and presented graphic colour photographs of advanced skin cancer lesions on various parts of the body. It then gave screening information on how to detect skin cancer, again with colour photographs, and prevention messages. The low fear appeal was identical except for the omission of the advanced skin cancer lesions. These studies were also the only first tier interventions that combined detection messages with primary prevention messages.

Seven studies were coded as providing some type of tailored message to target individuals. Of these, five used photographs or Dermscans of the participants, with Mahler et al. (2005 and 2007) and Olson et al. (2007) showing UV photographs or Dermscans which highlighted sun damage not seen to the naked eye. Novick (1997) showed photographs aged by 25 years, or aged and transposed with skin cancerous lesions. These photographs could also be said to contain a fear appeal, dependent on the amount of damage obvious on the photograph, and were used to increase participants’ perceived susceptibility to skin damage. Weinstock et al. (2002) showed
UV photographs similarly to Mahler et al. (2005 and 2007) and tailored feedback through mailed reports matched to each individual’s stage of change. This type of personalised feedback was also utilised by Karnatz (1993). All these interventions were effective in achieving some behaviour change (p<0.05; p=0.000; p<0.004; p<0.02 respectively).

Bernhardt (2001) was unsuccessful in achieving behaviour change with a tailored web page as described in Section 5.3.7. This study’s messages focused on ‘participants’ outcomes of regularly using or not using sunscreen and their perceived self-efficacy to regularly use sunscreen during their high-risk sun exposure behaviours’, as well as tailored messages of skin cancer risk according to their skin tone, sun behaviours, barriers to wearing sunscreen, perceived risk of skin cancer and personal involvement with the issue of skin cancer (Bernhardt 2001, pg.292).

Lowe et al.’s (1999) curricular-based intervention focused on a message of the immediate effects of the sun such as skin damage and sunburn, with less emphasis on the long term outcomes of skin cancer (Gillespie et al. 1998). Buller et al. (2006), in another curricular-based intervention, combined a skin damage and skin cancer prevention message. Both interventions focused on personal risk and self-efficacy. See Table 5.2 and Appendix 3.

**5.3.11 Dissemination channels**

Many interventions used print or audio-visual materials to present sun protection information; some were also coded as using ‘other’ dissemination channels including participatory discussion groups (Lowe et al. 1999), visualisation tasks and survivor testimonials (Jackson 1997), role modelling (Olson et al. 2007), and UV, Dermscans or aged photographs (Novick 1997; Weinstock et al. 2002; Mahler et al. 2005; Olson et al. 2007). Only one intervention (Bernhardt 2001) used interactive media, with participants completing a web-based survey which then linked them immediately to a tailored web page with sun protection information. The tailored web page itself did not appear to be interactive. See Table 5.2 and Appendix 3.
5.3.12 Length of campaign

Seven interventions were coded as ‘one-off’ interventions, all of which lasted less than one hour. Of these four were successful with Mahler et al. (2007), Mahler et al. (2005), and Novick (1997) using a photo-aging prevention approach, and Jackson (1997) using a skin cancer and photo-aging prevention approach. Bernhardt (2001) with the web-based information, and Dukeshire (1996a; 1996b) did not alter sun protective behaviours. Karnatz (1993) was successful with an intervention of three weeks duration, followed-up over the next two weeks. Buller et al. (2006) showed short-term behaviour change with six 50 minute lessons over a period of six weeks. Weinstock et al. (2002) showed behavioural changes with a year long intervention, with follow-up 12 months post intervention; Lowe et al. (1999) showed no behavioural changes at intervention completion with a four to six week educational module each year for three years, with follow-up approximately three months post each module. Olson et al. (2007) found a decreased decline in sun protection in intervention groups compared to control groups with a three year intervention, but noted no positive results until the second year of the intervention.

See Table 5.2 and Appendix 3.
Table 5.2: Summary of results for first tier of evidence

<table>
<thead>
<tr>
<th>First tier evidence</th>
<th>Best relative effect (significance)</th>
<th>Study quality (H, M, L)</th>
<th>Use of theory</th>
<th>Use of formative research</th>
<th>Use of segmentation</th>
<th>Environment or Social strategies</th>
<th>Audience</th>
<th>Message content &amp; features</th>
<th>Dissemination channels</th>
<th>Length of campaign</th>
</tr>
</thead>
<tbody>
<tr>
<td>Buller et al. (2006) RCT n=2038 School</td>
<td>4% overall sun protection at 1 month follow-up (p=0.0035)</td>
<td>High</td>
<td>SCT</td>
<td>Age only</td>
<td>Students</td>
<td>Skin damage, skin cancer, efficacy</td>
<td>Education, activities</td>
<td>6 weeks</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lowe et al (1999) RCT n=3,400 School</td>
<td>44% overall sun protection at 1 year, no effect at 3 year finish</td>
<td>High</td>
<td>SCT, HBM, Trans.</td>
<td>Survey</td>
<td>Age only</td>
<td>Policy strategies</td>
<td>Students and parents</td>
<td>Skin damage, efficacy</td>
<td>Education Interactive</td>
<td>4 to 6 weeks each year for 3 years</td>
</tr>
<tr>
<td>Mahler et al. (2007) RCT n=133 University</td>
<td>177% decrease incidental exposure (p&lt;0.02)</td>
<td>High</td>
<td>HBM; PMT; TPB</td>
<td>-----------------</td>
<td>Students</td>
<td>Photoaging Message and/or photo</td>
<td>Audiovisual and/or photo</td>
<td>&lt; 1 hour</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mahler et al. (2005) RCT n=146 University</td>
<td>Sunscreen use I1=160% I2=550% (p&lt;0.05)</td>
<td>High</td>
<td>TAB</td>
<td>-----------------</td>
<td>Students</td>
<td>Photoaging Message Tailored UV photo</td>
<td>I1 &amp; I2= Video, Photos I2 =As above plus tangible product</td>
<td>&lt; 1 hour</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

29 SCT (Social Cognitive Theory), HBM (Health Belief Model), Trans (Transtheoretical Model), TPB (Theory of Planned Behaviour), TAB (Theory of Alternative Behaviour), ELM (Elaboration Likelihood Model), PMT (Protection Motivation Theory), TRA (Theory of Reasoned Action), Triandis (Triandis Theory of Attitude-Behavior Relations).
<table>
<thead>
<tr>
<th>First tier evidence</th>
<th>Best relative effect (significanc e)</th>
<th>Study quality (H, M, L)</th>
<th>Use of theory 30</th>
<th>Use of formative research</th>
<th>Use of segmentation</th>
<th>Environme ntal or Social strategies</th>
<th>Audience</th>
<th>Message content &amp; features</th>
<th>Dissemination channels</th>
<th>Length of campaign</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bernhardt et al. (2001) RCT n=83 University</td>
<td>No behavioural effect</td>
<td>High</td>
<td>SCT, ELM, other Focus groups</td>
<td>Multi – on perceptions, skin type, efficacy, behaviour</td>
<td>---------------</td>
<td>Students</td>
<td>Skin cancer message, personal risk Tailored web page</td>
<td>Web page</td>
<td>&lt;1 hour</td>
<td></td>
</tr>
<tr>
<td>Jackson (1997) RCT n=211 University</td>
<td>Sun protection body= 25% (p&lt;0.05)</td>
<td>High</td>
<td>TRA, HBM, PMT, Triandis</td>
<td>Age, gender Social norms</td>
<td>Students</td>
<td>Skin cancer photoaging message</td>
<td>Print material, video, visualization task</td>
<td>&lt;1 hour</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dukeshire (1996) P&amp;P with control N=131 University</td>
<td>Not significant</td>
<td>Mod</td>
<td>TRA, PMT</td>
<td>----------------</td>
<td>Students</td>
<td>Fear appeal, secondary detection</td>
<td>Print material, Audiovisual materials</td>
<td>&lt;10 minutes</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dukeshire (1996)</td>
<td>Not significant</td>
<td>Mod</td>
<td>TRA, PMT</td>
<td>Segmented on behaviour</td>
<td>Students</td>
<td>As above</td>
<td>As above</td>
<td>&lt;10 minutes</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Weinstock et al. (2002) RCT n=2324 Tourist/recreation</td>
<td>Overall sun protection =9.3% (p=0.004)</td>
<td>Mod</td>
<td>Trans</td>
<td>3 years pilot studies, beach interviews</td>
<td>Segmented on stage of change</td>
<td>Given sunscreen Primary audience</td>
<td>Photoaging, UV photos Tailored feedback</td>
<td>Print material, written and verbal feedback</td>
<td>3 contacts over 1 year</td>
<td></td>
</tr>
</tbody>
</table>

30 SCT (Social Cognitive Theory), HBM (Health Belief Model), Trans (Transtheoretical Model), TPB (Theory of Planned Behaviour), TAB (Theory of Alternative Behaviour), ELM (Elaboration Likelihood Model), PMT (Protection Motivation Theory), TRA (Theory of Reasoned Action), Triandis (Triandis Theory of Attitude-Behavior Relations).
<table>
<thead>
<tr>
<th>First tier evidence</th>
<th>Best relative effect (significance)</th>
<th>Study quality (H, M, L)</th>
<th>Use of theory</th>
<th>Use of formative research</th>
<th>Use of segmentation</th>
<th>Environmetal or Social strategies</th>
<th>Audience</th>
<th>Message content &amp; features</th>
<th>Dissemination channels</th>
<th>Length of campaign</th>
</tr>
</thead>
<tbody>
<tr>
<td>Novick (1997)</td>
<td>Time series n=30</td>
<td>Tourist/recreation</td>
<td>Sunscreen use</td>
<td>I1=50% I2=87% (p=0.000)</td>
<td>Mod</td>
<td>Age &amp; gender</td>
<td>Given sunscreen</td>
<td>Primary audience</td>
<td>Photoaging Aged photos</td>
<td>Photos</td>
</tr>
<tr>
<td>Olson et al. (2007)</td>
<td>RCT n=797</td>
<td>Community</td>
<td>Overall sun protection</td>
<td>15% (p&lt;0.01)</td>
<td>High</td>
<td>SCT: PMT</td>
<td>Age</td>
<td>Policy, sun protection breaks in sport, sunscreen provided</td>
<td>Students, caregivers, coaches, lifeguards</td>
<td>Skin damage, skin cancer, role modelling, environmental cues</td>
</tr>
<tr>
<td>Karnatz (1993)</td>
<td>RCT n=98</td>
<td>General</td>
<td>Sunscreen use</td>
<td>I1=46% I2=55% (p&lt;0.02)</td>
<td>High</td>
<td>Trans, HBM, TRA</td>
<td>Age I2= stage of change</td>
<td>Primary audience</td>
<td>Skin cancer message I2= tailored feedback</td>
<td>Print material</td>
</tr>
</tbody>
</table>

31 SCT (Social Cognitive Theory), HBM (Health Belief Model), Trans (Transtheoretical Model), TPB (Theory of Planned Behaviour), TAB (Theory of Alternative Behaviour), ELM (Elaboration Likelihood Model), PMT (Protection Motivation Theory), TRA (Theory of Reasoned Action), Triandis (Triandis Theory of Attitude-Behavior Relations).
5.4 Results – other study designs (Tier two studies)

5.4.1 Study Characteristics (Second tier evidence)
In the expanded review an additional 11 studies were analysed: five used pre and post designs without a control group; three used a time series design without a control group; and three used a post-test only design with a control group. The 11 additional studies originated from the USA (4), Australia (4), Canada (1), and the UK (1). Four interventions used a secondary-school setting, two used university-settings, one a recreational setting, and four were coded as population-wide. Sample sizes ranged from 62 to 1,655. Lombard et al. (1991) had a sample size of two recreational settings, with analysis based on the number of observations rather than participants.

5.4.2 Interventions
Four additional secondary-school studies were included in the second tier of evidence. Geller et al. (2003a), Geller et al. (2005), and Ramstack (1986) all reported curricular-based interventions, none of which discussed the use of behavioural theory. Geller et al. (2003a) reported some changes in wearing of long-sleeved shirts (significance not reported); however as follow-up was undertaken immediately post intervention this result may represent intentions rather than behaviour change. Geller et al. (2005) reported no change in the wearing of hats or sunscreen, but a significant small decrease in the wearing of protective clothing (p=0.03). Ramstack et al. (1986) reported substantial changes in sunscreen, moderate changes in wearing protective clothing, and small changes in tanning and hat wearing (overall significance p<0.001). Hughes (1993) reported on a multi-factorial intervention in which four intervention arms were compared to a control group: (Group 1) – students were given a workbook and leaflet on sun protection; (Group 2) – same as Group 1 plus a video in which an actress from a popular television show discussed the concepts of sun and skin cancer with a class of children; (Group 3) – same as Group 2 plus getting students to design posters for homework; (Group 4) – Same as Group 3 plus an additional discussion about issues raised in the earlier segments. No statistically significant changes in behaviour were noted (figures not recorded).
Two additional university-based interventions were also reviewed. Mahler et al. (1997) compared a 10 minute slide show with an emphasis on the use of sunscreen to *stop photo-aging* against a 10 minute slide show with an emphasis on the use of sunscreen to *prevent skin cancer*. No significant behavioural change was found. However, there appeared to be a negative trend towards increased sunbathing, with the skin cancer prevention group showing greater relative increases than the photo-aging group. No outcome for use of sunscreen was reported except for the yes/no use of sunscreen which had been given to participants as a gift. Dukeshire (1996c) reported on a study investigating high against low against no fear appeals. The study found no behavioural effects; however, Dukeshire notes that a process evaluation showed that fear levels were not effectively manipulated.

One additional intervention at a tourist or recreational setting was reviewed. This study utilised a time series design where a non-equivalent comparison group (Pool B) received the intervention 17 days after Pool A.  

As formative research with patrons, staff and management indicated that lifeguards were visible and recognisable peer leaders in the swimming pool environment and could be used as intervention agents to influence protective behaviours among pool patrons, Lombard et al. (1991) used role modelling by lifeguards as a major component of their intervention, providing them with clothing, hats, sunscreen and shade. The intervention also used a variety of strategies including: the use of signage, posters, and pamphlets; the provision of sunscreen; feedback on the prevalence of sun protective behaviours posted within the pool environment; and a commitment raffle to promote sun protection. It achieved moderate to substantial increases in a number of protective behaviours during the intervention.

Four population-wide campaigns were reviewed, all of which used mass media advertising as an essential strategy within the campaign. The campaigns were evaluated with cross-sectional surveys before and after the campaign period. McGee and Williams (1992) reported the evaluation of a three month New Zealand ‘SunSmart’ campaign aimed at adolescents. The campaign used a variety of media to increase awareness of melanoma and sun protection through primary messages of ‘be

---

32 While this time series design featured a delayed start for the second intervention site, it was not coded as running a concurrent control group, as both groups finished at the same time.
sun smart’ and ‘cover up with a hat, shirt and sunscreen’. Little information was provided on the campaign itself, but a moderate decrease in tanning (22% relative change), and a small increase in overall sun protection (6% relative change) from pre to post testing in students aged 13 to 15 years old (significance not reported). Hill et al. (1993) reported on an evaluation of the ‘SunSmart’ campaign conducted in Victoria from 1988 to 1991. While the campaign targeted all age groups, the evaluation separately reported results for the 14 to 29 year old group. The intervention was a multi-component campaign comprising mass media advertising, sponsorships, teaching resources for schools, advising on school policies, working with unions to produce sun protection guidelines for workers, and advocacy to reduce sunscreen prices, promote sun protection in magazines and fashion houses, and promote shade at recreation areas. The campaign was an extension of earlier public education campaigns which had significantly raised awareness within the population. Evaluation at two years found significant changes in the wearing of hats by females (167% relative change, p<0.01) and changes in the wearing of protective clothing by males and females aged 14 to 29 (8% and 5% relative change, p<0.01). Dobinson (2004a; 2004b) also reported on the continuing ‘SunSmart’ campaign in Victoria conducted during 1999 to 2001. As such it included the previously noted strategies but also included a new advertising campaign – ‘Time Bomb’. Evaluation of effects on 14 to 29 year olds found significant increases in attempts to get a tan (25% relative change, p<0.01). They also found small, positive changes for wearing hats and sunscreen and negative changes for wearing shirts; however none of those changes reached statistical significance. Jalleh and Donovan (2002; 2003) reported on the evaluation of a three year Western Australian mass media campaign termed ‘SunSmart West Aussies’. The campaign primarily consisted of an advertisement, ‘How to remove a skin cancer’ and a media-based competition, ‘Spot the SunSmart West Aussie’. The evaluation was given found small decreases in the wearing of hats, sunscreen, clothing, and the use of shade. Statistical significance was not reported (as results from two studies were combined to give effect levels).

5.4.3 Quality Assessment

Eight studies were coded as being of moderate quality and three as low quality. Moderate quality was the highest these study designs could achieve due to their lack
of a comparison group. Those studies coded as low were given the ratings due to a lack of detail on participant recruitment or selection, and the timing of the follow-up evaluations (eg. immediate evaluation after a short duration intervention or asking questions about seasonal behaviours that respondents would not have experienced by follow-up). Findings from these studies need to be treated with some caution.

5.4.4 Other factors

None of the secondary-school interventions in the second tier of evidence noted the use of behavioural theory or formative research with the target group. All the studies tended to use standard educational channels for dissemination of the sun protection message, with some using print or popular media, and discussion. Notably the most consistent positive changes occurred in the oldest intervention, which was conducted before 1986. This was also seen in the population-wide interventions where McGee and Williams (1992) and Hill et al. (1993) (reporting on a 1988 to 1991 campaign) achieved small to substantial positive changes in a variety of behaviours, whereas two later campaigns found more negative results. The Victorian ‘SunSmart’ campaigns reported the use of the Transtheoretical Model and other non-defined theories of social cognitive behaviour to inform the development of their campaigns. They also conducted formative research with adolescent focus groups (The Anti-Cancer Council 1989). Similar to Lowe et al. (1999), a variety of strategies were implemented to effect people at different stages of change; thus no further segmentation or message tailoring was performed within the target audience. These interventions could be said to most closely follow a social marketing process within program development given their use of behavioural theory, formative research, use of environmental strategies, and strong promotional efforts.

A summary of these results are included overleaf in Tables 5.2 and 5.3, with more comprehensive data sheets in Appendix 3.
Table 5.3: Summary of results for second tier of evidence

<table>
<thead>
<tr>
<th>Second tier evidence</th>
<th>Best relative effect (significance)</th>
<th>Study quality (H, M, L)</th>
<th>Use of theory</th>
<th>Use of formative research</th>
<th>Use of segmentation</th>
<th>Environment or Social strategies</th>
<th>Audiences</th>
<th>Message content &amp; features</th>
<th>Dissemination channels</th>
<th>Length of campaign</th>
</tr>
</thead>
<tbody>
<tr>
<td>Geller et al. (2002, 2003) Pre &amp; post n=214 School</td>
<td>Use of shirts 138% (unknown significance for adolescent age group)</td>
<td>Mod</td>
<td>----------</td>
<td>-----------</td>
<td>Age</td>
<td>Policy guidelines but not utilised</td>
<td>Primary</td>
<td>Skin cancer message, UV literacy</td>
<td>Popular media, education</td>
<td>1 to 2 hours if no supplementary activities</td>
</tr>
<tr>
<td>Geller et al. (2005) Pre &amp; post n=344 School</td>
<td>No positive behaviour change</td>
<td>Mod</td>
<td>----------</td>
<td>-----------</td>
<td>Age</td>
<td>----------</td>
<td>Primary</td>
<td>Skin cancer &amp; detection message, UV literacy</td>
<td>Education</td>
<td>7 lessons over approx 2 months</td>
</tr>
<tr>
<td>Ramstack et al. (1996) Pre &amp; post n=289 School</td>
<td>Sunscreen use =140% (p&lt;0.001 for all behaviours)</td>
<td>Low</td>
<td>----------</td>
<td>Not with target group, but teachers and education authority</td>
<td>Age</td>
<td>----------</td>
<td>Primary</td>
<td>Skin cancer &amp; detection message</td>
<td>Education</td>
<td>Approx 6 weeks</td>
</tr>
</tbody>
</table>

33 SCT (Social Cognitive Theory), HBM (Health Belief Model), Trans (Transtheoretical Model), TPB (Theory of Planned Behaviour), TAB (Theory of Alternative Behaviour), ELM (Elaboration Likelihood Model), PMT (Protection Motivation Theory), TRA (Theory of Reasoned Action), Triandis (Triandis Theory of Attitude-Behavior Relations).
<table>
<thead>
<tr>
<th>Second tier evidence</th>
<th>Best relative effect (significance)</th>
<th>Study quality (H, M, L)</th>
<th>Use of theory 34</th>
<th>Use of formative research</th>
<th>Use of segmentation</th>
<th>Environment or Social strategies</th>
<th>Audiences</th>
<th>Message content &amp; features</th>
<th>Dissemination channels</th>
<th>Length of campaign</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hughes et al. (1993) Post with control n=543 School</td>
<td>No behavioural effect</td>
<td>Mod</td>
<td>--------</td>
<td>-----------</td>
<td>Age</td>
<td>--------------------------</td>
<td>Primary</td>
<td>Skin cancer message</td>
<td>Print material, education, group discussion</td>
<td>&lt; 1 week</td>
</tr>
<tr>
<td>Mahler et al. (1997) Post test with comparison n=62 University</td>
<td>Not significant</td>
<td>Mod</td>
<td>Uses items from HBM but not explicit</td>
<td>-----------</td>
<td>Age</td>
<td>--------------------------</td>
<td>Primary</td>
<td>I1= photoaging, I2= skin cancer message</td>
<td>Slide show</td>
<td>10 minutes</td>
</tr>
<tr>
<td>Dukeshire (1996c) Post test with control n=120 University</td>
<td>No behavioural change</td>
<td>Mod</td>
<td>TRA, PMT</td>
<td>-----------</td>
<td>-----------</td>
<td>Primary</td>
<td>Fear appeal, secondary detection</td>
<td>Print material, audio-visual material</td>
<td>&lt; 5 minutes</td>
<td></td>
</tr>
<tr>
<td>Lombard et al. (1991) Time series N= 2 pools Tourist/recreation</td>
<td>Shade use I1= 355% Overall sun protection I2=341% (Significance)</td>
<td>Mod</td>
<td>SCT</td>
<td>Interviews with patrons, staff</td>
<td>Age</td>
<td>Given sunscreen, settings approach</td>
<td>Children, parents, lifeguards</td>
<td>Skin cancer message</td>
<td>Print material, role modelling, feedback posters, raffle</td>
<td>21 to 42 days</td>
</tr>
</tbody>
</table>

34 SCT (Social Cognitive Theory), HBM (Health Belief Model), Trans (Transtheoretical Model), TPB (Theory of Planned Behaviour), TAB (Theory of Alternative Behaviour), ELM (Elaboration Likelihood Model), PMT (Protection Motivation Theory), TRA (Theory of Reasoned Action), Triandis (Triandis Theory of Attitude-Behavior Relations).
<table>
<thead>
<tr>
<th>Second tier evidence</th>
<th>Best relative effect (significance)</th>
<th>Study quality (H, M, L)</th>
<th>Use of theory</th>
<th>Use of formative research</th>
<th>Use of segmentation</th>
<th>Environment or Social strategies</th>
<th>Audiences</th>
<th>Message content &amp; features</th>
<th>Dissemination channels</th>
<th>Length of campaign</th>
</tr>
</thead>
</table>
| McGee et al. (1992)  | X-section surveys
n= 286 / 345
Community-wide | Tanning decrease = 22% (unknown significance) | Mod | -------- | -------- | Age | Primary | Skin cancer message, secondary detection | Mass media | Approx. 3 months |
n=1655/1376
Community-wide | Use of hats women = 167% (p<0.01) | Mod | Trans, other social cog theories | Focus groups | Multiple strategies-policy, advocacy, shade & worker guidelines, media pressure | Population-wide: primary and secondary targeted | Skin cancer message | Mass media, other advertising, education, sponsorships | 2 years. Media campaign over 2 summers. |
| Dobbinson et al. (2004a) (2004b) X-section surveys
n=1406/1426
Community-wide | No significant change | Mod | As above | Youth advisory committee | As above | Population-wide: Primary and secondary targeted | Skin cancer message, detection message | Mass media. Public relations, education, sponsorships | 2 years, summer media campaigns |
| Jalleh et al. (1999) | X-section surveys
n=100/200
Community-wide | Small negative change of unknown significance | Mod | -------- | -------- | Age | Population-wide: Primary targeted | Skin cancer, detection message | Mass media, promotional | Approx 3 months, summer campaign |

35 SCT (Social Cognitive Theory), HBM (Health Belief Model), Trans (Transtheoretical Model), TPB (Theory of Planned Behaviour), TAB (Theory of Alternative Behaviour), ELM (Elaboration Likelihood Model), PMT (protection Motivation Theory), TRA (Theory of Reasoned Action), Triandis (Triandis Theory of Attitude-Behavior Relations).
5.5 Discussion

5.5.1 Judging the effectiveness of sun protection interventions aimed at adolescents and young adults

It is difficult to give a definitive judgement on the effectiveness of programs targeted at adolescent and young adults. While a number of interventions were successful in changing some aspect of sun related behaviour, a majority of these were small, experimental studies which have limited potential for generalising their results.

In the secondary school environment there is limited evidence that sun protection interventions can change adolescent behaviour in the short term. Within the first tier of evidence Buller et al. (2006) found small relative effects (4%) in overall sun protection compared to control school participants at one month follow-up (p = 0.0035). However, Lowe et al. (1999), whilst achieving some success at the end of one year of a three year intervention with younger age groups (relative change 44% in overall sun protection, p<0.001), found no significant changes in those same students at the end of the intervention. Lowe et al. (1999) appeared to have many elements within their campaign which may have enhanced success in a younger age group, and did in fact achieve moderate success at the end of the first year with younger participants. The fact that it did not achieve significant behaviour change in the adolescent participants at the end of the study highlights the difficulties in targeting this audience. The authors of both studies suggest the strong influence of peer pressure and social norms which act on this group points to the need for any intervention targeting the adolescent market to engage at a community rather than a local school level. Two other interventions utilising a before and after design noted positive changes in sun protection behaviour. However, the lack of a control group and immediate follow-up for both interventions means results should be viewed with caution (Geller et al. 2002/ 2003; Ramstack et al. 1996).

University-based interventions also had mixed results. The studies tend to be small, theoretically driven experiments that were testing limited strategies against control groups. Thus caution is also needed when generalising these results to a wider population. Only three first tier interventions had some success in changing
behaviours (Mahler et al. 2007; Mahler et al. 2005; Jackson 1997); however the small samples sizes of most studies meant a decided lack of power to detect changes.

All three of the interventions at tourist or recreational environments were successful in achieving some behaviour change. Of most note, given its 12 month follow-up, is the Weinstock et al. study (2002) which reported a 9.3% relative change in overall sun protection for participants aged 16 to 24 years. While some degree of bias may be present due to its high attrition of 38%, this study shows the possibility of long-term change in adolescent and young adult sun protective behaviours.

The strongest evidence that adolescent sun protection behaviour can be positively influenced is seen in the community-wide group randomised trial for adolescents in grades six to eight (Olson et al. 2007). Whilst the intervention did not increase sun protection amongst the intervention groups, it lessened the well documented decline in sun protection which occurs in young adolescents, achieving a positive relative change of 15% in sun protection when compared to control groups. The study design and participant numbers (n=797) provide good support for the effectiveness of this intervention.

5.5.2 The use of social marketing

While no study explicitly stated the use of social marketing in intervention development or process, a number of studies used some social marketing elements within the development process. The Victorian ‘SunSmart’ campaigns could be said to most closely follow a social marketing process with their use of behavioural theory, formative research, environmental strategies, and strong promotional efforts. It should be noted that while not previously labelled as such by the developers, these programs are now described by Australian state Cancer Councils as ‘social marketing’ campaigns (Cancer Council NSW 2010)\textsuperscript{36}. Weinstock et al. (2002) also utilised behavioural theory, formative research and extensive pilot testing, as well segmentation of the target audience, to tailor materials to individuals.

\textsuperscript{36} As noted previously, knowledge of the development of the campaigns would be needed to assess the campaigns against social marketing benchmark criteria.
5.5.3 The use of behavioural theory

Most interventions utilised behavioural theory to aid development and evaluation of the intervention, with 11 interventions noting a combination of two or more theories. The five theories commonly mentioned were: the Theory of Reasoned Action, Protection Motivation Theory, the Health Belief Model, Social Cognitive Theory, and the Transtheoretical Model. While an in-depth examination of how these theories or models informed the development of strategies is impossible due to the lack of description in many reports, some general observations can be made.

The Theory of Reasoned Action/Planned Behaviour was used most commonly, along with Protection Motivation Theory, and would appear to be a useful model as it allows the inclusion of the concept of normative beliefs (i.e. the belief about whether each referent approves or disapproves of the behaviour). Within this target group, peer referents appear to have a major impact on decision-making, although Robinson (2004) found group norms a greater predictor of sun behaviour than subjective norms. This means that while adolescents and young adults may be aware of a number of different attitudes held by parents, friends and important others in particular situations or contexts, it is the attitudes of particular groups that hold precedence dependent on who the individual identifies most with in that situation. It may be that this theory needs the addition of a group norm construct to more closely identify the decision-making process for this demographic.

Protection Motivation Theory (PMT) was utilised by five first tier interventions, always in combination with one or more other theories. Its use tended to be seen in the formulation of sun protection communications where it informed the development of messages including ‘threat’ components (perceived severity and vulnerability), and ‘coping appraisal’ components (response efficacy and self-efficacy). Dukeshire (1996) examined specific constructs from PMT by investigating the use of high or low fear ‘threats’ and their effect on the sun protection of

---

37 While subjective norm is a measure of perceived pressure from all referents and reference groups that people define as important to them, group norms are a measure of perceived pressure from specific reference groups that the person identifies with in that context.
university students, in three separate experiments. The results did not demonstrate any consistent effects of the efficacy of high fear over low fear messages.

The Health Belief Model was utilised by four interventions, always in conjunction with other theories. Its constructs of perceived threat against perceived benefits and barriers appears a useful starting point for intervention development although, for this demographic, the threat of skin cancer has less veracity than the threat of skin damage (i.e., wrinkles, skin spots and aging). This theory is also limited in its explanation of social and environmental influences which, as noted previously, play a major role in the decision to sun protect for this demographic.

Social Cognitive Theory was utilised by four interventions, two of which were successful in changing sun protection behaviour. This theory has been used successfully to guide a number of interventions with adolescents, particularly in the area of smoking cessation (McDonald et al. 2003). Its conceptualisation of behaviour as a dynamic interaction between behaviour, personal and environmental influences resonates for the situational aspects of sun protection. In addition, constructs of behavioural capability, self-efficacy, reinforcements and observational learning give useful guidance for the development of strategies for this demographic.

The Transtheoretical Model was utilised by three first tier studies, and two second tier studies. It appears to be useful for segmenting the target audience to tailor messages to individuals within the target group. The model identifies 10 processes of change which are said to be ‘covert and overt activities’ that people use to progress through stages. This includes processes such as: increasing awareness about the causes, consequences, and cures for a problem behaviour (consciousness raising); assessment of one’s self-image with and without a problem behaviour (self re-evaluation); and affective and cognitive re-assessments of how the presence or absence of the particular behaviour effects one’s social environment (environmental re-evaluation) (Prochaska et al. 2002). The use of these 10 processes of change gives practical guidance to the formulation of strategies within an intervention. However, while these processes of change appear to be a strength of the model by assisting the formulation of strategies, further research is needed to confirm the stages as
appropriate descriptors of sun protective behaviour and which processes are relevant for each stage for these behaviors.

5.5.4 Appearance/skin damage focus

One of the major observations of this review is the general effectiveness of interventions focused on appearance or skin damage rather than, or occasionally including, a skin cancer message. A number of successful interventions targeted appearance concern through photographs or audio-visual materials (Mahler et al. 2007; Olson et al. 2007; Mahler et al. 2005; Weinstock et al. 2004; Novick 1997; Jackson 1997). While, many of these interventions were of less than an hour in duration, one showed some positive behaviour change one year post intervention with no further input. One of the few facilitators of sun protection voiced by adolescents and young adults is the need to prevent wrinkles, sun damage and the embarrassment of sunburn. Therefore, these interventions can be seen to recognise that, particularly within this target group, the fear of aging and wrinkled skin holds a more salient threat than that of skin cancer. It appears that a focus on these deleterious effects may be the best way of gaining interest in a sun protection message, and at the same time promoting benefits which can be realised in the short rather than long term.

While the benefits of a focus on appearance and skin damage are apparent, the efficacy of photo-aging information as opposed to UV photographs or Dermascan images is unclear. UV photographs or Dermascan images convey feedback on adolescent and young adults’ previous sun related behaviours, and were an integral element in studies by Mahler et al (2007), Mahler et al. (2005), Weinstock et al. (2004) and Olson et al. (2007). Mahler et al. (2007) compared photo-aging information against UV photographs against no information in a 2 X 2 X 2 design. They found that while both interventions showed some shorter-term positive changes in sun protective behaviour, the photo-aging information appeared more effective in producing longer-term change. No significant interactions were found between the two interventions. Jackson (1997) and Buller et al. (2006) noted positive changes in sun protection with a combined photo-aging/skin damage and skin cancer message.
5.5.5 Self-efficacy and planning

Adolescents and young adults have indicated that barriers to sun protection include forgetfulness, unpreparedness, laziness, inconvenience, and lack of attention (Lupton and Gaffney 1996; Lovato et al. 1998; Horsley et al. 2002; Abroms et al. 2003; Cancer Research UK 2003; Mikati 2005). Therefore, while many in this target group may have relatively positive attitudes to sun protection, there is a gap between intentions and action. This suggests a need for strategies that target planning for, and implementation of, sun protection in different situations to be included in intervention development, as well as skill building to improve self-efficacy. The Jackson (1997) intervention appeared to be the only one that attempted to affect post-intentional cognitions, with a visualisation task in which participants were led to imagine purchasing sunscreen, placing the sunscreen where they would see it every day, and using it daily.

5.5.6 Targeting social norms

As noted in Chapter Two, the social norms surrounding tanned skin and sun protection play a major role in attitudes to, and performance of, sun protective behaviour for this demographic. For this reason a number of researchers have stated the need for community-wide strategies to improve the effectiveness of interventions (Lowe et al. 1999; Buller et al. 2006; Olson and Starr 2006). Of those interventions reviewed, only the population-based ‘SunSmart’ (Hill et al. 1993 and Dobbinson 2004a and b) and community-based ‘SunSafe’ project (Olson et al. 2007) could be said to have used a multi-setting approach. ‘SunSmart’ targeted social norms at the broader societal level, with pressure on fashion houses and magazines to promote sun protection with hats and clothing, and reduce the darkness of tans on models (Hill et al. 1993). This strategy appeared to be successful, with attitudes to tanning changing substantially over the campaign’s length. However, the multi-component nature of the intervention means the effectiveness of any one strategy is unknown. Olson et al (2007) targeted adults, clinicians, coaches and lifeguards within their community intervention – educating them on their important influence as role models and information givers, and showing them a Dermascan of their own faces to highlight
UV damage. The authors suggested the role modelling of these primary and secondary caregivers was integral to the success of the intervention.

Normative beliefs about the attractiveness of tanned skin were also successfully manipulated in the Jackson (1997) intervention which reduced the perceived advantages of tanning, indirectly decreasing intentions to sunbathe (Jackson 1997; Jackson and Aiken 2006). As this intervention was targeted only at female undergraduates, more evidence is needed on the effectiveness of this strategy in influencing a broader demographic.

5.5.7 Segmentation of target audiences and tailoring of message content

The segmentation of target audiences was successfully used by two interventions to tailor message content, both of which used the Transtheoretical Model as the basis for segmentation. The success of these two interventions, and in particular the long term effects shown by Weinstock et al. (2002), suggest that this approach holds some potential for increasing the effectiveness of sun protection interventions aimed at this demographic.

Two other interventions targeted only females, and were also effective in promoting some behavioural change. With the marked gender differences that are documented in this demographic in regards to sun protection, this approach to segmentation is also likely to be useful for tailoring intervention strategies.

5.5.8 Targeting secondary audiences

Little evidence was available on the utility of targeting parental audiences for improving adolescent and young adults’ sun protective behaviours. While Lowe et al. (1999) had home exercises to be completed with parents, it is impossible to know the parental level of involvement in these tasks. Olson et al. (2007) noted parents as change agents and role models in their community-wide intervention but no specific strategies for targeting parents were described. As discussed in Chapter Two, Cokkinides et al. (2004) found three parental factors to be independently associated with children’s (11 to 18) frequent sunscreen use: parental insistence that their child
use sunscreen; parental self-efficacy for their child’s sunscreen use; and parental
density of (their own) sunscreen use. Qualitative research supports this
observation, with adolescents and young adults identifying parents as one of the few
facilitators of their own sun protection behaviour (Lupton and Gaffney 1996;
Abroms et al. 2003; Mikati 2005). However, qualitative research has also found older
adolescents resistance to parental directives (Lupton and Gaffney 1996). It may be
that parents need to be educated on their continued usefulness in promoting a sun
protective message as their children age, but also assisted in practical ways of
achieving this role so as to avoid their children reacting against the message.

Some evidence was found for the efficacy of targeting other caregivers and role
models to encourage sun protection in this demographic. The Olson et al. (2007)
intervention targeted lifeguards, sports coaches, teachers, and primary care
physicians with educational sessions and Dermascan viewing. The researchers saw
this as integral to the success of their intervention. The utility of role modelling by
‘important others’ is also supported by Lombard et al. (1991) who achieved
substantial effects among one to 17 year old participants, with a strong focus on role
modelling by pool lifeguards. However, as follow-up was concurrent with the
intervention, the sustainability of effects is not known.

5.5.9 Exchange theory
Mahler et al.(2005) achieved substantial, significant changes in participants’ use of
dsunscreen when not sunbathing, but also noted a non-significant increase in the
amount of sunbathing in the standard intervention group. This had also occurred in
an earlier study by Mahler et al. (1997) where they compared a photo-aging
presentation against a skin cancer prevention presentation, with the skin cancer
presentation showing a relative increase in sunbathing by 108% compared to the
photo-aging at 17%. In contrast, the enhanced intervention arm in the later study,
where participants were given sunless tanner with instructions on its use, reported a
38% decrease in sunbathing. While these results are non-significant, this trend may
be explained through the fundamental tenet of social marketing, i.e., exchange.
Exchange theory recognises that behaviour change will most likely occur if the
customer perceives the benefits of change to equal or exceed the costs of change
The studies by Mahler and colleagues had a strong focus on sunscreen use to avoid skin aging or skin cancer. Noting a high level of appearance concern by participants with pro-tan attitudes, only the enhanced intervention, with the provision of fake tanning lotion, could actually allow participants to continue having tanned skin without the dangers associated with sunbathing. The intervention thus encouraged decreased sunbathing, but in exchange participants were given a means to keep their tan. In this way the cost of not tanning was reduced for these participants. With the strong pro-tan attitudes voiced by many adolescents and young adults, the efficacy of the promotion and usage of fake tanning lotion as a means to decrease UV exposure needs further investigation for this demographic.

5.5.10 The use of environmental strategies

A number of successful interventions used environmental strategies, although it is difficult to determine whether these strategies were instrumental in the success of the programs. From a social marketing viewpoint, the provision of shade or sunscreen can be seen as targeting some of the barriers expressed by this demographic such as forgetfulness, laziness, unpreparedness, and inconvenience, and in turn should reduce the ‘cost’ of sun protection to some degree. However, as a substantial amount of sun exposure appears to be deliberately sought by this target group in order to have tanned skin other strategies are needed which either target pro-tan attitudes or provide tanned skin at a reduced risk. As stated previously the provision of sunless tanner, in particular, may be a worthwhile strategy as it limits the need to change strong pro-tan attitudes. However, this message may contradict cancer authorities’ message of ‘no tan’.

5.5.11 Reactance

One danger in presenting a strong message against tanning may be seen in Mahler et al. (1997) and Dukeshire (1996) where there appeared to be a trend towards increased sunbathing in the intervention groups. This may point to some reactance against the message of the intervention in those individuals who were not given a specific strategy that would allow for them to continue with tanned skin in a safer manner. This has been suggested previously in research by Jones and Leary (1994)
where they found students high in appearance concern were most threatened by the message and resisted the anti-tanning messages. Cho and Salmon (2006) also found that university students in a precontemplation stage for sunscreen use were more likely to think defensively and fatalistically to facts regarding risk from skin cancer, and subsequently have less favourable attitudes towards message recommendations. This observation is also supported by the increase in sunbathing reported by the standard intervention group in Mahler et al. (2005), even though they increased their sun protective behaviour when not specifically tanning. Those in the enhanced intervention group that were given sunless tanner reported decreased sunbathing.

5.5.12 Intervention length

Only half the ‘one-off’ interventions (four out of seven) showed any positive effect. Those one-off interventions that did appear effective all had a strong focus on photo-aging, although Jackson (1997) also included other strategies looking at increasing perceptions of susceptibility to skin cancer and changing social and image norms for tanning. While most of these interventions had short-term follow-ups of two to four weeks, Mahler et al. (2007) showed long term change in sun protection for incidental exposure at one year follow-up, with a photo-aging information intervention of less than one hour’s duration. Weinstock et al. (2002) showed long term behavioural change with an intervention that incorporated an initial intensive, personalised segment, with two tailored feedback letters over the following year. Thus, in terms of contact hours, the intervention was no more intensive than many ‘one-off’ interventions.

The ideal length of a sun protection intervention for this demographic is difficult to ascertain from the available evidence, Olson et al. (2007) noted that while no changes were observed in the first year of their three year intervention, changes were observed at three years. The authors suggest this length of time was needed for role modelling of caregivers and peers to become effective within the community.

Evidence from other behavioural research on smoking and weight disorder prevention programs for these age groups is also equivocal on an optimum length of intervention. Rooney and Murray (1996) in a meta-analysis of school-based smoking
prevention programs, found larger effects at post-test for programs less than ten sessions, distributed over a year, with no difference in effect levels resulting from ‘booster’ sessions in following years. However, at longer term follow-ups they found no difference in effect levels with the number of sessions, but larger effects with concentrated delivery and booster sessions. A meta-analysis for eating disorder prevention programs in adolescents and young adults found significantly smaller intervention effects for single session programs compared to multi-session programs, but several effective programs of three to four sessions long were identified (Stice and Shaw 2004). Stice et al. (2006, pg. 684) in a meta-analysis of obesity prevention programs for children and adolescents found ‘relatively shorter duration’ programs (in weeks) produced significantly larger effects than did those that were ‘longer in duration’. From this evidence it would appear that an intervention length of between three to ten sessions may be the optimum to maximise information or skill transfer but limit ‘wear out’ effects. Olson et al. (2007) suggested repeated advice and reinforcement is also necessary to maintain behaviour change. This suggests the need for researchers to look at the sustainability of strategies. While short term education is necessary, the ongoing need for enabling and reinforcing strategies recommends Olson et al.’s approach to targeting the community and primary and secondary caregivers to influence social norms, reduce the barriers to sun protection and give ongoing reinforcement to sun protective behaviour.

5.5.13 Contextual issues

The importance of contextual factors in sun protection interventions is highlighted in the difference in results between Hill et al. (2002) and Dobinson (2004a; 2004b). Hill et al. reported on the evaluation of the ‘SunSmart’ campaign which ran from 1988 to 1991, whereas Dobinson reported on evaluation of an extension of the 1999 to 2001 campaign which included an advertisement ‘Time Bomb’. The differences in results between the two evaluations point to the moderating effects of baseline levels of awareness and knowledge of sun protection issues, level of sun protection practiced, and previous exposure to sun protection campaigns. Audiences which have relatively high levels of sun protection may be more difficult to raise to a higher level. Previous campaigns may have raised sun protection levels in audiences that were more amenable to change, leaving those more reluctant to adopt new
behaviours and thereby causing a moderation of effect levels within campaigns. This highlights the necessity of seeing sun protection interventions within their environmental and social context. It also suggests the utility of behaviour and communication models which divide audiences on their current readiness to change specific behaviours, or, perhaps, their patterns of behaviour adoption. Understanding the context surrounding sun protection behaviours and using segmentation strategies allows more reluctant target groups to be targeted specifically.

These studies also point to the limitations of only including ‘gold standard’ RCTs in systematic reviews, as they would not have been included in reviews with more restrictive inclusion criteria, yet are the only examples of population-wide interventions for this demographic.

5.5.14 Use of second ‘tier’ evidence

Inclusion of lower tier studies allowed for a broader examination of the effectiveness of sun protection interventions with this demographic, particularly by the inclusion of four population-wide interventions. Unfortunately, three of these studies reported outcomes for a wide age range, of 14 to 29 years (Hill et al. 1993; Dobbinson 2004a) and 18 to 35 years (Jalleh et al. 1999), thus limiting the usefulness of this data for the defined adolescent and young adult demographic.

5.5.15 Methodological issues

One of the difficulties in synthesising the results of studies for this review was the range of outcome measures used. Synthesis would be greatly simplified by the use of an overall measure of sun protection. The utility of such an index is highlighted by Jackson (1997) where significant changes were seen in the overall sun protection score but not in specific behaviours. This occurred from people using different methods to achieve an increase in their sun protection, based on personal preference or the context in which they were performing those behaviours. The use of a number of outcomes such as the use of sunscreen, shade, hats or protective clothing with no overall measure of sun protection, can therefore hide positive changes by spreading them over a number of outcomes. This position is supported by data from Karnatz
(1993) where increases in sunscreen were seen but changes in the use of shade and protective clothing were conflicting. An overall measure of sun protection would have given a more accurate picture of the effectiveness of the intervention. For example, in Olson et al (2007) the proportion of the individual’s body surface protected from the sun by clothing, sunscreen or shade was calculated by using algorithms based on body surface area charts.

At the same time, reporting on the different measures is useful to determine how effective interventions are at changing specific behaviours. Sunscreen use is an ‘easier’ behaviour to alter than the use of sun protective clothing, hats or shade, but is the least preferred method of sun protection as advised by cancer authorities. Many of the interventions reviewed however, had a major focus on sunscreen use.

5.6 Limitations

This review has not included studies that only reported mediating factors such as attitudes or intentions to change behaviour. While this limited the scope of review, it was done to provide more definitive answers on actual behaviour change, as the association between intentions and behaviour is not a direct relationship (Webb and Sheeran 2006). The multitude of differences between studies in terms of study design, focus, strategies, sample sizes and outcome measures, make the synthesis of information in this area problematic. It should be noted that some interventions may not have had a primary aim of changing behaviour, and any comments on the ‘success’ of interventions are limited to their effect on specific sun protection behaviours. The comments should not, therefore, be construed as passing judgement on any other aspect of the intervention.

A further limitation is the availability of information for review. All judgements on development, process and evaluation are taken from the published article or report, unless the reviewed paper referred to other sources. The comprehensiveness of this review is thus subject to these constraints. This is particularly noted for judgements on the ‘quality’ of studies, where ratings are indicative of the amount of information in a paper.
One final limitation is seen in the nature of the review process itself. This critical review has taken a systematic examination of interventions via a ‘systematic review’ method. However, some critics see the ‘reductionist’ approach which is inherent in systematic review as unsuitable for public health, seeing instead the need for a more scholarly interpretation of the evidence in order to incorporate complexity, ethics and understanding. While this review has presented some interpretation of the evidence that exceeds the traditional empirical confines of systematic review, it was limited by coding strictures which tended to reduce information to binary yes/no, or categorical form, rather than the richer description which may have occurred with qualitative analysis.

5.7 Conclusions

This review was undertaken to provide an evidence base for the development of social marketing interventions for adolescents and young adults. While no interventions were based on ‘social marketing’, a number of factors have been identified that offer useful avenues for future social marketing interventions. Of these, the targeting of appearance related issues through UV photographs/Dermascan images or photoaging/skin damage information appears to be an important approach to increasing involvement and affecting behaviour change for this audience. Allied with this is a need to target the social norms related to tanned skin and the wearing of sun protective clothing. However, care needs to be taken in the development of communications as there is the danger of reactance in those with strong pro-tan attitudes. There may, therefore, be some role for the promotion of fake tans for particular groups.

Limited evidence was found to support the use of one particular behavioural theory over another. However, a number of constructs from different theories have been observed to offer useful insights into particular aspects of sun related behaviour with this demographic. Similarly, while segmentation is a core element of any social marketing intervention, limited evidence as to the most appropriate method of segmentation was found. The use of the ‘stages of change’ from the Transtheoretical Model or segmentation based on gender have been utilised successfully and warrant further research.
The next chapter describes a Delphi consensus process conducted with experts in the fields of social marketing and/or sun protection, undertaken to formulate specific guidelines for the development of social marketing interventions for adolescents and young adults. This process allowed the incorporation of expert knowledge and experience into the development of the guidelines, supported by evidence from this systematic review and other published literature. It thus fills some of the ‘gaps’ in evidence that could not be addressed by this review.
Chapter 6: Guidelines for the development of social marketing programs for adolescents and young adults

6.1 Introduction

This chapter describes the process and presents the results of a Delphi consensus project to formulate ‘best practice’ guidelines for social marketing programs for adolescents and young adults’ sun protection. This method of guideline development brought the expertise of sun protection and social marketing practitioners and academics to the forefront of guideline development, whilst still utilising established methods of evidence confirmation. It thus sought to integrate social marketing theory into the evidence-base which has been established over 25 years of sun protection primary prevention programs and research. The chapter begins with some background on the use and development of practice guidelines, and then presents details of the research conducted.

6.2 Evidence-based guidelines in public health

Since the 1990s there has been an increasing recognition of the importance of clinical practice guidelines to ‘assist practitioner and patient decisions about appropriate health care for specific clinical circumstances’ (Field and Lohr 1990). If they are developed through valid and reliable methods, and seen as relevant by the practitioners that will be using them, the use of such guidelines can potentially: improve health outcomes; improve efficiency and optimize value for money; highlight gaps in the evidence for practice; and improve the quality of decision-making in clinical practice (Woolf et al. 1999; Scott et al. 2004).

These benefits and provisos also hold true for the use of practice guidelines within public health. Many guidelines have been developed by government and non-governmental agencies to assist decision-making within public health practice, such

Some organisations have developed guides to standardise the development of clinical guidelines (National Health and Medical Research Council 1999; Scottish Intercollegiate Guideline Network 2001). Specific methods often differ according to the stakeholders involved, the availability and reliance on formal literature reviews, the extent to which expert opinion is used, and the process by which the guidelines are expressed. However, almost all guideline development approaches include multidisciplinary development, systematic review of the literature, and graded recommendations based on the strength of evidence (Cook et al. 1998; Miller and Petrie 2000).

*a) Multidisciplinary development* is needed to ensure that guidelines are based on a broad range of knowledge and expertise, and are therefore valued by all members of the team in order to be incorporated successfully into practice (Miller and Petrie 2000). Where conclusive evidence is lacking, subjective judgement is often necessary to formulate recommendations (Scott et al. 2004). It is therefore crucial to ensure the representation of experts and potential end-users can be seen within recommendations. It is also crucial that bias and self-interest is minimised by use of systematic, explicit and formalised methods of obtaining group consensus, such as the nominal group technique, the Delphi process or consensus conference process (Scott et al. 2004).

*b) Systematic review of the literature* is necessary to minimise bias, and ensure recommendations are based on current evidence (Scott et al. 2004). This may involve the use of previous systematic reviews, if available, and/or the use of primary research to conduct new systematic reviews (Cook et al. 1998). In either case, it is important that all data is assessed against consistent methodological standards (Scott et al. 2004). The resulting evidence is then reviewed by the multidisciplinary committee in order to formulate recommendations.
c) The third component cited by guideline frameworks is the grading of recommendations based on the strength of evidence. This allows users of the guidelines to know how much confidence can be placed in the recommendations (GRADE Working Group 2004). The use of a systematic and explicit approach to grading of evidence can minimise error and bias. A number of grading systems have been developed, with the Agency for Healthcare Research and Quality identifying 40 such systems (Caracciolo et al. 2004). Carriacolo et al. (2004) note that these systems generally share the same structure but differ in the importance given to specific classes of evidence or in their specificity.

6.3 Limitations in current guideline development approaches

While guideline development has been increasingly standardised, a number of debates continue around the use of guidelines in a public health context.

i) Lack of ‘gold standard’ evidence

The NHMRC (1999) advises that in public health there is often a difficulty in evaluating interventions by randomised controlled trials, which are considered the ‘gold standard’ of medical evidence. They state that researchers should, therefore, not disadvantage this area by the rigid application of a hierarchy of evidence, and should recognise that much of the evidence will be of a lower level of rating than evidence required for clinical practice guidelines. The NHMRC still advises that published grading systems be used.

ii) Reductionist approach

Another debate involves the use of systematic review in a public health context. As discussed in Chapter Four, while systematic reviews are seen as an essential component within guideline development, many argue as to the appropriateness of this type of ‘reductionist’ approach which removes the context within which public health interventions are developed and implemented (Tilford 2000). Practitioners need to take into account a social and historical view of public health; therefore they require a consideration of context, politics, and economics, as well as biomedical and technical factors to inform their evidence base (Rychetnik and Frommer 2002). This context is difficult to synthesise with a systematic review approach.
**iii) Low grading of ‘expert’ opinion**

Expert committee reports/opinions and/or clinical opinion of respected authorities are classed as category four evidence carrying the lowest strength of recommendation in grading systems for establishing Strength of Recommendation (SOR) scores (see Table 6.1). Yet in terms of ‘practice’, practitioner opinion is highly rated. A US national survey of 284 HIV prevention program managers found peers and colleagues were the top sources of information that influenced program decisions, with scientific publications, government and non-academic reports and newspapers ranking at the bottom (Goldstein et al. 1998). As much of the expertise and knowledge of experienced researchers or practitioners in public health is often not recorded or published, nor able to be supported through experimental or quasi-experimental study designs, the difficulties in establishing this evidence base solely through systematic review is obvious.
Table 6.1: SIGN Grading System (Scottish Intercollegiate Guideline Network 2001)

Levels of evidence

<table>
<thead>
<tr>
<th>Grade</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1+++</td>
<td>High quality meta-analysis, systematic reviews of RCTs, or RCTs with a very low risk of bias</td>
</tr>
<tr>
<td>1+</td>
<td>Well conducted meta-analyses, systematic reviews of RCTs, or RCTs with a low risk of bias</td>
</tr>
<tr>
<td>1-</td>
<td>Meta analyses, systematic reviews of RCTs, or RCTs with a high risk of bias</td>
</tr>
<tr>
<td>2+++</td>
<td>High quality systematic reviews of case-control, or cohort, or studies</td>
</tr>
<tr>
<td></td>
<td>High quality case-control or cohort studies with a low risk of confounding bias or chance, and a moderate probability that the relationship is causal</td>
</tr>
<tr>
<td>2+</td>
<td>Well conducted case-control or cohort studies with a low risk of confounding bias or chance and a moderate possibility that the relationship is causal</td>
</tr>
<tr>
<td>2-</td>
<td>Case control or cohort studies with a high risk of confounding bias or chance, and a significant risk that the relationship is not causal</td>
</tr>
<tr>
<td>3</td>
<td>Non-analytic studies, e.g. case reports, case series</td>
</tr>
<tr>
<td>4</td>
<td>Expert opinion</td>
</tr>
</tbody>
</table>

Grades of recommendation

<table>
<thead>
<tr>
<th>Grade</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>At least one meta analysis, systematic review, or RCT rated as 1++, and directly applicable to the target population; or</td>
</tr>
<tr>
<td></td>
<td>A systematic review of RCTs or a body of evidence consisting principally of studies rated as 1+, directly applicable to the target population, and demonstrating overall consistency of results</td>
</tr>
<tr>
<td>B</td>
<td>A body of evidence including studies rated as 2++, directly applicable to the target population, and demonstrating overall consistency of results; or</td>
</tr>
<tr>
<td></td>
<td>Extrapolated evidence from studies rated as 1++ or 1+</td>
</tr>
<tr>
<td>C</td>
<td>A body of evidence including studies rated as 2+, directly applicable to the target population and demonstrating overall consistency of results; or</td>
</tr>
<tr>
<td></td>
<td>Extrapolated evidence from series rated as 2++</td>
</tr>
<tr>
<td>D</td>
<td>Evidence level 3 or 4; or</td>
</tr>
<tr>
<td></td>
<td>Extrapolated evidence from studies rated as 2+</td>
</tr>
</tbody>
</table>

6.4 Delphi consensus approach

One method of guideline development, recently used by Roddy et al. (2005; 2006) utilises expert opinion to establish the initial framework for guideline development.

---

38 Extrapolated evidence means that evidence not specific to the question/area of research is taken into account for considered judgement.
recommendations through Delphi consensus methods. A Delphi consensus method can be defined as ‘a group facilitation technique that seeks to obtain consensus on the opinions of ‘experts’ through a series of structured questionnaires’ (Hasson et al. 2000, pg. 1009). Systematic review is then used to provide supporting evidence in estimating the strength of recommendations (SOR).

The method also utilises a new process for determining SOR, where the SOR for each recommendation is based on the traditional SOR table and, additionally, on a visual analogue scale (VAS) as judged by the expert participants. Recommendations are then grouped according to their original SOR and the mean VAS and 95% confidence interval calculated for each group. The authors state the principal strength of this method is the filling of the gap between expert opinion and research evidence, allowing recommendations to be upgraded beyond that supported by the category of research evidence.

An example of two guidelines for exercise in osteoarthritis (OA) patients is shown in Table 6.2 (taken from Roddy et al. 2005, pg. 350). Note that Roddy et al. (2005) used a hierarchy of evidence table taken from Shekelle et al. (1999) whereas this project utilised the SIGN Grading System shown previously.

**Table 6.2: Example of SOR and VAS grading**

<table>
<thead>
<tr>
<th>Recommendation</th>
<th>Category of evidence (1-4)</th>
<th>Strength of recommendation</th>
<th>VAS Mean (SD) cms</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Both strengthening and aerobic exercise can reduce pain and improve function and health status in patients with knee and hip OA</td>
<td>Knee 1B Hip 4</td>
<td>A C (extrapolated from knee OA)</td>
<td>8.9 (1.1) 6.3 (2.1)</td>
</tr>
<tr>
<td>2. There are few contraindications to the prescription of strengthening or aerobic exercise to patients with hip or knee OA</td>
<td>4</td>
<td>C (extrapolated from adverse event data)</td>
<td>8.0 (1.5)</td>
</tr>
</tbody>
</table>
6.5 Method

Guideline development was conducted following the process outline in Roddy et al. (2005). Table 6.3 shows the process and timeline as conducted.

6.5.1 Contact participants

Twenty-four experts from the fields of social marketing and sun protection were identified from the background literature and systematic review, and through consultation with the Cancer Council NSW sun protection staff. Those chosen were sent introductory letters asking them to participate in a Delphi consensus process with the aim of developing evidence and expert-based guidelines for the development of social marketing sun protection programs for adolescents and young adults. Informal letters and a formal proposal document were first sent through e-mail; the same documents were also sent through standard mail three weeks later, as reminders.

Thirteen experts agreed to participate in the process; however, two did not return Round One documents or reply to Round Two, so they were not sent any further rounds. Those who participated were academics in the field of social marketing research and practice (4), two of whom had research experience in sun protection; academics involved in sun protection research and practice (4); and ‘practitioners’ involved in the organisation of state (Australian) or national (UK) sun protection campaigns (3). The formal proposal and contact letters are shown in Appendix 4.
Table 6.3: Process and timeline of Delphi project

| Round 1 | Participants provide up to 10 propositions, and then return via e-mail. 
  
  *Content analysis performed by researcher, grouped by themes.* | 11 out of 13 replies 
  
  *Formed combined propositions* |
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>March 26</strong></td>
<td></td>
</tr>
</tbody>
</table>

| Round 2 | Participants receive all propositions back and choose 10 from this list, and then return via e-mail. 
  
  *Quantitative analysis performed by researcher.* | 11 replies 
  
  *Number of recommendations increased to 15* |
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>May 2</strong></td>
<td></td>
</tr>
</tbody>
</table>

| Round 3 | Participants receive all propositions back with descriptive statistics to see where opinion lies within group, choose 15 from list, and then return via e-mail. 
  
  *Quantitative analysis performed by researcher* | 10 replies |
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>June 12</strong></td>
<td></td>
</tr>
</tbody>
</table>

| Round 4 | Participants receive all propositions back with descriptive statistics, choose 15 propositions from list, and then return via e-mail. 
  
  *Quantitative analysis performed and, propositions with less than 25% agreement rejected, those with 75% agreement accepted. Propositions with 25% to 75% agreement returned to participants with descriptive statistics.* | 11 replies |
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>July 12</strong></td>
<td></td>
</tr>
</tbody>
</table>

| Round 5 | Participants receive edited list with descriptive statistics, choose 15 propositions from list, and then return via e-mail. 
  
  *Quantitative analysis performed, propositions with highest level of agreement chosen.* | 11 replies |
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>July 30</strong></td>
<td></td>
</tr>
</tbody>
</table>

| Assess evidence | Send out final points 
  
  *Researcher gathers evidence from systematic reviews and other research for each proposition, and sends to participants with traditional SOR grading.* | 2 recommendations combined to form 15 recommendations with 50% or more agreement |
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>October 9</strong></td>
<td></td>
</tr>
</tbody>
</table>

| Grade evidence | Participants asked to rate each recommendation on VAS scale. 
  
  *Researcher calculates mean VAS and standard deviation for each recommendation, tables with traditional groupings, mean VAS and 95% confidence interval.* | 11 replies |
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Nov 10</strong></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Feb 6</th>
<th>Finalised VAS</th>
<th><em>Returned to panel March 11</em></th>
</tr>
</thead>
</table>
6.5.2 Initiate process

Participants were sent ‘observations’ from the systematic review of sun protection interventions for adolescents and young adults, described in Chapter Five, as an orientation to the issue of social marketing for this target group (See Box 6.1 for examples). These ‘observations’ were taken from the discussion section of Chapter Five.

Box 6.1: Examples of observations from systematic review

<table>
<thead>
<tr>
<th>Behavioural theory</th>
</tr>
</thead>
<tbody>
<tr>
<td>The use of a behavioural theory or a combination of theories in the development of strategies can aid the development of effective interventions. In reviewed programs targeting adolescents and young adults, the Theory of Reasoned Action/Planned Behaviour, Protection Motivation Theory and Transtheoretical Model were most commonly used.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Segmentation and tailoring</th>
</tr>
</thead>
<tbody>
<tr>
<td>Interventions which segmented these groups on stage of change and tailored messages accordingly showed some effect in achieving behaviour change.</td>
</tr>
</tbody>
</table>

Interventions which targeted only females and focused on appearance concern also showed some effect in achieving behaviour change.

The following statement was included on the use of these observations:

‘You have also been given some conclusions which resulted from a recent review of sun protection interventions for adolescents and young adults undertaken by me. This is given as an orientation to the issue, however it is not assumed that you need to read this information or that your propositions will come from these conclusions. You also do not need to agree with these conclusions; however, they may be a useful point of engagement with the issue. The review that these conclusions were taken from can be obtained from me on request.’

Participants were then asked to provide up to 10 propositions, based on their knowledge and opinion, which they believed were the most important in developing social marketing interventions for the primary prevention of skin cancer among adolescents and young adults.
Three examples were also provided after a request by one of the participants to show examples of how the propositions should be formatted (See Figure 6.1). Two of these examples came from a Health Canada website on guidelines for social marketing; one came from the observations from the systematic review. These statements showed a broad scope recommendation generic to any social marketing program, one more focused on a youth audience but non-specific to sun protection, and one specifically focused on sun protection for the target audience, and were given to show the range of possibilities for recommendations, not as a promotion of any particular viewpoint.

**Figure 6.1: Examples of propositions**

1. Celebrities and popular spokespersons can be effective to change social norms (Health Canada 2005, in relation to any social marketing program).

2. Programs should **not** highlight that communication came from an authority, present adult viewpoint, or lecture (Health Canada 2005, in relation to youth programs).

3. Programs should highlight short-term consequences related to sunburn and appearance for this target group.

**6.5.3 Round One analysis**

A total of one hundred and seven Round One responses were received from the 11 experts and collated. Responses were then grouped into 11 major themes via content analysis utilising the social marketing framework as described in Chapter Four. These were returned to participants, along with 29 new recommendations which were developed from combining recommendations that covered similar ideas. These new recommendations were identified to participants, as part of the transparent process. Comments on any element of the Delphi process or recommendations by participants were also presented to all participants after being de-identified. An
example of this content analysis is shown in Box 6.2. The full analysis is shown in Appendix 5.

6.5.4 Round Two to Five

For Round Two, participants received all 136 propositions back, grouped via the social marketing framework. From this round it was decided to increase the number of recommendations that could be chosen from ten to 15 to potentially allow more focused recommendations to survive the consensus process. Participants were thus asked to choose up to 15 recommendations from the list provided, which they then returned via e-mail. A simple quantitative analysis was then performed in order to show the percentage of participants choosing each recommendation, (i.e. a recommendation with 9.1% meant one out of 11 participants had chosen that recommendation). The document was then returned to participants for Round Three. An example of the document returned to participants is shown for ‘competition’ in Box 6.3.
Box 6.2: Content analysis for recommendations relating to ‘competition’

**Competition**

Common theme of the ‘tan’ as competition to sun protective behaviours- therefore need to understand and tackle this competition- look to influencing social norms (2 sources), perceptions on health and tanning (2 sources), uncoupling health from beauty (1 source). Fashion and commercial interests can also be seen as competition. Two comments on care in promotion of fake tanning lotions- need to emphasise that it does not offer protection from UV, and is seen in the context of individuals making reasoned health choices.

*<Document 1> I reference coded*

Reference 1 – Acquire a detailed and in-depth understanding of the ethnography of sun tans and related behavior.
Reference 2 – Do your competitive analysis: what are the fashion, celebrity and lotion industries doing? Is it a threat? Does it offer opportunities? Does it provide helpful insights into your target group?

*<Document 2> I reference coded*

Reference 3 – Given that the media often portrays beauty and health as inter-related, the program should attempt to un-couple these two.

*<Document 3> I reference coded*

Reference 4 – Programs should emphasis proximal outcomes such as skin damage (wrinkles, aging) and sunburn, rather than the distal outcomes of skin cancer for this demographic. Tanning provides immediate benefit with long run cost, while not tanning may be seen as having an immediate cost (peers see you as a wimp) in return for vague future benefits. It will be important to show immediate benefits for the desired behaviour.

This process was repeated for Rounds Four and Five; however, from Round Four, those recommendations with less than 25% agreement were removed from the document leaving 16 recommendations. The percentage agreement for Rounds Four and Five are presented in Table 6.4.
Box 6.3: Round Three example

<table>
<thead>
<tr>
<th>Competition</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>37. Acquire a detailed and in-depth understanding of the ethnography of sun</td>
<td>___</td>
</tr>
<tr>
<td>tans and related behaviour</td>
<td></td>
</tr>
<tr>
<td>38. Do your competitive analysis: what are the fashion, celebrity and lotion</td>
<td>18.2</td>
</tr>
<tr>
<td>industries doing? Is it a threat? Does it offer opportunities? Does it provide</td>
<td></td>
</tr>
<tr>
<td>helpful insights into your target group?</td>
<td></td>
</tr>
<tr>
<td>39. The desired behaviour needs to acquire a positive image. Tanning is</td>
<td>9.1</td>
</tr>
<tr>
<td>cool, but what is not tanning? The target needs to be involved in</td>
<td></td>
</tr>
<tr>
<td>developing a position for not tanning that is seen as appealing. Perhaps</td>
<td></td>
</tr>
<tr>
<td>teen age girls could be offered cool incentives that are only available</td>
<td></td>
</tr>
<tr>
<td>to girls who are not deeply tanned.</td>
<td></td>
</tr>
<tr>
<td>40. In a free choice society, the target has the power to choose its own</td>
<td>___</td>
</tr>
<tr>
<td>desired behaviour. The only power held by the change agent is to provide</td>
<td></td>
</tr>
<tr>
<td>a more appealing choice than anything other choice available to the target.</td>
<td></td>
</tr>
<tr>
<td>41. Tackle the mythical concept of a ‘safe tan’.</td>
<td>___</td>
</tr>
<tr>
<td>42. Sun protection programs for this demographic need to have a deep</td>
<td>45.5</td>
</tr>
<tr>
<td>understanding of the competition to sun protective behaviours that comes</td>
<td></td>
</tr>
<tr>
<td>from the social norms and attitudes surrounding tanned skin, and consider</td>
<td></td>
</tr>
<tr>
<td>strategies and messages to counter this competition.</td>
<td></td>
</tr>
</tbody>
</table>
Table 6.4: Percentage agreement for Rounds Four and Five

<table>
<thead>
<tr>
<th></th>
<th>Round 4 %</th>
<th>Round 5 %</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Sun protection programs for this demographic should take a holistic, whole of life approach – with long term commitment. This necessitates multi component, multi-setting approaches inclusive of the wider community.</td>
<td>90.9</td>
<td>90.9</td>
</tr>
<tr>
<td>2. Relationships with stakeholders and potential allies need to be developed to potentiate message dissemination – this can include parents, teachers, sports coaches, media/celebrity figures etc. Think imaginatively in terms of potential partnerships – possible relationships could come from the cosmetics/sunscreen or fashion industries; however care needs to be taken not to compromise message and strategy direction.</td>
<td>81.8</td>
<td>100.0</td>
</tr>
<tr>
<td>3. Sun protection programs should be implemented at various stages throughout adolescence, especially at developmental transitions such as the move from primary (middle) school to high school, or the move from high school to university, as these are times of decreasing parental influence and changing peer and media influences, which can result in increased risk behaviour.</td>
<td>81.8</td>
<td>100.0</td>
</tr>
<tr>
<td>4. Formative research is essential early in program development in order to gain a deeper understanding of the self-interests of the target market, and the motivators and barriers to sun protective behaviour. This allows strategies and messages to be developed from the target audience’s perspective; similarly pre-testing of resource material is also critical to confirm its acceptability to the target audience.</td>
<td>81.8</td>
<td>90.9</td>
</tr>
<tr>
<td>5. Segmentation of the target market is necessary in order to tailor messages and strategies. Age segmentation is essential, but program developers should also consider segmentation based on gender, attitudes and behaviour, and/or risk.</td>
<td>90.9</td>
<td>100.0</td>
</tr>
<tr>
<td>6. Sun protection programs for this demographic need to have a deep understanding of the competition to sun protective behaviours that comes from the social norms and attitudes surrounding tanned skin, and consider strategies and messages to counter this competition.</td>
<td>81.8</td>
<td>90.9</td>
</tr>
<tr>
<td>7. Programs should emphasis more direct outcomes such as skin damage (wrinkles, aging) and sunburn, rather than the indirect outcomes of skin cancer for this demographic; however reference should still be made to skin cancer outcomes as fear is still a strong motivator for behaviour change.</td>
<td>81.8</td>
<td>90.9</td>
</tr>
</tbody>
</table>
8. The changing of social norms regarding the desirability of a tanned appearance is essential for achieving whole-of-life sun protection behaviour. Such messages/strategies need to be directed both within and outside the adolescent/young adult target groups. Within the target group possible strategies include the targeting of group norms, where changing the behaviour of a few individuals ultimately might influence the behaviour of many. Groups might be defined based on sports teams, clubs, or simply groups of friends.

9. Sun protection programs for this target group need to promote their perceived self-efficacy for sun protection, by showing how sun protection can fit into current lifestyle and fashion choices, and offering specific strategies to incorporate sun protection into their daily lives.

10. Sun protection programs to this target group need to look at environmental strategies such as the provision of shade and provision of sunscreen at settings that pose a risk to this group. However, these must be provided in a manner that optimises their usage – that is, the provision of shade will not optimize sun protection without attention to the social amenity within shaded space.

11. Programs should pursue policy change and regulation where possible. Possible issues include solarium usage and taxation on sun protection items.

12. Utilise a broad range of communication channels incorporating paid and unpaid components, in order to strengthen message dissemination. While television is still the most powerful motivator, people in this demographic are also frequent users of ‘new media’.

13. To achieve behavioural change the ‘new behaviour’ being marketed needs to be EASY, FUN and/or FASHIONABLE e.g. easy application of sun cream, hats considered fashionable.

14. As a large proportion of sunburn occurs because people ‘forget’ to apply or re-apply sunscreen- or to take a hat or umbrella- or forget how long they have been in the sun, much of the communication strategy should be ‘reminder’ communication utilising avenues such as Friday pm radio and weekend media.

15. Programs should target their audience at various settings that pose a sun exposure risk for this demographic. As much sunburn is incidental this should include non-beach/pool situations.

16. Focused, ongoing attention to the products (sunscreen, hats, clothing) necessary for sun protection is essential for sufficiently engaging these age groups in sun protection behaviour.
Round Five resulted in 12 recommendations with more than 90% agreement, and four recommendations with 54% to 73% agreement.

6.5.5 Finalisation of recommendations

In order to finalise the guidelines, the sixteen recommendations were returned to the Delphi participants and comments sought. At the same time, consultation with the ‘end users’ (The Cancer Council of NSW sun protection staff) was conducted. From these discussions, some minor alterations in recommendations were undertaken:

- For recommendation number 11 on the targeting of policy, it was decided to differentiate between ‘public’ policy and ‘organisational’ policy, as this better aligned with The Cancer Council’s conceptualisation of policy issues. The recommendation was therefore changed from ‘Programs should pursue policy change and regulation where possible. Possible issues include solarium usage and taxation on sun protection items’, to ‘Programs should pursue policy change and regulation where possible. This includes public policy (eg. No sales tax on sun protective clothing, or solarium regulation) and organisational policy (e.g. Scheduling of school sport during low UV periods).’

- For recommendation number five on segmentation variables, it was decided to add an additional variable based on ‘perceived benefits and barriers’. This was in response to a Delphi participant suggesting segmentation should encompass ‘why’ people sun protect rather than just ‘who’ sun protects. The recommendation was therefore changed from ‘Segmentation of the target market is necessary in order to tailor messages and strategies. Age segmentation is essential, but program developers should also consider segmentation based on gender, attitudes and behaviour, and/or risk’, to ‘Segmentation of the target market is necessary in order to tailor messages and strategies. Age segmentation is essential, but program developers should also consider segmentation based on gender, attitudes and behaviour, perceived benefits and barriers, and/or risk.’
• Recommendation 13 on making the behaviour fun and fashionable was incorporated into recommendation nine which stated that interventions needed to fit sun protection into adolescent’s and young adults’ current lifestyles.

These changes were then sent back for Delphi participants’ approval, finalising 15 guidelines for the development of social marketing programs targeting adolescents’ and young adults’ sun protection.

6.5.6 Assess evidence for recommendations and grade recommendations

The evidence-base to support each recommendation was determined utilising the pre-existing systematic review of adolescent and young adults’ sun protection interventions described in Chapter Five. Two additional research papers were also included that provided mediational analyses on interventions already included in the systematic review. As critical appraisal of the methodological quality of studies was conducted previously for the systematic review by two coders, this rating was used with a Grade of Recommendation (SOR) assigned via the SIGN grading system. Consensus on the SOR was then sought through a second reviewer, who assessed the totality of evidence for each guideline and assigned a Grade of Recommendation via the SIGN grading system.

The list of guidelines was returned to participants with available evidence, and traditional SOR grading provided.

6.5.7 Grading of evidence via VAS

Each participant was then asked to indicate how strongly he or she rated each recommendation based on all aspects relating to their knowledge and practical opinion, as well as the research evidence. This was recorded using a 10cm visual analogue scale (VAS) anchored with two descriptors labelled ‘not recommended’ at 0cm and ‘fully recommended’ at 10cm. The mean VAS and standard deviation was calculated for each recommendation, and presented in a table with groupings according to original SOR, mean VAS, and 95% confidence interval. (See Figure 6.2)
6.6 Results

Table 6.5 shows the finalised guidelines with Strength of Recommendation and Visual Analogue Scores, ordered by strength of VAS. As shown in Table 6.5, the guidelines cover recommendations on general structure, settings and timing of interventions, the importance of formative research and segmentation, and the need for strategies to target: 1) the competition to sun protection that comes from the social norms surrounding tanning and sun protection, 2) perceived self-efficacy, and 3) skin damage concerns in addition to skin cancer. Additional recommendations stated the need for policy and environmental strategies, the use of a broad range of communication channels, and focused ongoing attention on the ‘products’ necessary for sun protection. For practitioner use, results were presented with contextual literature in the form of ‘discussion points’, and linkage to the Delphi content analysis from Round One. An example of this is shown in Box 6.4.
<table>
<thead>
<tr>
<th>Level of consensus</th>
<th>Recommendation</th>
<th>Category of evidence</th>
<th>SOR</th>
<th>VAS</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Formative research is essential early in program development in order to gain a deeper understanding of the self-interests of the target market, and the motivators and barriers to sun protective behaviour. This allows strategies and messages to be developed from the target audience’s perspective; similarly pre-testing of resource material is also critical to confirm its acceptability to the target audience.</td>
<td>Expert opinion</td>
<td>D</td>
<td>9.16</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>(8.34-9.99)</td>
</tr>
<tr>
<td>100.0%</td>
<td>Sun protection programs for this target group need to promote their perceived self-efficacy for sun protection, by showing how sun protection can fit into current lifestyle and fashion choices, and offering specific strategies to incorporate sun protection into their daily lives.</td>
<td>Extrapolated evidence from 2 studies Jackson and Aitken (2006); Reynolds et al. (2006)</td>
<td>C/D</td>
<td>8.75</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>(8.23-9.28)</td>
</tr>
<tr>
<td>90.9%</td>
<td>Sun protection programs for this demographic need to have a deep understanding of the competition to sun protective behaviours that comes from the social norms and attitudes surrounding tanned skin, and consider strategies and messages to counter this competition.</td>
<td>Expert opinion</td>
<td>D</td>
<td>8.72</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>(8.19-9.26)</td>
</tr>
<tr>
<td>90.9%</td>
<td>Programs should emphasise more direct outcomes such as skin damage (wrinkles, aging) and sunburn, rather than the indirect outcomes of skin cancer for this demographic; however reference should still be made to skin cancer outcomes as fear is still a strong motivator for behaviour change.</td>
<td>A systematic review including Mahler et al. 1997; Novick 1997; Weinstock et al. 2002; Mahler et al. 2005; Olson et al. 2006; Mahler et al. 2007; Jackson 1997; Buller et al. 2006</td>
<td>B</td>
<td>8.44</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>(7.62-9.25)</td>
</tr>
</tbody>
</table>
100.0% Utilise a broad range of communication channels incorporating paid and unpaid components, in order to strengthen message dissemination. While television is still the most powerful motivator, people in this demographic are also frequent users of ‘new media’.

100.0% Segmentation of the target market is necessary in order to tailor messages and strategies. Age segmentation is essential, but program developers should also consider segmentation based on gender, attitudes and behaviour, perceived benefits and barriers, and/or risk.

90.9% The changing of social norms regarding the desirability of a tanned appearance is essential for achieving whole-of-life sun protection behaviour. Such messages/strategies need to be directed both within and outside the adolescent/young adult target groups. Within the target group possible strategies include the targeting of group norms, where changing the behaviour of a few individuals ultimately might influence the behaviour of many. Groups might be defined based on sports teams, clubs, or simply groups of friends.

100.0% Programs should pursue policy change and regulation where possible. This includes public policy e.g. No sales tax on sun protective clothing or solarium regulation; and organisational policy eg. The scheduling of school sport during low UV periods.

90.9% Sun protection programs for this demographic should take a holistic approach – with long term commitment. This necessitates multi component, multi-setting approaches inclusive of the wider community.

---

39 While some studies utilising the Transtheoretical Model were effective in changing behaviour, it could not be ascertained that the segmentation was essential to the success of the intervention.
Sun protection programs to this target group need to look at environmental strategies such as the provision of shade and provision of sunscreen at settings that pose a risk to this group. However, these must be provided in a manner that optimises their usage – that is, the provision of shade will not optimize sun protection without attention to the social amenity within shaded space.

Programs should target their audience at various settings that pose a sun exposure risk for this demographic. As much sunburn is incidental this should include non-beach/pool situations.

Relationships with stakeholders and potential allies need to be developed to potentiate message dissemination – this can include parents, teachers, sports coaches, media/celebrity figures etc. Think imaginatively in terms of potential partnerships – possible relationships could come from the cosmetics/sunscreen or fashion industries; however care needs to be taken not to compromise message and strategy direction.

Olson et al (2007) also utilised partnerships with stakeholders. However it could not be ascertained whether this was essential to the success of the program and would not increase the rating of this guideline if included.
Sun protection programs should be implemented at various stages throughout adolescence, especially at developmental transitions such as the move from primary (middle) school to high school, or the move from high school to university, as these are times of decreasing parental influence and changing peer and media influences, which can result in increased risk behaviour.

To achieve behavioural change the ‘new behaviour’ being marketed needs to be EASY, FUN and/or FASHIONABLE e.g. easy application of sun cream, hats considered fashionable. This necessitates focused, ongoing attention to the products (sunscreen, hats, and clothing) necessary for sun protection.

As a large proportion of sunburn occurs because people ‘forget’ to apply or re-apply sunscreen- or to take a hat or umbrella- or forget how long they have been in the sun, much of the communication strategy should be ‘reminder’ communication utilising avenues such as Friday pm radio and weekend media.
Box 6.4: Example of guideline presentation for practitioner use

<table>
<thead>
<tr>
<th>Guideline 9: Programs should emphasise more direct outcomes such as skin damage (wrinkles, aging) and sunburn, rather than the indirect outcomes of skin cancer for this demographic; however reference should still be made to skin cancer outcomes as fear is still a strong motivator for behaviour change</th>
</tr>
</thead>
<tbody>
<tr>
<td>SIGN Grade of recommendation: B – a body of evidence including studies rated as 2++ directly applicable to the target population</td>
</tr>
<tr>
<td>Levels of evidence: A systematic review including Mahler et al. 1997 (2-); Novick 1997 (2-); Weinstock et al. 2002 (1-); Mahler et al. 2005 (1-); Olson et al. 2006 (1+); Mahler et al. 2007 (1-); Jackson 1997 (1-); Buller et al. 2006 (1+).</td>
</tr>
<tr>
<td>VAS grading: 8.44 (SD 1.38)</td>
</tr>
</tbody>
</table>

**Discussion points**

- One of the few facilitators of sun protection voiced by adolescents and young adults is the need to prevent wrinkles and sun damage, as well as the embarrassment of sunburn (Lupton and Gaffney 1996; Abroms et al. 2003; Cancer Research UK 2003; Mikati 2005). Also, as pro-tan attitudes are the strongest competition to sun protection among most adolescents and young adults (Wichstrom 1994; Davis et al. 2002; Geller et al. 2002; Lazovich and Foster 2005; Nicol et al. 2007), for a threat to reduce the strength of these attitudes it must be directed at an element which is a high involvement issue for this target group – appearance. A focus on these deleterious effects may be the best way of gaining interest in a sun protection message, and at the same time promote benefits which can be realized in the short rather than long term.

- All seven reviewed programs orientated towards appearance concern were successful in achieving behaviour change (two of these targeted only females). Six interventions utilised UV/aged photos or Dermascan images as feedback on past behaviours, all successful in achieving behaviour change (Mahler et al. 1997; Novick 1997; Weinstock et al. 2002; Mahler et al. 2005; Olson et al. 2006; Mahler et al. 2007); one intervention combined a photo-aging and skin cancer message (Jackson 1997). Mediational analyses found susceptibility of photoaging and severity of photoaging were associated with intention to sun protect (Jackson and Aiken 2006).

- Buller et al. (2006) found positive changes in sun protection behaviours with a curricular intervention combining a skin damage and skin cancer message.

  - See Appendix 2, pages 39-40 for Delphi analysis under Appearance.
6.7 Discussion

6.7.1 Implications for program development

Social marketing is an iterative process. Its planning framework encourages development and constant adaptation of interventions based on ongoing research. These guidelines, therefore, represent general principles for social marketers targeting the sun protection behaviours of adolescents and young adults, and should be utilised as such. As for all social marketing, specific strategies and messages should then be developed based on formative research and rigorous pre-testing of materials, to tailor interventions to specific contexts and audiences.

6.7.2 Social marketing features

While many of the guidelines are not specific to a social marketing approach, core social marketing elements are represented. As discussed in Chapter Three, the identifying features of social marketing are: customer orientation; a focus on behaviour change as the ultimate aim; a recognition that behaviour will only change if the customer perceives the benefits of changing to equal or exceed the costs of changing; the use of the marketing mix; extensive use of research to devise, monitor and revise campaigns; the use of market segmentation; and an emphasis on competition. All of these identifying features are represented in some manner. The guidelines stress the need for sun protection strategies to show how sun protection can fit within this target market’s lifestyle, and recognise the strong competition to sun protection which comes from the social norms surrounding tans. They also, however, include recommendations to target policy and environments, and to take a holistic approach – recommendations more recognisably aligned with a ‘health promotion’ approach. Thus, they integrate the advantages of a social marketing approach more wholly within its public health context.

One element missing which might have been expected to be covered was a guideline on message features. While a number of points covering message features were originally contained within the first round of recommendations, none survived the consensus process. This can be seen as indicative of lack of agreement on the most appropriate forms of message construction and also a decreased importance of
message ‘type’ compared to overall content, timing and structure of sun protection interventions. This also highlights that many features of a sun protection intervention cannot be standardised. Promotion of a sun protection message should be tailored for specific segments within the target market.

### 6.7.3 Acceptance of guidelines by end-users

As noted in Section 6.2, end-user acceptance and usage is heightened by allowing input through the development process. TCCN sun protection staff were involved in early development of the Delphi proposal, and consulted before finalisation of the guidelines in order to format the ‘end-product’ into the most usable form for practitioner use. This resulted in a document providing each guideline with background information and the reference to the initial Delphi analysis relating to each guideline, in addition to the SOR and VAS scores. The CCNSW sun protection team reasoned that the enhanced background information would allow more informed decision-making around the framework provided by the established guidelines.

As this study is part of a larger project with the ultimate aim of conducting a social marketing sun protection intervention for an adolescent market, this guideline document has been used by CCNSW in the development of this intervention.

### 6.7.4 Utility of the guideline development process

The project was conducted with a pragmatic view of reducing the time and energy commitment of participants, as much as possible within the confines of a process that included five consensus rounds and one grading round. This led to a simple method for consensus where participants chose 15 recommendations from the initial list of 129, with percentages given based on the number of participants choosing each recommendation. Feedback was also encouraged and presented anonymously to all participants, although this was limited throughout the process.

---

41 It should be noted that this did not affect the content of the guidelines, rather the format of the guideline document.
Holey et al. (2007) have suggested a more involved method of consensus, showing the level of agreement for each statement with within-subject weighted kappa statistics, and importance rankings with mean and standard deviation for each statement. The authors state that this would reduce subjectivity and ensure maximum validity of results in a Delphi process. While this may improve the consensus process by allowing more detailed feedback to participants and demonstrating to those conducting the Delphi process when consensus is achieved, this would also increase the response burden for each round. When relying on participants’ goodwill to be involved in such a process, this heightened commitment may decrease initial and ongoing response rates and, potentially, the attention given to each statement. For this Delphi process, with an initial listing of 129 statements, the benefits of this more involved method could have been outweighed by the potential loss in involvement.

As expected, the traditional evidence-base for most of the guidelines was of the lowest category – expert opinion. This, however, had little correlation with the VAS grading for the guidelines based on the panel’s knowledge and experience ($r_s = -.45$). An example of this is seen in the first guideline in Table 6.5 stating the importance of formative research and pre-testing of materials. This received the highest VAS grading of 9.16, yet its traditional SOR was level D. The nature of this recommendation means it would be difficult to establish through systematic review alone, yet is recognised by experts as being essential when developing interventions for this demographic. This highlights the utility of a grading system based on experience as well as traditional hierarchical methods.

6.8 Limitations

One of the major limitations with a consensus approach is the broadening of content to accommodate all views. This, inevitably, loses more focused recommendations for recommendations which gain the acceptance of the majority but potentially lessen innovation. The number of recommendations chosen by participants on each round was increased from ten to 15 for this reason. However, as discussed previously, the guidelines show a framework for social marketers. As such, the broader focus of the guidelines does not lessen their utility, but suggests the need to develop interventions specific to the context, relationships, and environments present in each community.
Biased responses could also have arisen from sending participants non-peer reviewed ‘observations’ from the systematic review, as previously described. However, participants were given this document as an orientation to the issue and were not required to read or use the document when formulating their recommendations. Given the expertise of Delphi participants within their fields, it is unlikely that these conclusions influenced participants’ initial propositions.

6.9 Conclusion

This chapter describes guidelines developed through a Delphi consensus process, which provide a framework for the development of social marketing interventions targeting adolescent and young adult sun protection. They are, for the most part, broadly focused, with many guidelines applicable to other sun protection target audiences – such as the importance of formative research, segmentation, pursuit of policy change and regulation, and the building of relationships with stakeholders and potential allies. Others are more specific to the adolescent and young adult demographic – such as the importance of appearance-based messages, the targeting of transition periods, and the consideration of ‘new media’. Utilised as a whole, they incorporate the major elements of social marketing theory within the established knowledge base of sun protection experience and health promotion.

The next chapter presents primary research into the segmentation of adolescent and young adult sun protection audiences.
Chapter Seven: The use of behaviour and advertising theory to segment sun protection target markets

7.1 Introduction

Segmentation of the adolescent and young adult sun protection audience (i.e. the division of the market into distinct segments) is a crucial element in any social marketing sun protection intervention aimed at this demographic. Guideline Six, as reported in Chapter Six, states:

‘Segmentation of the target market is necessary in order to tailor messages and strategies. Age segmentation is essential, but program developers should also consider segmentation based on gender, attitudes and behaviour, perceived benefits and barriers, and/or risk.’

Traditional grading of this recommendation via a hierarchy of evidence table was low, with a Strength of Recommendation of level D (i.e. based on expert opinion). This is indicative of a lack of experimental research in this area. However, the level of expert approval for this guideline was high, with a final consensus of 100%, and a VAS grading of 8.09 (7.47-8.71).

The lack of specificity on the preferred basis for segmentation in Guideline Six highlights the lack of consensus on what is the best or most appropriate variable on which to segment this audience. This chapter describes primary research into one segmentation strategy, developed from advanced advertising theory. The primary aim of this component of the research was to investigate the utility and appropriateness of a Brand Loyalty approach in segmenting adolescent and young adult sun protection audiences, and how inclusion in specific segments related to attitudes and beliefs regarding sun protection.
This chapter initially discusses the use of segmentation in commercial and social marketing, as well as reviewing its use in previous sun protection interventions targeting adolescents and/or young adults, before discussing Brand Loyalty segmentation in sun protection. This model was previously described in Chapter Three, but is discussed in further depth as applicable to the current research. The chapter then describes the development of the survey tool, the survey methods, and the results of a survey on Brand Loyalty segmentation.

### 7.2 Segmentation in commercial marketing

Segmentation has become a cornerstone of commercial marketing and advertising, as it allows marketing strategies and communications to be tailored to the needs and wants of discreet target groups.

The benefits of segmentation, as denoted by McDonald and Dunbar (2004), are that it:

- leads to closer matching of customers’ needs with the product/service;
- allows niche marketing;
- allows the concentration of resources in markets where competitive advantage is greatest and returns are high;
- leads to competitive advantage as it enables marketers to consider the market in different ways to their competitors; and
- allows companies to market themselves as specialists in their chosen segments.

As utilised in commercial marketing, segmentation is defined by the needs of customers rather than those of the company; as such it is an iterative process, the purpose of which is to satisfy the customers’ needs more closely (McDonald and Dunbar 2004). McDonald and Dunbar (2004, pg. 54) state that, to be effective each segment should:

- consist of customers who are relevant to the purchase situation/decision;
- have sufficient potential size to justify the time and effort in planning specifically for them;
• be distinguishable from other segments with a distinctive set of requirements that can be served by an equally distinctive marketing strategy;
• be reachable by sales and distribution channels currently being used or which could be used;
• be capable of being identified by a set of characteristics, such that customers can be reached by a distinctive and cost effective communications strategy;
• have homogeneity within segments and heterogeneity between segments; and
• have segment data that is usable, practical and readily translatable into a marketing strategy.

7.3 Segmentation in social marketing

Within social marketing, segmentation presents similar benefits, although it is often constrained by elements beyond the control of the marketers, such as ‘actual’ products (i.e., behaviours) that cannot be altered\(^ {42} \), or the necessity of targeting groups where competition is fiercest. Additionally, segments are often chosen based on need or vulnerability, rather than where returns will be greatest. Yet, within these constraints, the underlying premise of segmentation for social marketers remains – it enables them to target their efforts to specific groups who will be best served by the product or need the product most, and it allows products (particularly tangible products) and communication and distribution channels to be best tailored to the target audiences’ needs and lifestyles (Kotler and Roberto 1989).

7.4 Segmentation in health promotion

While segmentation is recognised as a keystone of social marketing, health promotion approaches also use elements of segmentation to guide where health

\(^ {42} \) Product refers to the set of benefits associated with the desired behaviours (core product) and the desired behaviours themselves (actual product). For sun protection campaigns, sun protective behaviours are the actual product, while the benefits that will accrue from performing those behaviours, such decreased skin cancers or delayed skin aging, are the core products. Tangible products are specific items or services associated with the actual product. For sun protection these could include products such as sunscreen, hats or other sun protection items, or particular services such as screening clinics.
resources should be utilised. Hawe et al. (2002) state that in identifying the priorities for health promotion, health promoters should examine a health problem’s: *prevalence* in the community; *severity*, i.e. effects on mortality or morbidity, quality of life and health costs; *selectivity*, i.e. its effect on particular groups and whether those groups are disadvantaged or vulnerable; and *amenability to intervention*, i.e. is it known that interventions have previously succeeded with this problem. This evaluation is similar to the evaluation recommended by Andreason (1995) for social marketers to determine which segment or segments will be targeted by a social marketing intervention. After segmenting target audiences along one or more segmentation variables, Andreason suggests that social marketers then evaluate where resources are best allocated, by exploring each segment’s: *differential needs*, which are a function of segment size, problem incidence, problem severity, and the defencelessness or vulnerability of people within the segment; their *differential general responsiveness*, which is a function of each segment’s assessed readiness or willingness to change; and their *differential cost*, which is a function of each segment’s reachability versus the organisation’s capabilities, i.e. how easy is it to find or reach this segment with the current resources and capabilities of the organisation. Both approaches recognise that resources should be committed based on a weighing of need against the potential for success; however, social marketing segments the *market* then evaluates the different segments, whereas health promotion uses the evaluation of the *problem* as a means of choosing the target audience.

7.5 The need for segmentation of adolescent and young adult sun protection audiences

As noted in Chapter Five, segmentation of the adolescent and young adult sun protection audience has traditionally been based only on age (e.g. Lowe et al. 1999; Buller et al. 2006; Olson et al. 2007) with few programs utilising any ‘secondary’ segmentation variables. However, the need for segmentation is particularly pressing for this demographic for a number of reasons:

- This demographic has been documented in the sun protection literature as reacting against sun protection messages to varying extents, dependent on their levels of appearance concern (Jones and Leary 1994) or ‘stage of change’ for sun protection (Cho and Salmon 2006). The systematic review of
sun protection interventions targeted at adolescents and young adults also noted a trend towards increased tanning in response to some interventions, implying some reactance to the sun protection message by some people in this demographic. This suggests messages need to be tailored to account for these differences in attitude and behaviour.

- The ‘no sun’ message prevalent in Australian sun protection over the past 25 years may need to be refined in light of new evidence showing the benefits of vitamin D in the prevention of a range of cancers and multiple sclerosis\(^{43}\) (NSW Health Department and The Cancer Council NSW 2001; Grant 2006; Kricker and Armstrong 2006; Reichrath 2006; van der Rhee et al. 2006; Reichrath 2009), and growing evidence of vitamin D deficiencies across a range of age groups within Australia (Jones et al. 1999; Kimlin et al. 2007; Erbas et al. 2008). While a ‘no sun’ message has been successful in promoting a consistent awareness of the danger of UV damage, a more nuanced message of limited sun exposure has been advanced by researchers (Reichrath 2006; Sinclair 2006; Sliney and Wengraitis 2006). As the adolescent and young adult audience is known to have more positive attitudes towards tanning than the rest of the population, there is a possible danger of this being misinterpreted by young people as promotion of tanning. This suggests messages will need to carry a higher informational load than previously and should, again, be tailored to account for the differences in attitude and behaviour towards tanning.

- Sun protection, particularly within Australia, is now a ‘mature’ issue with relatively high awareness. This may lead to audiences, particularly those who have grown up with a large amount of sun protection advertising, becoming immune or inattentive to the messages being generated. Snyder and Hamilton (2002) found new information was positively correlated with increased effect size in behaviour change from U.S media campaigns, whether the new information was about the behaviour being promoted, services associated with the behaviour, or enforcement of the behaviour by law. While

\(^{43}\) While cancer organisations have never actually stated ‘no sun’, but rather a ‘no tan’ approach, some academic comment has described this as the approach taken by organisations over this time (see citations), and noted that cancer organisations did not promote any benefits to sun exposure despite some evidence emerging on vitamin D benefits. This has now changed with Australian cancer organisations promoting time and region specific sun avoidance messages.
segmentation of the adolescent and young adult audience may not generate ‘new’ information, it can generate distinctive messages for specific segments of the market.

- The maturity of the sun protection issue also means that previous interventions may have raised sun protection levels in audiences that were more amenable to change, leaving those more reluctant to adopt new behaviours. This, again, suggests distinctive messages and strategies are needed to target those more reluctant to change.

7.6 Segmentation in previous interventions targeted at adolescents and young adults

As previously noted, segmentation of the adolescent and young adult audience in previous sun protection interventions has been most commonly based on age, with only six interventions identified that conducted a ‘secondary’ segmentation – based on gender, ‘stage of change’, current behaviour or multiple variables.

i) Gender

Novick (1997) and Jackson (1997) segmented audiences based on gender, targeting only females with their interventions. Both interventions did not, however, tailor strategies based on gender differences in patterns of sun protection behaviour (described in Chapter Two), but rather on the assumption that females are more likely to be concerned with appearance-based issues than males. They have, therefore, predominantly targeted skin protection and appearance issues rather than the prevention of skin cancer. As shown in the systematic review of these interventions, both achieved some positive change in sun protection. However, other interventions directed at male and female adolescents and young adults, utilising a predominantly appearance concern approach, have also shown positive changes in sun protection behaviours in both genders (Mahler et al. 1997; Weinstock et al. 2002; Mahler et al. 2005; Mahler et al. 2007). This suggests that appearance concern can be utilised successfully for both genders, and is not only applicable to females.
ii) ‘Stage of change’
Karnatz (1993) and Weinstock et al. (2002) both utilised the Transtheoretical Model to segment the target audience based on participants’ self-reported stage of change. Both interventions provided tailored feedback to participants on how to reduce personal risk, by utilising the behavioural and cognitive processes of change that have been shown as assisting in movement through stages. As both interventions were effective in achieving some significant behavioural changes, this suggests that this type of segmentation may be successfully utilised with this audience. However, some questions remain as to the model’s adequacy in encompassing the complexity of sun protection. Further investigation into the TTM as a basis for segmentation of adolescent and young adult sun protection audiences is presented in Chapter Eight.

iii) Behaviour
Dukeshire (1996b) used segmentation based on prior sun behaviours of participants, as he preselected participants for the study based on self-reported sunbathing over the previous summer. However, he did not use this segmentation to tailor messages or strategies; rather, he investigated the effects of fear appeals on a ‘high risk’ target audience.

iv) Multiple variables
Bernhardt (2001) used segmentation based on multiple factors – including the participants’ self-reported level of involvement, the sun exposure risk behaviours participants were likely to perform in the next 30 days, self-efficacy for using sunscreen, and preference for message source and message design – to provide tailored messages. This intervention did not achieve statistically significant changes in sun protective behaviours, although some differences were noted such as increased numbers of participants in experimental groups reading the tailored web page compared to the generic page, and being less likely to report that it was important for them to be tanned or that they felt more attractive when tanned. While this suggests some utility in the tailored web page based on multiple segmentation variables, it is impossible to know which segmentation variables, or combination of variables, were most effective in eliciting these changes.
7.7 Brand Loyalty segmentation and sun protection

As described in Chapter Three, when tailoring advertising messages for audiences Rossiter and Percy (1997, pg. 58) prescribe initial segmentation of the target market on a Brand Loyalty approach, which they define as the ‘regular (repeat) purchase of the brand based on (a) continued awareness and (b) a favourable price- and promotion-resistant attitude towards it’ (pg.58). By segmenting the audience along these lines and tailoring messages to the specific purchase or usage motives of the buyer (or influencer), the Rossiter-Percy Model aims to maximise buyer response for the brand being advertised.

While the Rossiter-Percy Model has been utilised successfully in a number of social marketing campaigns (Rossiter et al. 2000), it has not been used in these campaigns as a segmentation method, nor is there documented use of it in sun protection. However, viewing the target market along awareness-attitude-behaviour grounds may provide useful audience segments which could then be differentially targeted through the development of tailored messages. While the promotion of sun protective behaviours may be difficult to picture within the Brand Loyalty approach to target audience selection, Table 7.1 delineates how Brand Loyalty segments may be defined for sun protection. For this, the pattern of behaviour which provides adequate sun protection is envisaged as a ‘brand’, with other patterns of behaviour denoting inadequate protection, no protection or dangerous sun-related behaviours (indoor or outdoor tanning) envisaged as rival brands.

While commercial marketers would choose from these groups on the basis of the leverage of each group, social marketers would also have to consider social justice issues regarding which group had the greatest need or was most vulnerable. Action objectives would still be specified for each group, as per commercial advertising, but for sun protection behaviours this may be decreasing the number of sunburns, increasing the occasions of full sun protection or decreasing hours spent sun baking. Key role players in the decision-making process would also be identified so they

44 During literature and systematic review process no literature was found on this method of segmentation for sun protection. Additionally, specific searching of ABI/Inform, Medline, Proquest, and Science Direct using ‘Rossiter’ or ‘brand loyalty’ and ‘sun protection’ found no literature.
could be reached, and advertised to, given their role in that decision – as initiator, influencer, decider, purchaser, or user of the advertised product.

Communication effects would be considered in the same way as for commercial advertising, and an investigation into the motives for using, or not using, sun protective behaviours would be needed for each target segment. Problem avoidance (e.g. sun protection as a means of avoiding skin cancer or skin damage) would be an obvious motive for some people, but many people may also look to social approval (e.g. sun protection as a means of winning approval or respect from family or friends).

Table 7.1: Brand Loyalty divisions for sun protection behaviour

<table>
<thead>
<tr>
<th>Category</th>
<th>Behaviour</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 New Category Users</td>
<td>NCUs People who are simply unaware of the need for sun protection behaviours.</td>
</tr>
<tr>
<td>2 Brand Loyals</td>
<td>BLs People who adequately practice sun protective behaviours.</td>
</tr>
<tr>
<td>3 Favourable Brand Switchers</td>
<td>FBSs People who generally practice adequate sun protective behaviours but don't when the price becomes too high (e.g. peer pressure, too uncomfortable, miss out on an opportunity for sport), or forget sun protection in certain situations (e.g. watching children at sport, gardening).</td>
</tr>
<tr>
<td>4 Other Brand Switchers</td>
<td>OBSs People who switch between inadequate or no protection.</td>
</tr>
<tr>
<td>5 Other Brand Loyals</td>
<td>OBLs People who see the tanned skin ‘brand’ of behaviour giving them more benefits than the sun protection ‘brand’ or people who don't practice sun protective behaviours because they see the price outweighing the benefits (e.g. can't be bothered).</td>
</tr>
</tbody>
</table>

An individual’s level of involvement in the decision-making process would also need investigation. As defined by Rossiter et al. (1991), involvement is the risk perceived
by the typical target audience member in choosing this brand on this purchase occasion. The avoidance of skin cancer would normally be seen as a high involvement decision, that is, the risk of not protecting yourself from the sun would be viewed as high (dependent on weather and situation), but to many people the risk per occasion may actually be perceived as low (i.e. an occasional sunburn is not viewed with great trepidation). For adolescents, however, the risk of protecting can be quite high if peer norms are pro tan and anti-sun protection. These elements would then impact on creative execution tactics and media planning, as described in Chapter Three.

This approach to the division of the sun protection target audience holds many advantages over other methods of segmentation that may be used in this area as it divides audiences on current behaviour and also incorporates elements of knowledge (those who are aware of the need for sun protection versus those who are not), attitudes and beliefs (towards the benefits of sun protection), competition (from social norms regarding tanned skin or laziness), and decisional balance (where the beliefs and attitudes towards the benefits of sun protection need to be balanced against the cost of sun protective behaviours for each individual). Most importantly it incorporates concepts of adequacy of sun protection and recognises patterns of behaviour that stem from an awareness and attitude to sun protection. At a commonsense level it, therefore, incorporates many elements which have been identified as influencing sun protective behaviour, while at the same time acknowledging tanning as a separate competitive behaviour. This has been previously confirmed by Jackson and Aitken (2006) where structural equation modelling found intention to sun protect was predicted by different constructs than those that predicted sunbathing or intentional tanning.

Segmentation along Brand Loyalty lines could then allow promotional strategies to be guided via the Rossiter-Percy grid (Rossiter and Percy 1997), incorporating a strong commercial advertising framework for message development. The utility of this form of segmentation to sun protection is the basis for this phase of the research.
7.8 Aims of research

As a preliminary exploration of the applicability of Brand Loyalty segmentation to a sun protection market audience, a survey was undertaken of students at an Australian university. The purpose of this survey was to explore:

1) whether the student population could be categorised within Brand Loyalty segments with a simple five part question;

2) whether inclusion in a Brand Loyalty category was related to skin type and demographic variables;

3) whether inclusion in a Brand Loyalty category was related to:
   • attitudes to sun protection and tanning,
   • beliefs about skin protection and tan attractiveness,
   • temptations to tan or not protect,
   • confidence to sun protect,
   • perceived risk for skin cancer,
   • thinking about sun protection; and

4) how inclusion in a Brand Loyalty category related to:
   • actual incidence of sun burn over the previous summer, and
   • reported tanning behaviours.

As no previous research had been published on the use of Brand Loyalty segmentation in sun protection the research was exploratory, intended to generate rather than test hypotheses. However, as Brand Loyalty is defined by Rossiter and Percy (1997) as the regular purchase of a brand based on a continued awareness of it, and a favourable price and promotion resistant attitude towards it, it was postulated that inclusion in a Brand Loyalty segment for sun protection would be predicted by attitudes and beliefs towards sun protection and perceived risk for skin cancer, as well as resistance to the competition to sun protection. This competition would come from attitudes, perceived social norms and temptations towards tanning, but also from perceived barriers to sun protection or a lack of self-efficacy.
7.9 Method

A cross-sectional survey was conducted with a convenience sample of university students (N=342). Students were approached during a university open week and asked to complete a survey about their sun protection habits. Testing was done at the end of summer in the Wollongong area of NSW, Australia. At this time of year UV radiation levels are reported to be in the high to very high UV index (levels over 6 UV index) and require sun protection (sun protection is recommended when the UV index is 3 or over) (SunSmart Victoria 2008; Bureau of Meteorology 2010). Students were given a choice of a small fruit juice or a chocolate bar as an incentive to complete the survey.

Ethical approval was sought and received from The University of Wollongong Human Research Ethics Committee to conduct the survey, in accordance with the NHMRC National Statement on Ethical Conduct in Human Research.

The survey tool was developed utilising a number of survey questions and scales which had been used in previous studies on sun protection, and new questions developed through reference to advertising theory and the sun protection literature. The survey was then assessed by two experts in health behaviour change for content and face validity, and by colleagues for readability and understanding. Test-retest reliability was assessed through a separate sample of 21 students.

7.10 Test-Retest for Reliability

As a test of the reliability of the survey, a two week test-retest was conducted with a convenience sample of students aged 17 to 25 years. Students were accessed through personal contacts and one undergraduate class studying a Population Health subject. Due to time constraints the re-test was concluded after the main survey. This meant that questions with low reliability were unable to be altered and re-tested; however, the reliability of each variable was taken into account in interpretation of results. Data were analysed using SPSS 15.0.
A total of 21 students within an age range of 17 to 25 years completed the test-retest questionnaire. The mean age of participants was 19.2 years (SD 2.3); 29% were male and 71% female. All were domestic students.

Kappa statistics (unweighted), Spearman’s rho and McNemar’s test were calculated for all nominal and ordinal measures (Peat et al. 2001; Di Iorio 2005; Huck 2008). Correlation and standard error of measurement (SEM) were calculated for the scales formed from sun protection and tanning attitudes, beliefs on skin protection and tanning attractiveness, confidence to sun protect, and the pros and cons of sun protection.

Assumptions of normality were assessed for all scale distributions. In order to test whether the distribution’s skew significantly deviated from that of a normal distribution, the value for the skew was divided by the standard error of the skew. This gave a Z-score which was interpreted to be significant from values from Tabachnick and Fidell (1996, pg. 73), at an absolute value of 2.58 (p<.05) (Manning and Munro 2006). This process was repeated for kurtosis, with the value for the kurtosis divided by the standard error of the kurtosis, interpreted at an absolute value of 2.58 (p<.05).

The interpretation of kappa statistics was taken from Peat et al. (2001) with 0.5 indicating moderate agreement, 0.7 good agreement and 0.8 very good agreement. Correlations were judged acceptable at 0.7, with 0.9 judged as excellent (Di Iorio 2005). McNemar’s test was considered acceptable if p ≥ 0.05. SEM measures were considered individually for each continuous variable according to the response range.

7.11 Survey variables

Each variable is discussed separately. A copy of the survey is provided in Appendix 6. Item-to-total correlations, inter-item correlations, and factor analysis were conducted, and Cronbach’s alpha statistics for internal consistency calculated on all composite scales, using the main student survey data (n=294). Interpretation of item-

45 For testing of cognitive and affective attitudes n=15, due to an editing error which meant some surveys showed different scales. These were excluded from analysis.
to-total correlations and inter-item correlations were taken from Hair et al. (1998), with item-to-total correlations greater than the criterion of 0.5 and inter-item correlations greater than the criterion of 0.3 judged acceptable. For factor analysis, loadings greater than the criterion of 0.5 were judged acceptable (Hair et al. 1998). Interpretation for Cronbach’s alpha was taken from Hair et al. (1998) with the lower limit \( \alpha = 0.6 \) acceptable for exploratory research.

**i) Brand Loyalty measure**

Brand Loyalty segmentation was assessed in Question 1, as shown in Figure 7.1, where respondents were asked to place themselves into one category which described their usual sun protective behaviour, with one or more sub-categories chosen as applicable. This question was developed based on a theoretical interpretation of segments described in the Rossiter-Percy Model (1997), as discussed in Section 7.7, adapted for sun protection behaviours. Kappa statistic for reliability on test-retest was \( k = 0.81 \), Spearman’s \( r_s = 0.93 \). McNemar’s test was not significant (p=0.22).

**ii) Attitudes to sun protection and tanning**

Attitudes to sun protection and tanning were assessed on seven-point semantic differential scales as utilised by Jordan et al. (2002) in research looking at physical activity and TTM. The statements preceding the adjective pairs were, ‘I feel protecting myself from the sun is…’ and ‘I feel tanning is..’ followed by three items related to cognitive properties of attitude (useful/useless, harmful/beneficial, wise/foolish) and three items related to affective properties of attitude (enjoyable/unenjoyable, pleasant/unpleasant, stressful/relaxing). Higher scores related to more negative attitudes; the scores were reversed for analysis.

Scales were averaged for the three cognitive items and three affective items for sun protection, and the three cognitive items and three affective items for tanning, yielding four attitude scales. Item-to-total and inter-item correlations were all above criterion scores, therefore principal components analysis with varimax rotation was

---

46 They found adding the construct of attitude from the Theory of Planned Behaviour to TTM increased prediction of stage of change for physical exercise.
Figure 7.1: Brand Loyalty survey question

performed to examine whether the 12 attitude questions were measuring four distinct constructs (cognitive sun protection attitudes, affective sun protection attitudes, cognitive tanning attitudes, affective tanning attitudes). Three components were extracted with an eigen value greater than one. Cognitive and affective tan attitudes loaded greater than 0.5 onto one factor, cognitive sun protection attitudes loaded greater than 0.7 on a second factor, and affective sun protection attitudes loaded greater than 0.7 on a third factor(See Factor Analysis A in Table 7.2). Cognitive and affective tan attitudes were therefore combined to create one tan attitude score. Item-to-total and inter-item correlations were calculated for the new combined score, however, tan attitudes (wise) displayed an inter-item correlation (0.29) below the criterion value of 0.3 with tan attitudes (relaxing). The exclusion of tan attitudes

A. Regarding sun protection, please tick ONE of the following 5 categories that best applies to you, and also tick one or more sub-categories if applicable.

| ☐ | I do not need to protect myself from the sun |
| ☐ | I know I should protect myself from the sun but I choose not to because: |
| ☐ | ☐ I want to tan  
| | ☐ The difficulties of doing so outweigh the benefits |
| ☐ | I use some sun protection but I choose not to protect myself fully because: |
| | ☐ I also like to tan  
| | ☐ It is too difficult to protect myself fully  
| | ☐ I feel some sun exposure is good for you |
| ☐ | I generally protect myself adequately, but there are times when I don’t because: |
| | ☐ I want a bit of a tan  
| | ☐ I forget  
| | ☐ It is too difficult in the circumstances  
| | ☐ I am unprepared |
| ☐ | I protect myself adequately from the sun at all times |

Figure 7.1: Brand Loyalty survey question
(wise) was examined via analysis of internal consistency and factor analysis. Cronbach’s alpha increased with the deletion of tan attitudes (wise) from a combined tan attitudes score. Principal components analysis was then repeated deleting tan attitudes (wise). Three components were extracted, a tan attitudes component with five variables loading > 0.6, a cognitive sun protection attitudes component loading > 0.8, and an affective sun protection attitudes component loading > 0.7. Tan attitudes (beneficial) loaded negatively on cognitive sun protection attitudes, however, this was below 0.4. (See Factor Analysis B in Table 7.2). The three attitude scales were, therefore, judged to display acceptable unidimensionality, measuring distinct attitude constructs.

Table 7.2: Principal components analysis for attitude scales (N =299)

<table>
<thead>
<tr>
<th></th>
<th>Analysis A</th>
<th>Analysis B</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Initial eigen values</strong> 1</td>
<td>4.041</td>
<td>3.767</td>
</tr>
<tr>
<td>2</td>
<td>2.494</td>
<td>2.465</td>
</tr>
<tr>
<td>3</td>
<td>2.031</td>
<td>1.814</td>
</tr>
<tr>
<td>Component</td>
<td>Component</td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td><strong>Tan attitudes (pleasant)</strong></td>
<td>.882</td>
<td>.890</td>
</tr>
<tr>
<td><strong>Tan attitudes (enjoyable)</strong></td>
<td>.868</td>
<td>.880</td>
</tr>
<tr>
<td><strong>Tan attitudes (relaxing)</strong></td>
<td>.807</td>
<td>.821</td>
</tr>
<tr>
<td><strong>Tan attitudes (useful)</strong></td>
<td>.776</td>
<td>.780</td>
</tr>
<tr>
<td><strong>Tan attitudes (beneficial)</strong></td>
<td>.692</td>
<td>-.354</td>
</tr>
<tr>
<td><strong>Tan attitudes (wise)</strong></td>
<td>.692</td>
<td>-.354</td>
</tr>
<tr>
<td><strong>Sun protection attitudes</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(beneficial)</td>
<td>.868</td>
<td>.887</td>
</tr>
<tr>
<td>(wise)</td>
<td>.858</td>
<td>.858</td>
</tr>
<tr>
<td>(useful)</td>
<td>.768</td>
<td>.791</td>
</tr>
<tr>
<td>(pleasant)</td>
<td>.880</td>
<td>.889</td>
</tr>
<tr>
<td>(enjoyable)</td>
<td>.871</td>
<td>.872</td>
</tr>
<tr>
<td>(relaxing)</td>
<td>.770</td>
<td>.780</td>
</tr>
</tbody>
</table>
Reliability for the cognitive sun protection attitude scale was $r = 0.40^{47}$, SEM 0.21, the affective sun protection attitude scale $r = 0.89$, SEM 0.17, and the combined tan attitude scale $r = 0.76$, SEM 0.19. Internal consistencies were $a = 0.83$, 0.83, 0.88 respectively.

**iii) Beliefs about skin protection and tanning**

Beliefs about skin protection$^{48}$ and tanning were assessed via an appearance concern motivation scale developed and validated by Maddock et al. (2005). The instrument consisted of two scales on beliefs about tan attractiveness and skin protection, which were found by Maddock et al. to correlate with TTM variables$^{49}$.

The scale consisted of five items measuring beliefs about tan attractiveness, and five items measuring beliefs about skin protection, ranging from ‘strongly disagree’ to ‘strongly agree’. For analysis, scales were averaged as described by Maddock et al. (2005) in the scale’s original development.

Item-to-total and inter-item correlations were examined. Item number two in tanning beliefs, ‘many people look younger with a tan’, showed an inter-item correlation (0.26) with item ten, ‘men look more masculine with a tan’, below the 0.3 criterion value. Deletion of item two from the scale was, therefore, examined. Principal components analysis with varimax rotation extracted two distinct constructs with an eigen value greater than one, described as beliefs about skin protection and beliefs about tan attractiveness, all loading greater 0.5 on one factor with no cross loading. Item two loaded lowest of other items in the tan attractiveness scale, recording a

---

$^{47}$ One respondent changed their assessment of cognitive sun protection attitudes from 4 to 1 on test-retest markedly affecting the reliability co-efficient value. Excluding this one respondent increased reliability to 0.8. Sample size for test-retest on attitudes was n=16 due to an error on five papers which altered the semantic differential scales from seven points to nine points on the first test.

$^{48}$ Note this scale was classified as measuring skin protection beliefs rather than sun protection beliefs

$^{49}$ While Maddock et al. (2005) classified these scales as measuring attitudes, this study has categorised the statements making up these scales as measuring beliefs, in that they are ‘statements about the object’, whereas attitude is an overall evaluation of the object. Fishbein (1967, pg.479) defines beliefs as independent but related to attitudes. Fishbein, M. (1967). *Readings in attitude theory and measurement*. New York, Wiley
value of 0.7. As this was an acceptable loading and internal consistency was
decreased with removal of item two, it was decided to retain item two in the scale.
As the distribution for the re-test scale of sun protection beliefs showed some
kurtosis, Spearman’s rho was calculated for correlation rather than Pearson’s $r$.
Reliability for the skin protection scale was $r_s = 0.66$, SEM 0.90, and for the tan
attractiveness scale was $r = 0.47$, SEM .80. Internal consistencies for skin protection
and tan attractiveness scales were $a = 0.84$, and 0.80 respectively.

Table 7.3: Principal components analysis for beliefs about sun protection and
tanning (N =299)

<table>
<thead>
<tr>
<th>Analysis</th>
<th>Component 1</th>
<th>Component 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Initial eigen values 1</td>
<td>3.271</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>2.691</td>
<td></td>
</tr>
<tr>
<td>Component 1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Taking care of my skin is important to me</td>
<td>.877</td>
<td></td>
</tr>
<tr>
<td>Taking care of my health is very important</td>
<td>.826</td>
<td></td>
</tr>
<tr>
<td>My skin is worth protecting</td>
<td>.786</td>
<td></td>
</tr>
<tr>
<td>I like to take good care of my skin</td>
<td>.764</td>
<td></td>
</tr>
<tr>
<td>Staying healthy is more important than being attractive</td>
<td>.643</td>
<td></td>
</tr>
<tr>
<td>I look better with a tan</td>
<td></td>
<td>.817</td>
</tr>
<tr>
<td>Most people look sexy with a tan</td>
<td></td>
<td>.816</td>
</tr>
<tr>
<td>Most people look healthier with a tan</td>
<td></td>
<td>.755</td>
</tr>
<tr>
<td>Men look more masculine with a tan</td>
<td></td>
<td>.698</td>
</tr>
<tr>
<td>Many people look younger with a tan</td>
<td></td>
<td>.626</td>
</tr>
</tbody>
</table>
iv) Decisional balance

Decisional balance is a construct from the Transtheoretical Model where people’s ‘weighing up’ of the pros and cons of change is said to alter relative to the stage of change that they are in in regards to a particular behaviour. Noar et al. (2003), in research on alcohol use, found decisional balance scales were equal to or better than positive and negative expectancy scales (from Social Cognitive Theory) in predicting alcohol problems and alcohol indices, as well as imposing a lower response burden. This research thus aimed to explore decisional balance in terms of its relationship to inclusion in a Brand Loyalty segment.

Decisional balance was assessed by five questions targeting the benefits of sun protection and five questions targeting the costs of sun protection for this audience. These questions were developed from a synthesis of published quantitative and qualitative research, described in Chapter Two, Section 2.10. Respondents were asked to rate the importance of the ten items when deciding whether to sun protect or not. Scales were formed by averaging all ‘pro’ items and all ‘con’ items to form two scores as per Noar et al. (2003).

Item-to-total and inter-item correlations were examined. While many items showed low inter-item correlation with other scale items, item-to-total correlations were acceptable except for item one ‘preventing skin cancer’ with the combined ‘pros’ scale \( r = 0.48 \), and item six ‘the time, preparation, and planning needed to protect myself’ with the combined ‘cons’ scale \( r = 0.49 \). It was not considered necessary that all items in the two scales should correlate with every other item, as ‘pros’ or ‘cons’ are not necessarily single constructs, i.e. people may perceive quite different costs for sun protection, which may not particularly relate to each other, but are placed under a general heading of ‘cons’.

The scales were further examined through principal components analysis. Three factors were extracted with an eigen value over one, with one factor containing ‘cons’ items seven, eight, nine and ten, all loading above 0.5. The second factor

---

50 This will be discussed further in Chapter Eight.
51 Measurements of quantity (drinks per day); frequency (number of days per (typical) week); and peak drinking (highest number of drinks in the last thirty days)
contained items four, five, and six loading above 0.7, and item seven loading 0.32.
Factor three contained ‘pro’ items one, two and three, all loading over 0.5 (See Table 7.4, Factor Analysis A).

Table 7.4: Principal components analysis for decisional balance (N =299)

<table>
<thead>
<tr>
<th></th>
<th>Analysis A</th>
<th>Analysis B</th>
</tr>
</thead>
<tbody>
<tr>
<td>Initial Eigen values</td>
<td>2.831</td>
<td>2.543</td>
</tr>
<tr>
<td>1</td>
<td>2.014</td>
<td>1.917</td>
</tr>
<tr>
<td>2</td>
<td>1.212</td>
<td>1.179</td>
</tr>
<tr>
<td>Component</td>
<td>Component</td>
<td></td>
</tr>
<tr>
<td></td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>Con 8 – ‘Uncool’ image</td>
<td>.850</td>
<td>.865</td>
</tr>
<tr>
<td>Con 9 – ‘Cool’ tan image</td>
<td>.843</td>
<td>.823</td>
</tr>
<tr>
<td>Con 10 – Friends lack of acceptance</td>
<td>.664</td>
<td>.629</td>
</tr>
<tr>
<td>Con 7 – Discomfort, unpleasant</td>
<td>.539</td>
<td>.323</td>
</tr>
<tr>
<td>Pro 4 – Responsible image</td>
<td>.810</td>
<td>.877</td>
</tr>
<tr>
<td>Pro 5 – Approval parents and people</td>
<td>.715</td>
<td>.772</td>
</tr>
<tr>
<td>Con 6 – Time, preparation</td>
<td>.710</td>
<td></td>
</tr>
<tr>
<td>Pro1 – Prevent skin cancer</td>
<td></td>
<td>.856</td>
</tr>
<tr>
<td>Pro2 – Prevent skin damage</td>
<td></td>
<td>.781</td>
</tr>
<tr>
<td>Pro3 – Prevent sunburn</td>
<td></td>
<td>.564</td>
</tr>
</tbody>
</table>
Examining item six, ‘the time, preparation, and planning needed to protect myself’, it was thought that this may have been ambiguous in its wording as a ‘con’. Item six was, therefore, removed from the cons scale. Further principal components analysis showed an improved factor extraction with ‘cons’ seven, eight, nine, ten loading above 0.6 on factor one; ‘pros’ one, two, three loading at or above 0.6 on factor two, and ‘pros’ four and five loading above 0.7 on factor three. ‘Con’ item ten cross loaded onto factor three, however, this was below 0.4 (See Table 7.4, Factor Analysis B). These three factors were described as ‘pros’ (intrapersonal), ‘pros’ (interpersonal) and ‘cons’. Pro items one, two, three, four and five were combined for analysis, to give an average ‘pros’ score, and con items seven, eight, nine and ten were combined to give an average ‘cons’ score. A score of average ‘pros’ minus ‘cons’ was also calculated using standardised scores to account for an uneven numbers of items in the two scales.

Correlation for ‘pros’ was \( r_s = 0.76, \) SEM= 0.12; ‘cons’ \( r_s = 0.52, \) SEM =0.15; ‘pros’ minus ‘cons’ \( r = 0.77, \) SEM = 0.82. Internal consistency for ‘pros’ \( \alpha = 0.60, \) and ‘cons’ \( \alpha = 0.74. \)

\( v) \) **Confidence and temptation**

Self-efficacy is a person’s confidence to engage (or not engage) in a specific behaviour across different situations, and to resist temptations related to the behaviour (Prochaska et al. 2002). As a measure of confidence, respondents were asked to state their level of agreement with statements ‘I feel confident in my ability to protect myself adequately from sun damage when I am at the beach/pool’, ‘I feel confident in my ability to protect myself adequately from sun damage when I am playing or watching sport’, and ‘I feel confident in my ability to protect myself adequately from sun damage in all situations’. Responses were recorded on five-point Likert scales ranging from ‘strongly disagree’ to ‘strongly agree’. Items were added to form one confidence scale. Item-to-total and inter-item correlations were examined. All were above criterion values. Factor analysis extracted one factor with an eigen value over two, with all factors loading at or above 0.8. The scale was

---

\(^{52}\)Questioning of some of the participants from the test-retest showed that this question was viewed as a ‘con’, so it is unknown why this loaded so highly with questions more related to social factors.
therefore judged to display acceptable unidimensionality. Statistics for reliability on test-retest were \( r = 0.64 \), SEM 0.15. Internal consistency was \( \alpha = 0.78 \).

Temptations to tan or to not sun protect were assessed by two questions ‘When I am at the beach I am tempted to not protect myself from the sun’ and ‘When I am at the beach I am tempted to tan’. They were scored on five point Likert scales ranging from ‘never’ to ‘always’. Questions were analysed as individual items. Kappa statistics for reliability on test-retest for temptations to not sun protect or to tan at the beach were \( k = 0.32 \), and \( k = 0.63 \), respectively; Spearman’s rho were \( r_s = 0.81 \), and \( r_s = 0.93 \) respectively. McNemar’s test was not significant for both questions (\( p = 0.14 \), \( p = 0.50 \) respectively).

**vi) Sun protection awareness**

As a measure of continual awareness of sun protection, respondents were asked how often they thought about sun protection when they were out in the sun. This single item was scored on a five part Likert scale ranging from ‘never’ to ‘always’. Kappa statistic for reliability on test-retest for thinking about sun protection was \( k = 0.63 \), Spearman’s rho was \( r_s = 0.84 \). McNemar’s test was not significant (\( p = 0.39 \)).

**vii) Sun protection and tanning behaviours**

The adequacy of participants’ sun protection was assessed with three questions relating to the incidence of sunburn on the past weekend, the type of burn if sunburn had occurred, and the incidence of sunburn over the past summer. The first two questions were taken from the Australian National Sun Survey (Centre for Behavioural Research in Cancer 2005b).

Tanning behaviour was assessed with two dichotomous questions asking whether participants had attempted to tan through outdoor UV exposure or indoor UV exposure in the past summer.

Reliability scores were not analysed for these measures as participants may have changed their behaviour during the two week interval between tests, leading to inaccurate reliability estimates.
viii) Perceived risk for skin cancer; skin type and colour

Perceived risk was assessed through the question, ‘To what extent do you feel you are at risk of skin cancer’, with a four-point Likert scale ranging from ‘no risk’ to ‘high risk’. Kappa statistic $k = 0.72$, Spearman’s rho $r_s = 0.89$. McNemar’s test was not significant ($p = 0.51$).

Skin type and skin colour questions were taken from the Australian National Sun Survey (Centre for Behavioural Research in Cancer 2005b), with skin type assessed with the question, ‘If your skin was exposed to strong sunshine at the beginning of summer with no protection at all, and you stayed in the sun for 30 minutes, would your skin: 1. Just burn and not tan afterwards, 2. Burn first then tan afterwards, 3. Not burn at all, just tan’. Kappa statistic was $k = 0.71$, and Spearman’s rho $r_s = 0.82$. McNemar’s test was not significant ($p = 0.51$). Skin colour was assessed with eight variations on colour from ‘very fair’ to ‘black’ by asking the question, ‘How would you describe your skin when you don’t have any tan?’ Kappa statistic was $k = 0.75$, and Spearman’s rho $r_s = 0.95$. McNemar’s test was not significant ($p = 0.41$).

ix) Demographics

Respondents were asked their age in years, gender, and whether they were a domestic or international student.

7.12 Analysis

Contingency table and chi-square analyses were conducted to establish whether there were significant relationships between Brand Loyalty group and the variables of skin type, skin colour, gender, student status and age. If more than 20% of cells had an expected count of less than five, items were examined and cells collapsed so as not to violate contingency analysis assumptions. For variables showing an overall significant relationship with Brand Loyalty, an examination of adjusted standardised residuals was conducted to determine where specific between-group relationships lay. Values equal to or greater than an absolute value of two were interpreted as showing a significant relationship between variables.

53 Age was converted from a scale measure into a categorical measure based on younger (aged 17/18/19/20) and older students (aged 21/22/23/24/25). The 17 to 20 year old grouping consisted of 62.2% of the sample.
Relationships between Brand Loyalty and attitudes and beliefs regarding sun protection and tanning, decisional balance, temptations to tan or not protect, self-efficacy, perceived risk for skin cancer, and thinking about sun protection, were examined through analysis of variance (ANOVA) or Kruskal-Wallis test (Manning and Munro 2006). ANOVA was used to determine mean differences across the Brand Loyalty segments over those variables with normal distributions. (Scale data distributions were examined for normality for both Brand Loyalty groupings via the process described in Section 7.10). Bonferroni post hoc comparisons, which are a more conservative analysis than Tukeys’, were conducted for those variables with normal distributions, with significance set at p<0.05. Kruskal-Wallis tests were conducted for ordinal variables and scales which failed tests of normality, with follow-up Mann-Whitney U-tests across the Brand Loyalty segments. Significance was set at p<0.005 for Mann-Whitney U-tests (incorporating a Bonferroni correction due to multiple comparisons).

A logistic regression analysis was then conducted which aimed to predict group membership on the variable of Brand Loyalty. Analysis was limited to Favourable Brand Switchers (FBS) versus Other Brand Switchers (OBS) groupings due to low numbers in other groupings. Multicollinearity between variables was examined by using SPSS multicollinearity diagnostics statistics produced by linear regression, with dummy variables created for nominal independent variables. A Homer and Lemeshow chi-square test of goodness of fit was performed to assess model fit, with a finding of non-significance set at a criterion value of $\alpha = 0.05$ taken as an indication of adequate fit (Manning and Munro 2006). Wald’s statistic was used to interpret the significance of individual predictors at a criterion value of $\alpha = 0.05$ (Manning and Munro 2006).

### 7.13 Results

Three-hundred and forty two students completed the survey. However, as this research concerns adolescents’ and young adult’s sun protection, those over 25 years of age were excluded, leaving a valid sample of 299 students aged 17 to 25 years. The mean age of participants was 20.2 years (SD 2.2); 32% were male and 68% female; 73% were domestic students and 27% were international students. The
majority of students classified their skin type as ‘burn first then tan afterwards’ (51%), and classified their skin colour as ‘fair/very fair’ (44%), ‘medium’ (33%), or ‘olive/dark/very dark/black’ (23%)\(^{54}\). (See Tables 7.5 and 7.6).

Table 7.5: Skin type

<table>
<thead>
<tr>
<th>Skin type</th>
<th>N</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Just burn and not tan afterwards</td>
<td>79</td>
<td>26.5%</td>
</tr>
<tr>
<td>Burn first then tan afterwards</td>
<td>153</td>
<td>51.3%</td>
</tr>
<tr>
<td>Not burn at all, just tan</td>
<td>66</td>
<td>22.1%</td>
</tr>
</tbody>
</table>

Table 7.6: Skin colour

<table>
<thead>
<tr>
<th>Skin colour</th>
<th>N</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Very fair</td>
<td>36</td>
<td>12.2%</td>
</tr>
<tr>
<td>Fair</td>
<td>93</td>
<td>31.5%</td>
</tr>
<tr>
<td>Medium</td>
<td>98</td>
<td>33.2%</td>
</tr>
<tr>
<td>Olive</td>
<td>49</td>
<td>16.6%</td>
</tr>
<tr>
<td>Dark</td>
<td>16</td>
<td>5.4%</td>
</tr>
<tr>
<td>Very dark</td>
<td>2</td>
<td>.7%</td>
</tr>
<tr>
<td>Black</td>
<td>1</td>
<td>.3%</td>
</tr>
</tbody>
</table>

\(^{54}\text{Skin colour categories were collapsed into three categories to match those reported by the Australian National Sun Survey.}\)
7.13.1 Aim One: How would the student population be categorised within these segments with a single five part question

The majority of students in this survey (62%) were categorised in the Favourable Brand Switchers (FBSs) segment (generally protect but at times don’t); while a further 11% were categorised as Brand Loyals (BLs) (always protecting themselves adequately from the sun). Only 6% percent of respondents did not protect themselves at all and were categorised as New Category Users (NCUs) (felt they did not need to protect themselves from the sun) (2%) or Other Brand Loyals (OBLs) (chose not to even though they knew they should) (4%). Results for Brand Loyalty categorisation are presented in Table 7.7 and Figure 7.2.

Table 7.7: Categorisation of sun protective behaviour

<table>
<thead>
<tr>
<th>Segments</th>
<th>N=294</th>
<th>N</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>New Category Users</td>
<td>6</td>
<td>2.0%</td>
<td></td>
</tr>
<tr>
<td>Other Brand Loyals</td>
<td>11</td>
<td>3.7%</td>
<td></td>
</tr>
<tr>
<td>Other Brand Switchers</td>
<td>61</td>
<td>20.7%</td>
<td></td>
</tr>
<tr>
<td>Favourable Brand Switchers</td>
<td>183</td>
<td>62.2%</td>
<td></td>
</tr>
<tr>
<td>Brand Loyals</td>
<td>33</td>
<td>11.2%</td>
<td></td>
</tr>
</tbody>
</table>

Of those OBLs who chose not to sun protect (n= 11), six reported they did not sun protect because they wanted a tan; whereas five reported that the difficulties of protecting outweighed the benefits. OBSs (n=61), who chose not to protect themselves fully, reported reasons for this as being: ‘I also like to tan’ (n=31); ‘it is too difficult to protect myself fully’ (n= 23); and ‘I feel some sun exposure is good for you’ (n=20) (Note respondents could choose more than one category). FBSs (n=183), who generally protect themselves adequately but don’t on occasions, gave reasons for their failure to protect adequately as: ‘I want a bit of a tan’ (n= 62); ‘I

---

55 5 participants ticked more than one Brand Loyalty segment and were excluded from analysis
forget’ (n=129); ‘It is too difficult in the circumstances’ (n=25); ‘I am unprepared’ (n=25).

Figure 7.2: Bar chart of Brand Loyalty segments

7.13.2 Aim Two: How inclusion in a Brand Loyalty category was related to skin type and demographic variables

i) Skin type
Figure 7.3 shows the breakdown of skin type for Brand Loyalty groupings. Contingency table analysis was conducted to establish whether there was a significant relationship between inclusion in a Brand Loyalty group and reported skin type. (Brand Loyalty categories NCU and OBL were combined due to 33% of cells having an expected count of less than five.) A significant relationship was found between skin type and inclusion in a Brand Loyalty category ($\chi^2$=25.2, 6 df, p =0.000).
Figure 7.3: Bar chart showing skin type for each Brand Loyalty category

An examination of the adjusted standardised residuals, using an absolute value of two as showing a significant relationship between variables, found: NCU/OBLs had significantly higher proportions of students with skin that ‘does not burn at all, just tans’; OBSs had significantly higher proportions of students with skin that ‘does not burn at all, just tans’ and significantly lower proportions of students with skin that ‘just burns does not tan afterwards’; and FBSs had significantly higher proportions of students with skin that ‘just burns does not tan afterwards’ and significantly lower proportions of students with skin that ‘does not burn at all, just tans’.

56 As the FBS and ‘burn first then tan afterwards’ skin type categories had high numbers of students, raw data shows a majority of FBSs as being this skin type. However, contingency table analysis examines relationships between variables based on what is observed in the data compared to what would be expected if no association existed. Significant differences were found when the observed numbers of people with specific skin types in each Brand Loyalty segment were significantly higher than would expected based on the relative proportions of students in Brand Loyalty categories and skin types categories.
**ii) Skin colour**

Figure 7.4 shows a breakdown of skin colour for Brand Loyalty groupings.

**Figure 7.4:** Bar chart showing skin colour for each Brand Loyalty category

Contingency table analysis was conducted to establish whether there was a significant relationship between inclusion in a Brand Loyalty group and reported skin colour. (Skin colour categories were collapsed into fair/very fair, medium, and olive/dark/very dark/black\(^{57}\), and Brand Loyalty categories collapsed to NCU\(_s\)/OBL\(_s\), OBS\(_s\), FBS\(_s\) and BL\(_s\), due to 66% of cells having an expected count of less than five.) A significant relationship was found between skin colour and inclusion in a Brand Loyalty category \((\chi^2 = 19.4, 6 \text{ df}, p = 0.03)\). An examination of the adjusted standardised residuals found: NCU\(_s\)/OBL\(_s\) and OBS\(_s\) were significantly more likely to have olive/dark/very dark/black skin and significantly less likely to have fair/very

---

\(^{57}\) These skin colour combined categories were based on the Australian National Sun Survey (Centre for Behavioural research in cancer 2005b).
fair skin; and FBSs were significantly more likely to have fair/very fair skin and significantly less likely to have olive/dark/very dark/black skin.

**iii) Gender**

Contingency table analysis was conducted to establish whether there was a significant relationship between inclusion in a Brand Loyalty group and gender. (Brand Loyalty categories NCUs and OBLs were combined due to 30% of cells having an expected count of less than five.) A significant relationship was found between gender and inclusion in a Brand Loyalty category ($\chi^2=12.0$, 3 df, $p = 0.007$). Examination of the adjusted standardised residuals found: NCUs/OBLs and OBSs were significantly more likely to be male; and FBSs were significantly more likely to be female.

**iv) Student status**

Contingency table analysis was conducted to establish whether there was a significant relationship between inclusion in a Brand Loyalty group and student status. (Brand Loyalty categories NCUs and OBLs were combined due to 30% of cells having an expected count of less than five.) A significant relationship was found between student status and inclusion in a Brand Loyalty category ($\chi^2=12.3$, 3 df, $p = 0.006$). An examination of the adjusted standardised residuals found: NCUs/OBLs and BLs were significantly more likely to be international students; and FBSs were significantly more likely to be domestic students.

**v) Age**

Contingency table analysis was conducted to establish whether there was a significant relationship between inclusion in a Brand Loyalty group and age. Age was grouped into ages 17 to 20 and 21 to 25. (Brand Loyalty categories NCUs and OBLs were combined due to 30% of cells having an expected count of less than five.) A significant relationship was found between age and inclusion in a Brand Loyalty category ($\chi^2=9.7$, 3 df, $p = 0.022$). An examination of the adjusted standardised residuals found: FBSs were significantly more likely to be in the
younger age group; and BLs were significantly more likely to be in the older age group.

7.13.3 Aim Three: How inclusion in a Brand Loyalty category was related to attitudes and beliefs regarding sun protection and tanning including decisional balance, temptations to tan or not protect, confidence to sun protect, perceived risk for skin cancer, and thinking about sun protection.

\[i\) Attitudes\]
All Brand Loyalty groups, in general, had positive cognitive attitudes to sun protection (i.e. sun protection is wise/useful/beneficial) with mean scores ranging from 5.3 to 6.8. Kruskal-Wallis test and Mann-Whitney follow-up tests found BLs had significantly more positive cognitive sun protection attitudes than NCUs and OBSs, and FBSs had significantly more positive cognitive sun protection attitudes than NCUs. (See Tables 7.8 and 7.9, and Figure 7.5).

Affective attitudes to sun protection (i.e. sun protection is enjoyable/pleasant/relaxing) were more ambivalent for all groups (mean scores 3.0 to 3.9), except BLs who reported moderately positive affective attitudes (5.4). This difference was significant for BLs against all other Brand Loyalty groups. (See Tables 7.8 and 7.9, and Figure 7.5).

Attitudes to tanning were also generally ambivalent (mean scores 3.1 to 4.4). However, a significant difference between BLs and OBSs was found, with BLs reporting significantly less positive attitudes to tans than OBSs. (See Tables 7.8 and 7.9, and Figure 7.5).

---

\[58\) Midpoint of scale was 4, range 1 to 7.
Table 7.8: Brand Loyalty and attitudes to sun protection and tanning (Scale 1-7)

<table>
<thead>
<tr>
<th></th>
<th>Brand loyalty segment</th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>NCU</td>
<td>OBL</td>
<td>OBS</td>
<td>FBS</td>
<td>BL</td>
</tr>
<tr>
<td>Sun protection attitudes (cognitive)</td>
<td>Mean</td>
<td>5.3</td>
<td>6.2</td>
<td>6.2</td>
<td>6.7</td>
</tr>
<tr>
<td></td>
<td>Median</td>
<td>5.6</td>
<td>6.0</td>
<td>6.3</td>
<td>7.0</td>
</tr>
<tr>
<td>Sun protection attitudes (affective)</td>
<td>Mean</td>
<td>3.7</td>
<td>3.0</td>
<td>3.5</td>
<td>3.9</td>
</tr>
<tr>
<td></td>
<td>Median</td>
<td>3.8</td>
<td>3.0</td>
<td>3.5</td>
<td>3.7</td>
</tr>
<tr>
<td>Tan attitudes</td>
<td>Mean</td>
<td>4.4</td>
<td>4.3</td>
<td>4.4</td>
<td>3.9</td>
</tr>
<tr>
<td></td>
<td>Median</td>
<td>4.2</td>
<td>4.4</td>
<td>4.5</td>
<td>4.0</td>
</tr>
</tbody>
</table>

NCU = New Category Users, OBL = Other Brand Loyals, OBS = Other Brand Switchers, FBS = Favourable Brand Switchers, BL = Brand Loyals

Table 7.9: Post hoc tests for Brand Loyalty and attitudes to sun protection and tanning

<table>
<thead>
<tr>
<th>Variable</th>
<th>F (df)a</th>
<th>Chi sq (df)b</th>
<th>Sig.</th>
<th>Bonferroni*a</th>
<th>Mann-Whitney U tests**b</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tanning Attitudes</td>
<td>4.26 (4)</td>
<td>p=.002</td>
<td>BL&lt; OBSa</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sun protection attitudes (affective)</td>
<td>13.23 (4)</td>
<td>p=.000</td>
<td>NCU, OBL, OBS, FBS&lt; BLa</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sun Protection attitudes (cognitive)</td>
<td>12.43 (4)</td>
<td>.014</td>
<td>NCU &lt;FBS, BLb OBS&lt;BLb</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*aANOVA and Bonferroni post hoc tests**Significant at p<0.05
|bKruskal-Wallis and Mann-Whitney U-tests**Significant at p<0.005
ii) Beliefs

Students held generally positive skin protection beliefs across Brand Loyalty groupings (range 19.4 to 21.4). While Kruskal-Wallis test found a significant difference between groupings, post hoc Mann-Whitney U-tests were non-significant. Tanning beliefs were also similar across NCU’s, OBLs, OBSs and FBSs (range 16.6 to 18.3), with mean scores showing that these groups held neutral to slightly positive tan attractiveness beliefs, however BLs reported slightly negative tan attractiveness beliefs (mean score 12.8). This difference was significant at p <0.05 (See Table 7.10, Table 7.11, and Figure 7.6).

---

59 Median values are used for variables within skewed distributions
Table 7.10: Brand Loyalty and beliefs about skin protection and tan attractiveness
(Range 5 to 25 – five items each scale with a range 1 to 5)

<table>
<thead>
<tr>
<th></th>
<th>NCU</th>
<th>OBL</th>
<th>OBS</th>
<th>FBS</th>
<th>BL</th>
</tr>
</thead>
<tbody>
<tr>
<td>Skin protection beliefs</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mean</td>
<td>19.4</td>
<td>20.8</td>
<td>20.8</td>
<td>21.4</td>
<td>21.2</td>
</tr>
<tr>
<td>Median</td>
<td>20.0</td>
<td>20.0</td>
<td>21.0</td>
<td>22.0</td>
<td>23.0</td>
</tr>
<tr>
<td>Tanning beliefs</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mean</td>
<td>16.6</td>
<td>18.3</td>
<td>17.6</td>
<td>16.4</td>
<td>12.8</td>
</tr>
<tr>
<td>Median</td>
<td>17.0</td>
<td>18.0</td>
<td>18.0</td>
<td>16.0</td>
<td>13.0</td>
</tr>
</tbody>
</table>

NCU = New Category Users, OBL = Other Brand Loyals, OBS= Other Brand Switchers, FBS= Favourable Brand Switchers, BL = Brand Loyals

Table 7.11: Post hoc tests for Brand Loyalty and beliefs about skin protection and tan attractiveness

<table>
<thead>
<tr>
<th>Variable</th>
<th>F (df)a</th>
<th>Chi sq (df)b</th>
<th>Sig.</th>
<th>Bonferroni*a</th>
<th>Mann-Whitney U tests**b</th>
</tr>
</thead>
<tbody>
<tr>
<td>Skin protection beliefs</td>
<td>11.68</td>
<td>(4) b</td>
<td>p = .020</td>
<td>NS b</td>
<td></td>
</tr>
<tr>
<td>Tanning attractiveness beliefs</td>
<td>7.89</td>
<td>(4) a</td>
<td>p = .000</td>
<td>BL &lt; FBS, OBS, OBL a</td>
<td></td>
</tr>
</tbody>
</table>

*aANOVA and Bonferroni post hoc tests*Significant at p<.05
*bKruskal-Wallis and Mann-Whitney U-tests**Significant at p<.005
iii) Decisional balance

Students in NCU, OBL, OBS, FBS categories, on average, reported the ‘pros’ or benefits of sun protection as being ‘somewhat important’ to ‘quite important’, with BLs reporting slightly higher importance. This difference was significant between BLs and OBSs (based on ranks) with BLs reporting significantly more ‘pros’ than OBSs (see Tables 7.12 and 7.13). BLs, FBSs and OBSs, on average, reported the ‘cons’ or barriers to sun protection between ‘a little bit important’ to ‘somewhat important’; whereas NCUUs and OBLs reported ‘cons’ as having slightly higher importance. Significant differences were found between OBLs compared to FBSs and BLs, with OBLs reporting significantly more ‘cons’ to sun protection than these.
groups. (See Tables 7.12 and 7.13). Interestingly, comparing the ‘pros’ minus ‘cons’ found more significant results with FBSs having a significantly more positive score than OBSs, OBLs, and NCUs, and approaching significance (p= 0.006) with a less positive score than BLs. Additionally, BLs had significantly more positive scores than OBSs and OBLs, and approached significance (p = 0.005) with more positive scores than NCUs. This is also shown in the plotting of standardised mean scores for pros and cons against Brand Loyalty grouping, where it is seen that from OBLs to BLs, the pros of sun protection became of higher importance while the cons of sun protection became of lower importance. (See Figure 7.7).

Table 7.12: Mean scores of ‘pros’ and ‘cons’

<table>
<thead>
<tr>
<th></th>
<th>Brand loyalty segment</th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>NCU</td>
<td>OBL</td>
<td>OBS</td>
<td>FBS</td>
<td>BL</td>
</tr>
<tr>
<td>Pros</td>
<td>Mean</td>
<td>3.80</td>
<td>3.56</td>
<td>3.62</td>
<td>3.84</td>
</tr>
<tr>
<td></td>
<td>Median</td>
<td>3.80</td>
<td>3.80</td>
<td>3.63</td>
<td>3.80</td>
</tr>
<tr>
<td>Cons</td>
<td>Mean</td>
<td>3.17</td>
<td>3.30</td>
<td>2.68</td>
<td>2.39</td>
</tr>
<tr>
<td></td>
<td>Median</td>
<td>3.13</td>
<td>3.25</td>
<td>2.75</td>
<td>2.25</td>
</tr>
<tr>
<td>Pros minus cons (Z score)</td>
<td>Score</td>
<td>-.75</td>
<td>-1.27</td>
<td>-.51</td>
<td>.16</td>
</tr>
<tr>
<td></td>
<td>(S.E.)</td>
<td>(.32)</td>
<td>(.48)</td>
<td>(.16)</td>
<td>(.08)</td>
</tr>
</tbody>
</table>

NCU = New Category Users, OBL = Other Brand Loyals, OBS= Other Brand Switchers, FBS= Favourable Brand Switchers, BL = Brand Loyals

Table 7.13: Post hoc tests for Brand Loyalty and pros and cons of sun protection

<table>
<thead>
<tr>
<th>Variable</th>
<th>Chi sq (df)</th>
<th>Sig.</th>
<th>Mann-Whitney U tests**</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pros</td>
<td>16.06 (4)</td>
<td>p = .003</td>
<td>BL&gt;OBS*</td>
</tr>
<tr>
<td>Cons</td>
<td>18.70 (4)</td>
<td>p =.001</td>
<td>OBL&gt;FBS,BL*</td>
</tr>
<tr>
<td>Pros minus cons</td>
<td>34.18 (4)</td>
<td>p =.000</td>
<td>FBS&gt;OBS, OBL, NCU, BL&gt;OBL, OBS</td>
</tr>
</tbody>
</table>

*Kruskal-Wallis and Mann-Whitney U-tests** Significant at p<0.005

60 Note significance was set at p<0.005 for Mann-Whitney tests.
61 This score is the difference between the Z scores of these two variables.
iv) Self-efficacy

Small differences were found for students’ confidence in their ability to protect themselves in various situations (range 2.9 to 3.8), however, OBSs were significantly less likely to feel confident in their ability to protect themselves in various situations than BLs and FBSs. (See Table 7.14 and Table 7.15). Note that Mann-Whitney tests are computed on ranks rather than mean scores, so that while NCU shows a greater

---

62 While these variables are distinct categories, a line graph is used to highlight patterns of response.
difference in mean scores to *BLs* and *FBSs* than *OBSs*, their sum of ranks did not show significant differences at the preset level of p<0.005, although p levels did approach significance at 0.008 and 0.009 respectively.

**Table 7.14: Brand Loyalty and confidence to sun protect** (Scale 1-5)

<table>
<thead>
<tr>
<th>Confidence</th>
<th>NCU</th>
<th>OBL</th>
<th>OBS</th>
<th>FBS</th>
<th>BL</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean</td>
<td>2.9</td>
<td>3.5</td>
<td>3.3</td>
<td>3.6</td>
<td>3.8</td>
</tr>
<tr>
<td>Median</td>
<td>3.0</td>
<td>3.7</td>
<td>3.7</td>
<td>3.7</td>
<td>4.0</td>
</tr>
</tbody>
</table>

*NCU = New Category Users, OBL = Other Brand Loyals, OBS = Other Brand Switchers, FBS = Favourable Brand Switchers, BL = Brand Loyals*

**Table 7.15: Kruskal-Wallis and Mann-Whitney follow-up results for confidence to sun protect**

<table>
<thead>
<tr>
<th>Variable</th>
<th>Chi sq (df)</th>
<th>Sig.</th>
<th>Mann-Whitney U tests*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Confidence</td>
<td>23.15 (4)</td>
<td>p=.000</td>
<td>OBS &lt; FBS, BL</td>
</tr>
</tbody>
</table>

*Significant at p<0.005

Students in *BL* groups on average (median score) were ‘never’ and *FBS* groups ‘rarely’ tempted *not* to sun protect, with other groupings ‘occasionally’ tempted *not* to protect. These differences were significant with *BLs* less tempted not to protect than all other Brand Loyalty groups, and *FBSs* less tempted not to protect than *OBSs*. All groups except *BLs* reported being tempted to tan ‘occasionally’ to ‘often’, with *BLs* significantly less tempted to tan than *FBSs* and *OBSs*, and *FBSs* less tempted to tan than *OBSs*. (See Tables 7.16 and 7.17).
v) **Think about sun protection**

Brand Loyalty groups varied in how often they think about sun protection, with *NCUs, OBLs* and *OBSs* reporting that they ‘rarely’ to ‘occasionally’ think about sun protection when they are out in the sun, and *FBSs* and *BLs* reporting they ‘often’ and ‘always’ think about sun protection respectively. A significant difference was found for Brand Loyalty groupings with *BLs* significantly more likely to think about sun protection than all other Brand Loyalty groupings, and *FBSs* significantly more likely to think about sun protection than *OBLs* and *OBSs* (See Table 7.18 and 7.19).

---

**Table 7.16: Brand loyalty and temptations not to protect or to tan**  
(Scale 1- 5)

<table>
<thead>
<tr>
<th>Brand loyalty segment</th>
<th>NCU Median</th>
<th>OBL Median</th>
<th>OBS Median</th>
<th>FBS Median</th>
<th>BL Median</th>
</tr>
</thead>
<tbody>
<tr>
<td>Temptation to not sun protect</td>
<td>3.5</td>
<td>3.0</td>
<td>3.0</td>
<td>2.0</td>
<td>1.0</td>
</tr>
<tr>
<td>Temptation to tan</td>
<td>3.5</td>
<td>3.0</td>
<td>4.0</td>
<td>3.0</td>
<td>2.0</td>
</tr>
</tbody>
</table>

NCU = New Category Users, OBL = Other Brand Loyal, OBS= Other Brand Switchers, FBS= Favourable Brand Switchers, BL = Brand Loyal

**Table 7.17: Kruskal-Wallis and Mann-Whitney follow-up results for variables related to temptation not to protect and temptation to tan**

<table>
<thead>
<tr>
<th>Variable</th>
<th>Chi sq (df)</th>
<th>Sig.</th>
<th>Mann-Whitney U tests*</th>
</tr>
</thead>
</table>
| Temptation to *not* protect | 57.19 (4) | p =.000 | BL<NCU, OBL, OBS, FBS  
| | | | FBS<OBS |
| Temptation to tan | 28.34 (4) | p =.000 | BL <FBS<OBS |

*Significant at p<0.05
Table 7.18: Brand Loyalty and thinking about sun protection

<table>
<thead>
<tr>
<th>Brand loyalty segment</th>
<th>NCU Median</th>
<th>OBL Median</th>
<th>OBS Median</th>
<th>FBS Median</th>
<th>BL Median</th>
</tr>
</thead>
<tbody>
<tr>
<td>Think about sun protection</td>
<td>2.5</td>
<td>2.0</td>
<td>3.0</td>
<td>4.0</td>
<td>5.0</td>
</tr>
</tbody>
</table>

NCU = New Category Users, OBL = Other Brand Loyals, OBS = Other Brand Switchers, FBS = Favourable Brand Switchers, BL = Brand Loyals

Table 7.19: Kruskal-Wallis and Mann-Whitney follow-up results for thinking about sun protection

<table>
<thead>
<tr>
<th>Variable</th>
<th>Chi sq (df)</th>
<th>Sig.</th>
<th>Mann-Whitney U tests*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Think about sun protection</td>
<td>78.63 (4)</td>
<td>p = .000</td>
<td>NCU, OBL, OBS, FBS&lt;BL OBL,OBS&lt;FBS</td>
</tr>
</tbody>
</table>

*Significant at p<0.005

iv) Perceived risk for skin cancer

Most students felt they were at ‘moderate’ (46%) or ‘low’ risk (36%) for skin cancer. No significant differences were found for Brand Loyalty groupings.

7.13.4 Aim Four: How inclusion in a Brand Loyalty category related to actual incidence of sun burn and tanning behaviours over the previous summer

One-fifth of students reported no sunburn over the current summer (22%), and identical numbers reported one burn (22%) and two burns (22%). A small proportion (4%) reported 10 or more burns. To explore the incidence of sunburn over the current summer for Brand Loyalty grouping, ‘sunburns over the past summer’ was plotted against Brand Loyalty categorisation (shown in Figure 7.8, with mean and median scores in Table 7.20). This shows the mean incidence of sunburn for OBLs at 4.8 (SD
8.5) compared to lower incidences of sunburns for NCUs (2.7, SD 3.7); OBSs (2.1, SD 2.2); FBSs (2.5, SD 3.6); and BLs (1.6, SD 2.1).

Due to mean scores being affected by some extreme scores of 20 or 30 sunburns, incidence of sunburn was then collapsed to form five categories: 1. No sunburns; 2. One sunburn; 3. Two or three sunburns; 4. Four or five sunburns; and 5. Six or more sunburns. A Kruskal-Wallis test was conducted with Brand Loyalty as the grouping variable and collapsed ‘burns this summer’ as the dependent variable. The five groups were found to significantly differ ($\chi^2$=9.61, 4 df, p =0.048). Post-hoc comparisons found FBSs had a significantly higher incidence of sunburns (median = 2.0) compared to BLs (median = 1.0; p =0.004). (See Table 7.21).

**Figure 7.8:** Bar chart showing mean and median burns this summer for Brand Loyalty groupings
Table 7.20: Mean and median score for burns this summer and Brand Loyalty groups

<table>
<thead>
<tr>
<th>Sunburn this summer</th>
<th>Brand loyalty segment</th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>NCU</td>
<td>OBL</td>
<td>OBS</td>
<td>FBS</td>
<td>BL</td>
</tr>
<tr>
<td>Mean</td>
<td>2.7</td>
<td>4.8</td>
<td>2.1</td>
<td>2.5</td>
<td>1.6</td>
</tr>
<tr>
<td>Median</td>
<td>1.0</td>
<td>2.0</td>
<td>2.0</td>
<td>2.0</td>
<td>1.0</td>
</tr>
</tbody>
</table>

NCU = New Category Users, OBL = Other Brand Loyals, OBS= Other Brand Switchers, FBS= Favourable Brand Switchers, BL = Brand Loyals

Table 7.21: Kruskal-Wallis and Mann-Whitney tests for sunburn this past summer

<table>
<thead>
<tr>
<th>Variable</th>
<th>Chi sq (df)</th>
<th>Sig.</th>
<th>Mann-Whitney U tests*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sunburns this summer</td>
<td>9.61 (4)</td>
<td>.048</td>
<td>FBSs&gt;BLs</td>
</tr>
</tbody>
</table>

Approximately one-quarter of students reported receiving a sunburn the previous weekend (24%). Contingency table analysis found no significant differences for Brand Loyalty groupings.

Approximately half of the students surveyed had made an attempt to get a tan through outdoor sun exposure (51%), and 10% had attempted to get a tan through a solarium or other indoor source. (See Table 7.22). Relationships between outdoor and indoor tanning behaviour and Brand Loyalty were explored through contingency table analysis. A significant relationship was found between outdoor tanning behaviour and Brand Loyalty grouping ($\chi^2=17.48$, 4 df, $p =0.002$), with $BLs$ significantly less likely to report attempts to tan. No significant relationship was seen with tanning through an indoor source of UV and Brand Loyalty grouping.
Table 7.22: Number attempting to tan through outdoor and indoor UV exposure

<table>
<thead>
<tr>
<th></th>
<th>NCU</th>
<th>OBL</th>
<th>OBS</th>
<th>FBS</th>
<th>BL</th>
</tr>
</thead>
<tbody>
<tr>
<td># Outdoor UV exposure</td>
<td>2</td>
<td>5</td>
<td>36</td>
<td>99</td>
<td>6</td>
</tr>
<tr>
<td>Percentage of Brand Loyalty group</td>
<td>33.3%</td>
<td>45.5%</td>
<td>59.0%</td>
<td>54.4%</td>
<td>18.2%</td>
</tr>
<tr>
<td># Indoor UV exposure</td>
<td>1</td>
<td>1</td>
<td>6</td>
<td>14</td>
<td>4</td>
</tr>
<tr>
<td>Percentage of Brand Loyalty group</td>
<td>16.7%</td>
<td>9.1%</td>
<td>9.8%</td>
<td>7.7%</td>
<td>12.1%</td>
</tr>
</tbody>
</table>

NCU = New Category Users, OBL = Other Brand Loyals, OBS= Other Brand Switchers, FBS= Favourable Brand Switchers, BL = Brand Loyals

7.13.5 Relationships between independent variables

i) Skin type
Skin type was significantly related to student status ($\chi^2=7.5$, 2 df, p =0.03) with those reporting a skin type of ‘just burn and not tan afterwards’ more likely to be domestic students. Skin type was also significantly related to skin colour ($\chi^2=116.1$, 4 df, p =0.000) with significantly more students with fair/very fair skin colour reporting a skin type ‘just burn and not tan afterwards’, medium skin colour reporting a skin type ‘burn first then tan afterwards’, and olive/dark/very dark/black reporting a skin type ‘not burn at all, just tan’. Skin type was not related to age or gender.

ii) Skin colour
Skin colour was related to student status ($\chi^2=7.9$, 2 df, p = 0.02) with significantly more domestic students likely to report a fair/very fair skin colour and less likely to report a medium skin colour, and international students more likely to report a medium skin colour and less likely to report a fair/very fair skin colour. Skin type was not related to age or gender.
iii) Student status
As stated previously, student status showed significant relationships with skin type and colour. It also showed a significant relationship with age, with international students more likely to be in the older age group and domestic students in the younger age group ($\chi^2 = 48.5, 1$ df, $p = 0.000$). Contingency table analysis also found a relationship between student status and perceived risk for skin cancer, with international students significantly more likely to perceive themselves at ‘no’ risk of skin cancer.

iv) Gender
Gender was not significantly related to age, skin type, skin colour or student status.

v) Age
Age was not significantly related to gender, skin type, or skin colour.

7.13.6 Prediction of group membership for OBSs versus FBSs
As relationships were found on bivariate analyses between Brand Loyalty grouping and a number of variables, a logistic regression was performed to examine which variables most strongly predicted group membership on the variable of Brand Loyalty. Due to low numbers on the sample subgroups of NCUs, OBLs and BLs, analysis was confined to OBSs versus FBSs. An examination for multicollinearity between variables found no strong correlations likely to inflate the variances of parameter estimates.  

All variables that were found to show significant relationships to Brand Loyalty on ANOVA or Kruskal-Wallis tests were entered into the logistic regression equation. A test of the full model with all 15 predictors against a constant-only model was

---

63 Examination of Variance Inflation Factor found none exceeding 2.4
64 An examination of outliers via boxplots was conducted, and outliers deleted as suggested by Tabachnick and Fidell (2007). Note: variables were included if they showed significant differences between any Brand Loyalty groups, not only FBS and OBS. The variable ‘pros minus cons’ was used rather than individual variables ‘pros’ and ‘cons’ as this variable showed more significant differences on bivariate analyses.
statistically reliable, $\chi^2 (df =15, n=189) = 91.39, p = 0.000$, indicating the predictors as a set reliably distinguished between $OBSs$ and $FBSs$. Using Wald’s criterion, only three predictors made a significant contribution to the prediction of group membership of $OBSs$ versus $FBSs$. These were: cognitive sun protection attitudes, temptation not to sun protect, and temptation to tan. However, while the model correctly predicted 91.4% of group membership for $FBSs$, prediction for $OBSs$ was moderate at 61.2%, leaving an overall correct prediction of 83.6% (See Table 7.23 for a table of this model with additional p values from bivariate analyses).

In order to produce a model with fewer predictors, those predictors with p values over 0.2 were removed from analysis, leaving 8 independent variables. A test of the full model with 8 predictors against a constant-only model was statistically reliable, $\chi^2 (df =8, n=215) = 88.36, p = 0.000$, however prediction of $OBS$ reduced to 53.7%. Therefore variables were returned to the model one by one with the model examined for fit with each returned variable. The addition of ‘pros minus cons’ returned the prediction of $OBS$ to an improved 59.3% and an improved overall prediction of 84.5%. This variable was therefore retained in the model resulting in nine predictors showing a statistically reliable model $\chi^2 (df =9, n=213) = 88.83, p = 0.000$ (See Table 7.24).

This model correctly predicted 93.1% of group membership of $FBSs$ and 59.3% membership of $OBSs$, and identified five predictors that made a significant contribution to the prediction of group membership (See Table 7.25). These were: age, cognitive sun protection attitudes, temptation to not sun protect, temptation to tan, and thinking about sun protection when out in the sun. For every one-unit increase in cognitive sun protection attitudes the odds of belonging to the $FBS$ grouping increased by a factor of 5.3 (CI 2.4 – 11.6). For every one-unit increase in thinking about sun protection when out in the sun, the odds of belonging to the $FBS$ grouping increased by a factor of 1.6 (CI 1.0 – 2.6). For every one-unit increase in age, the odds of belonging to the $FBS$ grouping decreased by a factor of 1.3 (CI 1.0 – 1.6). For every one-unit increase in temptation to not sun protect, the odds of belonging to the $FBS$ grouping decreased by a factor of 2.9 (CI 1.6 – 5.2). For every

---

65 Variables skin type, skin colour, student status, affective sun protection attitudes, skin protection beliefs, tan attitudes and pros minus cons were removed from analysis.
one-unit increase in temptation to tan, the odds of belonging to the FBS grouping decreased by a factor of 2.2 (CI 1.3 – 3.7)\(^{66}\).

Table 7.23: Logistic regression analysis of variables predicting Brand Loyalty groupings FBS and OBS including bivariate p values (Homer and Lemeshow \(\chi^2 = 6.007\) (df 15) \(p = 0.646\))

<table>
<thead>
<tr>
<th>Predictor</th>
<th>(\beta)</th>
<th>SE (\beta)</th>
<th>Wald’s (\chi^2)</th>
<th>(p)</th>
<th>(e^\beta) (odds ratio)</th>
<th>Bivariate (p)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Constant</td>
<td>-1.590</td>
<td>4.45</td>
<td>.128</td>
<td>.721</td>
<td>.204</td>
<td></td>
</tr>
<tr>
<td>Skin type</td>
<td>-.350</td>
<td>.4665</td>
<td>.569</td>
<td>.451</td>
<td>.704</td>
<td>.002</td>
</tr>
<tr>
<td>Skin colour</td>
<td>-.020</td>
<td>.307</td>
<td>.004</td>
<td>.949</td>
<td>.981</td>
<td>.007</td>
</tr>
<tr>
<td>Gender</td>
<td>-.984</td>
<td>.538</td>
<td>3.347</td>
<td>.067</td>
<td>.374</td>
<td>.016</td>
</tr>
<tr>
<td>Age</td>
<td>-.202</td>
<td>.135</td>
<td>2.226</td>
<td>.136</td>
<td>.817</td>
<td>.101</td>
</tr>
<tr>
<td>Student status</td>
<td>.360</td>
<td>.647</td>
<td>.310</td>
<td>.578</td>
<td>1.434</td>
<td>.108</td>
</tr>
<tr>
<td>Cognitive sun protective attitudes</td>
<td>1.924</td>
<td>.497</td>
<td>14.990</td>
<td>.000</td>
<td>6.847</td>
<td>.000</td>
</tr>
<tr>
<td>Affective sun protective attitudes</td>
<td>.072</td>
<td>.231</td>
<td>.098</td>
<td>.754</td>
<td>1.075</td>
<td>.543</td>
</tr>
<tr>
<td>Tan attitudes</td>
<td>-.238</td>
<td>.269</td>
<td>.780</td>
<td>.377</td>
<td>.788</td>
<td>.286</td>
</tr>
<tr>
<td>Skin protection beliefs</td>
<td>-.543</td>
<td>.486</td>
<td>1.248</td>
<td>.264</td>
<td>.581</td>
<td>.162</td>
</tr>
<tr>
<td>Tanning beliefs</td>
<td>.556</td>
<td>.425</td>
<td>1.710</td>
<td>.191</td>
<td>1.744</td>
<td>.622</td>
</tr>
<tr>
<td>Temptation to not sun protect</td>
<td>-1.266</td>
<td>.345</td>
<td>13.425</td>
<td>.000</td>
<td>.282</td>
<td>.000</td>
</tr>
<tr>
<td>Temptation to tan</td>
<td>-.760</td>
<td>.383</td>
<td>3.958</td>
<td>.047</td>
<td>.468</td>
<td>.003</td>
</tr>
<tr>
<td>Thinking of sun protection</td>
<td>.524</td>
<td>.275</td>
<td>3.646</td>
<td>.056</td>
<td>1.689</td>
<td>.000</td>
</tr>
<tr>
<td>Confidence to sun protect</td>
<td>.423</td>
<td>.319</td>
<td>1.762</td>
<td>.184</td>
<td>1.526</td>
<td>.004</td>
</tr>
<tr>
<td>Weighing of pros and cons</td>
<td>.160</td>
<td>.256</td>
<td>.390</td>
<td>.533</td>
<td>1.173</td>
<td>.000</td>
</tr>
</tbody>
</table>

\(^{66}\) The model was also examined using pros and cons rather than pros minus cons, however this model did not perform as well in predicting group membership \(\chi^2\) (df =16, n=???) =, \(p = 0.000\)

196
Table 7.24: Logistic regression analysis of variables predicting Brand Loyalty groupings FBS and OBS including bivariate p values (final model) (Homer and Lemeshow $\chi^2 = 10.831$ (df 8) $p = 0.211$)

<table>
<thead>
<tr>
<th>Predictor</th>
<th>$\beta$</th>
<th>SE $\beta$</th>
<th>Wald’s $\chi^2$</th>
<th>$p$</th>
<th>$e^{\beta}$ (odds ratio)</th>
<th>Bivariate $p$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Constant</td>
<td>-.199</td>
<td>3.245</td>
<td>.004</td>
<td>.951</td>
<td>.819</td>
<td></td>
</tr>
<tr>
<td>Gender</td>
<td>-.709</td>
<td>.462</td>
<td>2.357</td>
<td>.125</td>
<td>.492</td>
<td>.016</td>
</tr>
<tr>
<td>Age</td>
<td>-.269</td>
<td>.105</td>
<td>6.492</td>
<td>.011</td>
<td>.764</td>
<td>.101</td>
</tr>
<tr>
<td>Cognitive sun protective attitudes</td>
<td>1.668</td>
<td>.398</td>
<td>17.584</td>
<td>.000</td>
<td>5.302</td>
<td>.000</td>
</tr>
<tr>
<td>Tanning beliefs</td>
<td>.385</td>
<td>.286</td>
<td>1.812</td>
<td>.178</td>
<td>1.469</td>
<td>.622</td>
</tr>
<tr>
<td>Temptation to not sun protect</td>
<td>-1.073</td>
<td>.298</td>
<td>12.968</td>
<td>.000</td>
<td>.342</td>
<td>.000</td>
</tr>
<tr>
<td>Temptation to tan</td>
<td>-.797</td>
<td>.265</td>
<td>9.057</td>
<td>.003</td>
<td>.451</td>
<td>.003</td>
</tr>
<tr>
<td>Thinking of sun protection</td>
<td>.481</td>
<td>.237</td>
<td>4.119</td>
<td>.042</td>
<td>1.617</td>
<td>.000</td>
</tr>
<tr>
<td>Confidence to sun protect</td>
<td>.523</td>
<td>.271</td>
<td>3.725</td>
<td>.054</td>
<td>1.687</td>
<td>.004</td>
</tr>
<tr>
<td>Weighing of pros and cons</td>
<td>.202</td>
<td>.205</td>
<td>.972</td>
<td>.324</td>
<td>1.224</td>
<td>.000</td>
</tr>
</tbody>
</table>

Table 7.25: Observed and predicted frequencies from logistic regression

<table>
<thead>
<tr>
<th>Observed Brand Loyalty segment</th>
<th>Predicted Brand Loyalty segment</th>
<th>% Correct</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>OBS</td>
<td>FBS</td>
</tr>
<tr>
<td>Brand Loyalty segment</td>
<td></td>
<td></td>
</tr>
<tr>
<td>OBS</td>
<td>32</td>
<td>22</td>
</tr>
<tr>
<td>FBS</td>
<td>11</td>
<td>148</td>
</tr>
<tr>
<td>Overall percentage</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

a. The cut value is 0.5
**7.14 Discussion**

**7.14.1 Sun protective behaviour**

Ninety-four percent of students (OBSs, FBSs, BLs) used some form of sun protection, but for many this was inadequate to prevent sunburn, the most obvious indicator of skin damage. Over 78% of these students received one or more sunburns over the previous summer. It is concerning that this occurred over a summer with higher than average rainfall and a higher number of rainy and cloudy days for December and February, and lower maximum temperatures and numbers of clear days for December, January and February \(^{67}\). This suggests that these sunburn figures may be lower than would occur in a more ‘average’ summer.

Also concerning is the high number of participants that had attempted to get a tan in the current summer. Among BLs, even though they were significantly less likely to tan through outdoor UV exposure than other groups, 18% of participants reported that they had attempted to get a tan through an outdoor source of UV, and a surprising 12% had attempted to tan through an indoor source of UV. It may be that some students are under a misapprehension that tanning can be done safely by using sunblock or that solaria UV is safer than outdoor UV, suggesting that their understanding of ‘adequate sun protection’ may not coincide with that promoted by Australian cancer authorities. This suggestion is supported by previous qualitative research by Coupland et al. (1998) where the authors noted a discourse of ‘safe tanning’ by some participants who discussed how they could acquire a tan without burning by: avoiding sun exposure at certain times of the day; restricting their total exposure time; or using sunscreen. Similarly, other studies have noted the erroneous perception of a ‘protective tan’ where people believe a light tan can protect from future sunburn (Murray and Turner 2004; Magee et al. 2007). Both of these studies found indoor tanning was viewed as a more controlled environment for achieving a ‘protective tan’ by a proportion of study participants, although this idea was not consistent across either sample.

---

7.14.2 Comparison with the Australian National Sun Survey

In comparing the students from this sample on the same questions reported in the Australian National Sun Survey (ANSS) for 18 to 24 year olds (Centre for Behavioural Research in Cancer 2005b), it can be seen that on skin type, solarium usage and sunburn the previous weekend, results are very similar to the ANNS. A z-test for the difference between two proportions was conducted to examine whether there were significant differences between the samples on these measures\(^{68}\). No significant differences were found for solarium use or incidence of sunburn the previous weekend, for males and females. On skin type, significant differences were found for males, with more males in the current survey reporting a skin type of ‘burns, does not tan’ (p= 0.01), and fewer reporting a skin type that ‘does not burn at all, just tans’ (p=0.01) (See Table 7.26).

As skin type was found to have a significant relationship with inclusion in a Brand Loyalty category, this suggests that this sample may underestimate NCU, OBL or OBS numbers for an Australian young adult population, as these Brand Loyalty segments had higher proportions of students with skin that ‘does not burn at all, just tans’; and overestimate figures for FBS, as this segment had higher proportions of students with skin that ‘just burns and does not tan afterwards’.

---

\(^{68}\) As the breakdown of sample numbers were not reported for males and females age 18 to 24 for the variables of ‘sunburn the previous weekend’ and ‘solarium usage’ in the National Sun Survey, sample numbers were taken from those for skin type.
Table 7:26: Comparison of results from the Australian National Sun Survey

<table>
<thead>
<tr>
<th>Skin type</th>
<th>Females Current</th>
<th>Females ANSS</th>
<th>Males Current</th>
<th>Males ANSS</th>
</tr>
</thead>
<tbody>
<tr>
<td>‘just burn and not tan’</td>
<td>26%</td>
<td>24%</td>
<td>28%*</td>
<td>17%</td>
</tr>
<tr>
<td>‘burn first then tan’</td>
<td>52%</td>
<td>51%</td>
<td>50%</td>
<td>52%</td>
</tr>
<tr>
<td>‘not burn at all, just tan’</td>
<td>22%</td>
<td>25%</td>
<td>23%*</td>
<td>31%</td>
</tr>
</tbody>
</table>

| Solarium usage | 10% | 14% | 8% | 6% |
| Sunburn the previous weekend  | 24% | 24% | 22% | 19% |

*p<0.05

7.14.3 Brand Loyalty as a segmentation tool

Significant differences were found between Brand Loyalty groups on a number of variables related to attitudes, beliefs, self-efficacy, and decisional balance. While some of the differences between NCU, OBL, and OBS did not reach significance, the patterns of response suggest a number of differences between these variables which would benefit from further exploration, particularly in looking at the differences between NCU and OBL. A graphical representation of the standardised scores for all scale variables (Figure 7.9), shows that for three variables, NCU values appear to regress to the mean, with OBL showing the more extreme scores from BL on pros minus cons, affective sun protection attitudes and tanning beliefs.
Figure 7.9: Graph showing a summary of standardised mean scale scores for continuous measures\textsuperscript{69}

This is explainable within the Rossiter-Percy model as, theoretically, it is not unexpected that people loyal to another ‘brand’ would show the most contrast with those loyal to the ‘adequate sun protection’ brand, except on actual awareness of the need for sun protection. Additionally, as NCU\textsuperscript{s} are ‘unaware of the need for sun protection’, they would be expected to show more ambivalence in attitudes and beliefs to sun protection and tanning. This is borne out in the data, where NCU\textsuperscript{s}’ median/mean responses tended towards the midpoint of the response range for affective sun protection attitudes, tanning attitudes, confidence to sun protect, temptation to not protect or tan, and thinking about sun protection; this compares to Brand Loyalty groups who reported cognitive sun protection attitudes and skin protection beliefs in the positive response range, NCU\textsuperscript{s} were the lowest of all the

\textsuperscript{69} While these variables are distinct categories, line graphs are used to highlight response patterns.
groups’ responses for cognitive sun protection attitudes and equally low with OBLs for skin protection beliefs\textsuperscript{70}.

The ‘cross-over’ of pros and cons scores between the OBS and FBS segments is also explainable within the Rossiter-Percy Model. OBSs weigh the cons of sun protection above the pros of sun protection, and are therefore more loyal to the ‘other’ brands whereas FBSs, while more ambivalent than BLs, still hold more favourable attitudes to the brand of ‘adequate sun protection’ but are susceptible to rival brands if the price of sun protection becomes too high (e.g., they are unprepared, it is too difficult, they forget or they want a tan). It is, therefore, a \textit{weighing} of benefits against ‘price’ that appears more determinant of Brand Loyalty grouping, than the separate scores on pros or cons. This cross-over in the weighing of pros and cons is similar to that which occurs in the Transtheoretical Model around ‘preparation’ stage. (This will be discussed in further detail in Chapter Eight).

The strong competition to sun protection from attitudes and beliefs towards tans is clearly shown in these results, differentiating those that reported adequate sun protection (BLs), from those that did not (NCUs, OBLs, OBSs, FBSs). While all groups generally showed positive cognitive sun protection attitudes and skin protection beliefs, as predicted by the Brand Loyalty model, BLs showed a stronger ‘price and promotion- resistant’ attitude, being less tempted to not sun protect than all other groups, and less tempted to tan than FBSs and OBSs. FBSs, in turn, were approximately 2 to 3 times more price- and promotion-resistant than OBSs, in terms of temptations to not protect and temptations to tan\textsuperscript{71}, and appeared to have a higher involvement with the issue of sun protection, being 1.6 times more likely to think about sun protection every time they were out in the sun. This may be due to this group tending to have a more sensitive skin type although, interestingly, no significant differences were found between the groups on perceptions of risk for skin cancer.

\textsuperscript{70} Note that this is discussing raw data, not standardised data where the dimensions of the response range have been removed.

\textsuperscript{71} For every one unit increase in temptation not to protect and tan, respondents were 2.9 and 2.2 times, respectively, more likely to belong to FBS group.
Worthy of note, are the minor differences between OBLs and OBSs in mean scores on all variables. On viewing standardised mean scores for all scale variables for OBLs and OBSs, the main differences between these groups appear to be with their affective attitudes to sun protection and their weighing of pros and cons. It may be that in view of similar beliefs on tan attractiveness and overall positive attitudes to tans for both these groups, it is relatively minor differences in affective attitudes and weighing of pros and cons that mark the transition from using no sun protection to using some sun protection. Conversely, it may also be that the areas of difference between these categories have not been ‘captured’ by the measures used in this survey.

Some partial support for the former supposition, that minor differences in attitudes can account for belonging to OBLs or OBSs, is found in the strong influence of cognitive attitudes to sun protection in delineating between FBSs and OBSs. For every one unit increase in a respondent’s overall evaluation of sun protection as a behaviour that was ‘useful, beneficial and wise’, the likelihood of belonging to the FBS category increased by 5.3. This is strong support for the proposition that Brand Loyalty categorisation denotes a differing ‘relationship’ between individuals and sun protection behaviour. It may then also be that different variables affect this relationship differently according to where an individual is on the continuum of increasing Brand Loyalty. Further discussion on this, and the implications of these findings for sun protection interventions will be presented in Chapter Eight.

It should be noted that within the segmentation of individuals based on patterns of sun protection behaviour, it is also probable that individuals are ‘loyal’ to some sun protection behaviours (eg. wearing a hat) above other behaviours. Further segmentation of Brand Loyalty groups, in order to tailor strategies and messages, may therefore be possible based on these differing loyalties. Further study would be needed to elucidate these differences, and explore their utility for sun protection initiatives.
7.14.4 Descriptions of Brand Loyalty segments

i) Brand Loyals

BLs made up 11% of the student population, and contained proportionally more international students than domestic students. This segment also contained, proportionally, an older cohort of students than other Brand Loyalty segments, however, this may be accounted for by student status, as international students were more likely to be in the older age group and domestic students in the younger age group. In actual behaviour, BLs were significantly less likely to attempt to tan than all other Brand Loyalty groups and reported significantly less sunburn over the previous summer than FBSs. However, disappointingly, 70% of BLs still reported receiving one or more sunburn over the previous summer. This highlights the difficulties in achieving ‘adequate’ sun protection (i.e., sun protection sufficient to prevent skin damage). This will be discussed further in Chapter Eight.

Not surprisingly, BLs held positive cognitive\(^{72}\) and affective attitudes to sun protection, positive beliefs about skin protection\(^{73}\), and generally negative attitudes to tanning and negative tan attractiveness beliefs\(^{74}\). Their weighing up of pros and cons showed a balance in favour of pros.

On analysis BLs reported stronger affective sun protection attitudes, thought more often about sun protection when they were out in the sun, and were less tempted not to sun protect than all other groups. Differentiating BLs from FBSs, the segments showed significant differences on the variables stated above, as well as BLs reporting less temptation to tan and less positive beliefs about tan attractiveness. This latter difference should be interpreted with caution due to the variable’s low reliability on test-retest.

ii) Favourable Brand Switchers

FBSs made up 62% of the student sample. Of this group 86% did not protect themselves adequately due to preparation or ‘action’ issues – they either forgot, were unprepared or felt it was too difficult to protect themselves fully; whereas 34%
reported that they did not always protect themselves adequately as they wanted a tan\(^{75}\). This segment was found to contain a higher proportion of domestic students, and consequently a younger age group. Interestingly, this segment appeared to have higher proportions of students with fair or very fair skin, and while raw data showed higher numbers of students in this group with skin that ‘burns first, then tans afterwards’, contingency table analysis found \(FBSs\) contained a higher proportion of students with skin that ‘just burns, then does not tan afterwards’ than other segments. A high percentage of this segment reported receiving one or more sunburn in the previous summer (83%), probably an indication of poor sun protective behaviours coupled with a skin type that is likely to burn.

On average, \(FBSs\) held positive cognitive attitudes to sun protection, but more neutral affective attitudes to sun protection and to tanning. They also had positive beliefs about skin protection, but neutral beliefs about tan attractiveness. They reported some confidence in their ability to protect themselves from the sun and often thought about sun protection when they were in the sun and, while rarely tempted not to sun protect, they were occasionally tempted to tan.

Differentiating \(FBSs\) from \(OBSs\) on bivariate analysis was their significantly higher confidence that they could protect themselves from the sun in a variety of situations\(^{76}\), being more likely to think about sun protection when they were out in the sun, and also their lower temptations to not sun protect or to tan. On multivariate analysis, confidence to sun protect was not a significant predictor, however it approached significance at \(p=0.054\). Instead, higher cognitive sun protection attitudes were the strongest predictor of belonging to \(FBS\) compared to \(OBS\) groups (odds of 5.3), with lower temptations to \(not\) sun protect or tan increasing the odds of belonging in \(FBS\) grouping by over double. While a younger age significantly predicted belonging to the \(FBS\) category, this is probably of little practical significance as median age for \(FBSs\) was 19 years and for \(OBSs\) 20 years.

\(^{75}\) Students could tick more than one box

\(^{76}\) Differences in confidence should be interpreted with caution due to the variable’s low reliability on test-retest.
**iii) Other Brand Switchers**

*OBSs* comprised 21% of the student sample. Of this group 51% chose not to protect themselves fully because they wanted a tan, whereas 38% thought it was too difficult to protect themselves fully, and 33% thought some sun was good for them. This segment, proportionally, had higher numbers of students with skin that ‘did not burn, just tans’ and tended to have darker skin colour rather than fairer, and a higher proportion of males. Sixty-nine percent reported receiving one or more sunburns in the previous summer.

On average *OBSs* reported positive cognitive attitudes to sun protection and beliefs about skin protection, and neutral affective attitudes to sun protection, attitudes to tanning and beliefs about tan attractiveness. They were ambivalent about their confidence to sun protect, occasionally thought about sun protection when they were out in the sun, were occasionally tempted not to sun protect, but often tempted to tan.

No significant differences were found between *OBSs* and *OBLs*.

**iv) Other Brand Loyals and New Category Users**

*OBLs* comprised 4% of the student sample. Of this group, 55% did not protect themselves from the sun because they wanted a tan; whereas 45% reported that the difficulties of doing so outweighed the risk. (Note only 11 students in this segment). Eighty-two percent reported one or more burns in the previous summer. *NCUs* comprised an even smaller section of the student sample at 2% or just six students. Five students (83%) reported one or more burns in the previous summer. Due to low numbers these two segments were combined for all contingency table analysis. In general these segments had less sensitive skin type, darker skin colour, and higher proportions of males and international students.

*OBLs* and *NCUs*, on average, reported positive cognitive attitudes to sun protection and beliefs about skin protection, and neutral affective attitudes to sun protection, attitudes to tanning and beliefs about tan attractiveness. They were ambivalent about

77 Students could tick more than one box
their confidence to sun protect, rarely thought about sun protection when they were out in the sun, and occasionally/often were tempted not to sun protect and tan.

While significant differences between NCU and OBL segments were unable to be detected due to low sample numbers and categories being combined for contingency table analysis, some (non-significant) differences between the segments were noted, as discussed previously. It should also be noted that, with a median rate of sunburn the same as BLs, many NCU’s did appear to be at lower risk of skin damage than other groups with inadequate sun protection (OBLs and FBSs). This may be due to having a darker skin colour and less sensitive skin type, or that through chance or design, their lifestyle does not generally lead them to be exposed to UV radiation. Certainly, in terms of need for sun protection, it appears it is worth delineating between NCU’s and OBLs. Further research would be needed to elucidate the relationships between these variables for these segments.

7.15 Limitations

A number of limitations are noted to this research. Due to timing constraints the test-retest reliability checks were unable to be completed prior to the full survey being conducted. This meant that items with low reliability could not be altered. Five scale variables showed low reliability: cognitive sun protective attitudes (r = 0.39), tanning attractiveness beliefs (r = 0.47), skin protection beliefs (rs = 0.66), cons (r = 0.52), and confidence (r = 0.64). However, the small sample size for test re-test meant that reliability coefficients could be strongly impacted by one respondent’s score. This was noted previously where one respondent changed their cognitive attitudes to sun protection from 4 to 1 on the retest, changing the reliability coefficient from r= 0.48 to r=0.80. On viewing the test-retest scores for skin protection beliefs, cons and confidence, all were markedly influenced by one respondent’s score which, if removed, moved reliability coefficients above criterion values.78 Therefore, a larger sample size for test-retest may have given more accurate reliability estimates, as they would be less likely to be affected by one or two markedly inconsistent scores. Also, as tan attractiveness and skin protection belief scales were previously validated and shown to correlate to TTM model variables specific to sun protection, with the tan

78 Tanning attractiveness beliefs had three scores which differed markedly on test-retest.
attractiveness scale improving the prediction of sun protection outcomes over 24 months above that of other TTM variables (Maddock et al. 2005). Therefore, for this survey, it is unlikely that these previously validated scales would have been altered. Internal consistency scores from this survey were similar to those shown by Maddock et al. (2005) with \( \alpha = 0.84 \) for skin protection beliefs and \( \alpha = 0.80 \) for tan attractiveness beliefs in the current survey compared to \( \alpha = 0.83 \) and \( \alpha = 0.86 \) respectively.

The considerable length of the survey could also be considered a limitation as it may have meant less attention was given to those items towards the end of the survey. The survey contained additional items from the TTM (which will be discussed in Chapter Eight), including 30 items on processes of change, taking participants up to 20 minutes to complete. This lessened attention may have affected, in particular, the test-retest reliability measures for some items, as students who had already completed a survey only two weeks previously may not have given the same focus to a repeat survey.

One major limitation, affecting research results, is a sample size too small to allow enough power for sub-group analyses of NCU and OBL segments. This meant collapsing these categories for contingency table analysis, and may have increased the likelihood of type-2 error. While raw data appeared to follow postulated patterns of response for attitudes and beliefs, self-efficacy and thinking about sun protection, no significant differences were found between NCU and OBL, or between these groups and OBSs. A larger sample size would have allowed a more definitive exploration of this area.

A final limitation, which was unable to be controlled for in the planning of the study, was the weather conditions of the summer in which the survey was held. The survey was conducted at the end of summer in order to increase the salience of sun protection for participants. However, as reported previously, the summer preceding the survey was colder and wetter than average. This may have narrowed the response range, particularly in relation to the number of sunburns over the previous summer, however, as the majority of the survey was concerned with attitudes and beliefs
regarding habitual patterns of behaviour, it is unlikely that results have been unduly affected.

7.16 Conclusion

As a preliminary investigation of the efficacy of Brand Loyalty in segmenting a young adult sun protection audience, this study has shown that this model of segmentation can categorise young adults on their patterns of sun protective behaviour, and that these groups appear to have differences in their attitudes, beliefs, efficacy, and their weighing of the benefits and barriers related to sun protection. Additionally, these groups can be described via demographic and skin colour and type variables, enabling ‘risk profiles’ to be built. While a lack of study power for subgroup analysis has limited the finding of significant differences between NCUs, OBLs, and OBSs, trends in raw data suggest these groups do differ on the variables discussed above, although the differences between OBLs and OBSs, in particular, need further delineation. The ability to predict between FBSs and OBSs on cognitive attitudes to sun protection, temptations to not protect and tan, and thinking about sun protection, supports the basis of the Rossiter-Percy model that target audiences can be delineated on their continued awareness, and price- and promotion-resistant attitude to a ‘brand’. This suggests the methods utilised by advertising theory to maximise ‘buyer’ response may transfer to a public health field. These findings indicate that further research is warranted in this area.

The following chapter continues the exploration of Brand Loyalty segmentation, comparing it with the Transtheoretical Model in terms of the variables described in this chapter, and investigating the construct of ‘processes of change’ and its potential to be used with Brand Loyalty segmentation.
Chapter Eight: The Transtheoretical Model and Brand Loyalty

8.1 Introduction

The Transtheoretical Model (Prochaska and DiClemente 1983) integrates processes and principles from a number of psychotherapy and behaviour change theories to view behaviour change as a progression through six stages (Prochaska et al. 2002). It has been used extensively in health behaviour research, particularly with smoking cessation and other ‘cessation’ interventions such as alcohol and substance abuse, and obesity and eating disorders (Riemsma et al. 2003). It has also been utilised in many ‘prevention’ interventions related to physical activity, diet, sexual behaviour, health screening and sun exposure (Bridle et al. 2005).

This chapter describes the constructs of the Transtheoretical Model (TTM), and some of the potential limitations of the model when describing sun protection behaviour. It then presents the findings of exploratory research into TTM as a segmentation tool for sun protection audiences, comparing it with Brand Loyalty segmentation. The chapter also examines ‘processes of change’ from the TTM, comparing the use of processes of change across TTM stages and Brand Loyalty segments.

8.2 The Transtheoretical Model

As discussed in Chapter Three, TTM has a temporal view of health behaviour change where people are divided into six ‘stages’ based on either their intention to change behaviour, or their actual behaviours, over specific time periods. Table 8.1 describes these stages in relation to sun protection.

---

79 The number of stages examined in research generally varies from 5 to 6 dependent on whether termination is included, however researchers have, on occasion, created sub categories, eg, Critenden et al. (1994) divided Precontemplation into three subcategories for smoking cessation. This research examines five stages. Critenden, K., Manfredi, C, Warnecke, R, Cho, Y. & Parsons, J. (1998) Measuring readiness and motivation to quit smoking among women in public health clinics: predictive validity. Addictive Behaviors, 23, 191-199.
Table 8.1: Stages of change for sun protection

<table>
<thead>
<tr>
<th>Stage</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Precontemplation</td>
<td>People have no intention to protect themselves from the sun within the next six months</td>
</tr>
<tr>
<td>Contemplation</td>
<td>People intend to protect themselves from the sun within the next six months</td>
</tr>
<tr>
<td>Preparation</td>
<td>People intend to take action to protect themselves from the sun within the next 30 days and have taken behavioural steps in this direction</td>
</tr>
<tr>
<td>Action</td>
<td>People have begun to protect themselves from the sun for less than six months</td>
</tr>
<tr>
<td>Maintenance</td>
<td>People have consistently protected themselves from the sun for more than six months</td>
</tr>
<tr>
<td>Termination</td>
<td>People no longer succumb to temptation and have total self-efficacy to protect themselves from the sun</td>
</tr>
</tbody>
</table>

People progress through these stages until they reach stability in their behaviour, although this process may involve a number of regressions, so that people ‘revolve’ rather than proceed linearly through stages. Allied with the construct of ‘stage of change’ are three other constructs of decisional balance, processes of change and self-efficacy.

8.2.1 Decisional balance

Decisional balance describes an individual’s weighing up of the benefits or pros of changing behaviour, against the costs or cons of changing behaviour (Prochaska et al. 2002). This construct was taken from Janis and Mann’s (1977) ‘decisional balance sheet’ which in turn was influenced by the work of Lewin (1938, 1946, 1948). Lewin posited that an individual’s decision-making changed as a function of the relative strength of two psychological forces arising from the individual’s expectancies. One force motivated him/her to seek expected gains from a particular
course of action, and was the summing up of all the positive valences for the course of action; while another force motivated him/her to avoid expected losses, and was a summing up of all the negative valences for the course of action (Janis and Mann 1977). Janis and Mann (1997, pg. 137) suggested that the four main considerations for this balance sheet were: ‘utilitarian gains and losses for self; utilitarian gains and losses for significant others; self-approval or disapproval; and approval or disapproval from significant others’, (i.e. four positive forces and four negative forces). The TTM developers originally used this model of decision-making, but on examining the results of a number of research studies that attempted to replicate this structure, developed instead a simpler and more stable structure of pros and cons (Prochaska et al. 2002). The developers of the model further suggest that mathematical relationships exist between pros and cons and the progression through stages, whereby progression from Precontemplation to Action involves an increase in the pros of changing by approximately one standard deviation, and a decrease in cons by approximately 0.5 of a standard deviation (Prochaska et al. 2002).

8.2.2 Processes of change

The TTM also identifies ten processes of change which are said to be ‘covert and overt activities’ that people use to progress through stages (Prochaska et al. 2002, pg. 103). These processes were developed through an examination of major theories on psychotherapy where Prochaska et al. (1994) proposed that all the major theories of therapy could be distilled into a few essential principles which they called ‘processes of change’. The authors state that ‘any activity that you initiate to help modify your thinking, feeling or behaviour is a change process’ (pg. 25), and that different change processes are differentially effective at different stages of change (Prochaska and Norcross 2001).

These processes are:

1. Consciousness raising – Increasing awareness about the causes, consequences, and cures for a problem behaviour;
2. Dramatic relief – Emotional reactions to the effects of the poor behaviour with reduced affect when the appropriate behaviour is enacted;
3. Self re-evaluation – Assessments of one’s self-image with, and without, a problem behaviour;
4. Environmental re-evaluation – Affective and cognitive re-assessments of how the presence or absence of the particular behaviour effects one’s social environment;
5. Social liberation – Noting or utilising changes in the social or physical environment supportive to health behaviours;
6. Helping relationships – Using helping relationships to support behaviour change;
7. Counter-conditioning – Learning healthier behaviours to substitute for problem behaviours or support healthy behaviour;
8. Reinforcement management – Providing consequences for taking steps in a particular direction;
9. Stimulus control – Removing or providing cues for behaviours;
10. Self-liberation – Engendering beliefs that one can change behaviour and commitments and recommitments to act on those beliefs.

(Prochaska et al. 2002, pg. 103)

The processes are also categorised into a higher order structure of cognitive-affective (processes 1 to 5) and behavioural processes (processes 6 to 10), with the cognitive-affective processes generally found to be more frequently used in the earlier stages of change, and behavioural processes more frequently used in the Action and Maintenance stages of change (Prochaska and Norcross 2001; Prochaska et al. 2002). Table 8.2 shows the typical use of processes across stages which have been found through empirical research (Prochaska et al. 2002). However, the authors note that the higher order structure of cognitive-affective or behavioural processes has been replicated across behaviours more consistently than the specific processes themselves, and that in some studies fewer processes have been used or additional processes have been found (Prochaska et al. 2002).
Table 8.2: Associations between stages of change and processes of change
(Prochaska et al. 2002, pg.107)

<table>
<thead>
<tr>
<th>Stages of change</th>
<th>Precontemplation</th>
<th>Contemplation</th>
<th>Preparation</th>
<th>Action</th>
<th>Maintenance</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Consciousness raising</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Dramatic relief</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Environmental reevaluation</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Self-reevaluation</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Self-liberation</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Counterconditioning</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Helping relationships</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Reinforcement management</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Stimulus control</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

8.2.3 Self-efficacy

Self-efficacy is defined as ‘the situation specific confidence that people have that they can cope with high-risk situations without relapsing to their unhealthy or high risk behaviour’ (Prochaska et al. 2002, pg. 103). This construct was integrated into the TTM from Bandura’s (1982) self-efficacy theory. Bandura proposed that an individual’s ability to deal with his/her environment was not a matter of simply knowing what to do, but rather having the operant capability to improvise multiple skills and sub-skills to manage changing circumstances. The initiation and regulation of dealings with their environment is therefore partly governed by an individual’s judgements of their operative capabilities – their perceived self-efficacy (Bandura 1982). He further stated that perceived self-efficacy influences peoples’ thought patterns and emotional reactions in dealings with their environment, and also influences the amount of effort they use and how long they will persist in the face of difficulties or adverse experiences.

The developers of TTM represent the construct of self-efficacy through a measure of self-efficacy (i.e. reflecting the confidence not to engage in a behaviour across
difficult situations), or a measure of temptation (i.e. reflecting the intensity of urges to engage in a specific behaviour in the midst of difficult situations) (Cancer Prevention Research Center 2008).

8.3 The Transtheoretical Model in sun protection research

While the application of the Transtheoretical Model (TTM) to sun protection behaviours has been investigated in a limited number of studies (Weinstock et al. 2000; Kristjansson et al. 2003; Kristjansson et al. 2004; Pagoto et al. 2004), and has been used successfully in sun protection interventions targeted at adolescents and young adults, some questions remain regarding the adequacy of the TTM in describing actual sun protective behaviour.

i) Adequacy of sun protection

Weinstock et al. (2000) found that while 34% of participants from a population of beachgoers in south-eastern New England were defined as being in a Maintenance stage of sun protective behaviour, this subgroup’s level of protective behaviour was still inadequate given their levels of sun exposure. This was also seen in Swedish research by Kristjansson et al. (2004) who investigated the use of the Transtheoretical Model in relation to a range of sun protective behaviours and sunbathing among adolescents 13 to 19 years. The authors reported 60% of those in the Action/Maintenance stages for sunscreen had experienced sunburn during the last 12 months, compared to 42% in the pre-action stages. While this may represent the cyclical nature of stages of change where a sunburn may move Precontemplators or Contemplators into action, it may also be that these stages are poor classifiers of actual sun protection behaviour with those in Action and Maintenance still not practising ‘adequate’ sun protective behaviour. Sun protection is not a dichotomous behaviour, there are multiple levels of adequacy of sun protection, with inadequate sun protection potentially worse than no sun protection if it means the individual spends more time in the sun.

ii) Encompassing complexity

The complexity of sun protective behaviour is difficult to encompass within the TTM. Kristjansson et al. (2004), in Swedish research, divided sun protection
behaviours into five sub-behaviour stages of change, finding widely divergent figures for Maintenance stages for the different behaviours: using sunscreen (59%), using shade for protection (47%), using clothes for protection (40%), giving up sunbathing (8%), and avoiding the sun between 11 a.m. and 3 p.m. (7%). Additionally, while 85% of the population sampled was categorised as being in a Precontemplation or Contemplation stage for giving up sunbathing, they still reported relatively high levels of protection when in the sun. This complexity differs markedly from the dichotomous smoking/non smoking behaviour that the TTM was originally designed for.

**iii) Limitations on temporal view of change**

The TTM’s temporal view of change also shows limitations when applied to a sun protection context. In the TTM those in Precontemplation have no intention to take action within the next six months, those in Contemplation and Preparation intend to take action within the next six months or thirty days respectively, and those in Action and Maintenance have changed behaviour for less or more than six months. However, some researchers in sun protection have removed this temporal component from the staging algorithm as, for their climate (e.g. Sweden), sun protection is not necessary during eight months of the year (Kristjansson et al. 2003). There is also some conflict in the staging algorithm for sun protection utilised by the Cancer Prevention Research Centre (2008). While the staging questions are about ‘protecting yourself from too much summer sun exposure’ the questions ask whether people have protected themselves for the past 12 months or intend to protect in the next 12 months. These conflicts limit the utility of the temporal component of the TTM for sun protection research.

**iv) Operationalisation of stage of change**

Operationalisation of this construct has differed in studies exploring stages of change for sun protection. Kristjansson et al. (2003), in Swedish research, used a single algorithm method without time frames targeted at sunbathing rather than sun protection, i.e ‘I am not going to give up sunbathing/ I am thinking of giving up sunbathing/ I intend to give up sunbathing/ I have given up sunbathing/ I gave up sunbathing along time ago or I have never sunbathed’. Similarly, for sun protection
behaviours they used simple statements for the specific behaviours of: using clothes for sun protection, staying out of the sun between 11 am and 3 pm; using shade from protection from the sun; and using a sunscreen, such as, ‘I have never thought of using clothes to protect myself from the sun/ I could think of using clothes to protect myself from the sun/ I intend to start using clothes to protect myself from the sun/ I have started to use clothes to protect myself from the sun/ I have used clothes to protect myself from the sun for a long time’. In contrast, Weinstock et al. (2002) used two algorithms, the one for overall sun protection behaviour which was used in this current research, and one for sunscreen use (both validated by Rossi et al. (1995). Karnatz (1993) found the four factor structure for classification (as used by Rossi and Blais (1992)) an inappropriate measure of stage of change for adolescents, and instead classified participants based on the answers to two questions, ‘how often do you use sunscreen or sunblock when you are outside?’ and an attitudinal statement, ‘I am considering using sunscreens more’, measured on a four-point Likert scale. These differences in operationalisation of the construct of stage of change mean it is difficult to compare, across studies, estimates of the proportion of people in different stages, and does raise the question of whether people would be classified differently depending on the questions/algorithms used.

While these issues raise questions on the use of the TTM for sun protection research, it is still noted that two interventions included in the systematic review, described in Chapter Five, utilised TTM effectively in order to tailor messages and strategies. This study thus aimed to further explore the use of TTM for segmentation of the sun protection audience acknowledging the previously noted limitations.

8.4 Aims of research

The primary aim of this research was to explore the relationships between the Transtheoretical Model and Brand Loyalty segmentation, and the applicability of the constructs of decisional balance, processes of change, and self-efficacy to a Brand Loyalty approach, as compared to a ‘stages of change’ approach.

Specifically this study sought to explore in a university student population:
1. The proportion of students within each stage of change for sun protection;
2. How inclusion in a stage of change was related to skin type and demographic variables;
3. How inclusion in a stage of change was related to attitudes and beliefs regarding sun protection and tanning including decisional balance, temptations to tan or not protect, confidence to sun protect, perceived risk for skin cancer, and thinking about sun protection;
4. How inclusion in a stage of change related to actual incidence of sun burn and tanning behaviours over the previous summer;
5. How Brand Loyalty categories relate to the ‘stages of change’ for sun protection; and
6. The applicability of the constructs of decisional balance, processes of change, and self-efficacy to Brand Loyalty approach, as compared to a ‘stages of change’ approach.

8.5 Method

A cross-sectional survey was conducted with a convenience sample of university students (N=342). Questions on Brand Loyalty, sun protection and tanning attitudes, skin protection and tanning beliefs, decisional balance, self-efficacy, thinking about sun protection, skin type and colour, tanning behaviours, sunburn over the previous summer and demographic variables have all been previously described. However, two further questions on ‘stages of change’ for sun protection and ‘processes of change’ were incorporated into the survey described in Chapter Seven. The survey was assessed by two experts in health behaviour change for content and face validity, and by colleagues for readability and understanding. Test-retest reliability was assessed through a separate sample of 21 students.

8.6 Test-Retest for Reliability

Test-retest method and the analysis of reliability and internal consistency for the survey are as stated in Chapter Seven, with kappa statistics (unweighted), Spearman’s rho and McNemar’s test calculated for all nominal and ordinal measures, and correlation and standard error of measurement (SEM) calculated for all scales. Assumptions of normality were assessed for all scale distributions.
A total of 21 students within an age range of 17 to 26 years completed the test-retest questionnaire. The mean age of participants was 19.2 years (SD 2.3); 29% were female. All were domestic students.

8.7 Survey variables

As the development of decisional balance and self-efficacy scales have been previously discussed in Chapter Seven, this discussion focuses on development of the ‘stages of change’ and ‘processes of change’ for sun protection items. The full survey is shown in Appendix 6. All item-to-total correlations, inter-item correlations, factor analysis, and Cronbach’s alpha statistics for internal consistency used the main student survey data (n=299)\textsuperscript{80}.

i) Stages of change for sun protection

Stage of change for sun protection was assessed by a staging algorithm shown in Table 8.4, validated by the Cancer Prevention Centre (Rossi et al. 1995), with respondents placed in a stage dependent on answers to the questions in Table 8.3\textsuperscript{81}.

The wording of the sentence, ‘The following questions are about protecting yourself from summer sun exposure’ was changed after comments from colleagues on the confusing nature of this sentence when combined with questions asking about intentions for the next six or 12 months. Also, as the setting for this research was in a latitude requiring year round sun protection, the sentence became ‘protecting yourself from sun exposure’\textsuperscript{82}.

Kappa statistic for reliability on test-retest for stage of change for sun protection was $k = 0.60$; Spearman’s rho $r_s = 0.83$. McNemar’s test was not significant ($p=0.29$).

\textsuperscript{80} Valid sample of 17 to 25 year olds
\textsuperscript{81} Note that this algorithm does not have a means to categorise those in ‘Termination’, therefore this stage was not explored in this survey.
\textsuperscript{82} More recent evidence has indicated that the population may not need to always protect themselves from the sun over 2 months in winter in the region studied as on average the UV index is below 3 at this time of year (Bureau of Meteorology, http://www.bom.gov.au/jsp/ncc/climate_averages/uv-index/index.jsp?period=nov, retrieved 6/08/10.
Table 8.3: Stage of change for sun protection survey question

<table>
<thead>
<tr>
<th>The following questions are about protecting yourself from sun exposure.</th>
<th>Yes</th>
<th>No</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Do you protect yourself from exposure to the sun consistently, that is, whenever you know you will be out in the sun for more than about 15 minutes?</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>2. Have you consistently protected yourself from exposure to the sun for the past 12 months?</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>3. Do you intend to consistently protect yourself from exposure to the sun in the next 12 months?</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>4. Do you intend to consistently protect yourself from exposure to the sun in the next 30 days? (If it is sunny).</td>
<td>Yes</td>
<td>No</td>
</tr>
</tbody>
</table>

Table 8.4: Staging algorithm for sun protection\(^\text{83}\) (Rossi et al. 1995)

<table>
<thead>
<tr>
<th></th>
<th>Precontemplation</th>
<th>Contemplation</th>
<th>Preparation</th>
<th>Action</th>
<th>Maintenance</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>2</td>
<td></td>
<td></td>
<td></td>
<td>No</td>
<td>Yes</td>
</tr>
<tr>
<td>3</td>
<td>No</td>
<td>Yes</td>
<td>Yes</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td></td>
<td>No</td>
<td>Yes</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**ii) Processes of change**

As no published scales for the measurement of the TTM construct of ‘processes of change’ were found in the literature, the ten processes of change were developed using three items each, adapted from a ‘processes of change’ scale for exercise from the Cancer Prevention Research Centre (Nigg et al. 1999).

\(^{83}\) Respondents were placed in the highest stage indicated by their responses, i.e. to be in maintenance a respondent would need to answer yes to all questions, for Action they would need to answer yes to questions 1, 3, 4 and no for question 2, for Preparation they would need to answer yes to questions 3 and 4. This algorithm is copied directly from Rossi et al. 1995.
Respondents were asked how often they used the processes of change on a 4-point Likert scale ranging from ‘never’ to ‘often’, with the scores for the three questions per process averaged for analysis. Examples of questions are:

i) consciousness raising: ‘I have read articles about skin cancer or skin damage and how to prevent it.’

ii) dramatic relief: ‘I have been emotionally moved by stories about people with skin cancer.’

iii) environmental reevaluation: ‘I have thought how my sun protective behaviour could be a role model for other people.’

iv) self reevaluation: ‘I have told myself that protecting myself from the sun will make me a healthier person.’

v) social reevaluation: ‘I have noticed that dark tans are becoming less fashionable.’

iv) self liberation: ‘I have decided I must plan and prepare to protect myself before I go out into the sun.’

iiiv) helping relationships: ‘I have told my friends to remind me to reapply sunscreen.’

iiiv) stimulus control: ‘I have kept things I use for sun protection handy so that I can protect myself easily.’

xi) counter conditioning: ‘I have viewed sunburn as an unhealthy mistake rather than a natural occurrence.’

x) reinforcement management: ‘I have felt good about myself when I have protected myself adequately from the sun.’

To examine the internal consistency of the processes of change scale, item-to-total and inter-item correlations were examined. As a number of items showed low inter-item correlations, principal components analysis was conducted to explore the unidimensionality of constructs.

See Appendix 6 for a full list of questions.
On loading 30 processes of change, eight components were extracted with eigenvalues over 1.0, explaining 61.2% of variance; however a scree plot of the data suggested only one factor (See Table 8.6 and Figure 8.1). An examination of items loading 0.5 or over on these components found: one major component (eigenvalue 8.2) including six items from the behavioural processes of self-liberation, helping relationships and stimulus control; one component (eigenvalue 1.7) including three dramatic relief processes; one component (eigenvalue 1.5) including three self-reevaluation processes; one component (eigenvalue 1.3) including three counter-conditioning processes; and three components including only two items each from specific processes. Therefore, to create scales that showed unidimensionality, a number of items were deleted and scales examined through further factor analysis, inter and intra-item correlation and calculation of Cronbach’s alpha. This led to a finalised number of five ‘processes of change’ which were described as ‘behavioural support’85, ‘self-reevaluation’, ‘dramatic relief’, ‘environmental reevaluation’, and ‘counter-conditioning’ (See Table 8.7). While this led to 13 items being deleted from the scales and the omission of a number of processes, the processes defined showed a stronger internal consistency, and explained a higher percentage of variance (64.5%).

Reliability statistics for most processes were judged as acceptable, being above the criterion value of $r = 0.7$; however, counter conditioning was slightly below this at $r = 0.66$, and environmental reevaluation was low at $r = 0.48$. The SEM appeared reasonable for both scales. The scales with measures of internal consistency and reliability are shown in Table 8.5.

---

85 This ‘process’ combined elements of self-liberation, helping relationships and stimulus control
Table 8.5: Processes of change reliability and internal consistency

<table>
<thead>
<tr>
<th>Processes</th>
<th>Internal consistency</th>
<th>Reliability</th>
</tr>
</thead>
<tbody>
<tr>
<td>Behavioural support</td>
<td>( a = 0.87 )</td>
<td>( r = 0.71 ), SEM 0.16</td>
</tr>
<tr>
<td>Self-reevaluation</td>
<td>( a = 0.77 )</td>
<td>( r = 0.74 ), SEM 0.16</td>
</tr>
<tr>
<td>Dramatic relief</td>
<td>( a = 0.71 )</td>
<td>( r = 0.72 ), SEM 0.16</td>
</tr>
<tr>
<td>Environmental reevaluation</td>
<td>( a = 0.70 )</td>
<td>( r = 0.48^* ), SEM 0.16</td>
</tr>
<tr>
<td>Counter-conditioning</td>
<td>( a = 0.66 )</td>
<td>( r = 0.66^* ), SEM 0.14</td>
</tr>
</tbody>
</table>

* Lower than criterion values for reliability

Table 8.6: Principal components analysis of processes of change\(^\text{86}\) (n= 299)

<table>
<thead>
<tr>
<th>Component</th>
<th>Item</th>
<th>Eigenvalue 1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>I have kept things I use for sun protection handy so that I can protect myself easily(^22) (SC)</td>
<td>.673</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>I have made commitments with myself to protect myself adequately from the sun (^{18}) (S-L)</td>
<td>.644</td>
<td>.435</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>I have decided I must plan and prepare myself to protect myself before I go out into the sun (^{17}) (S-L)</td>
<td>.641</td>
<td>.325</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>My friends and I have supported each other in protecting ourselves from the sun and not tanning (^{21}) (HR)</td>
<td>.594</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>I have told my friends to remind me to reapply sunscreen (^{19}) (HR)</td>
<td>.558</td>
<td>.448</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>I have checked the weather so I could to prepare to protect myself from the sun (^{24}) (SC)</td>
<td>.534</td>
<td>.314</td>
<td>.358</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>I have told myself that it is easy to protect myself from the sun (^{16}) (S-L)</td>
<td>.479</td>
<td></td>
<td></td>
<td></td>
<td>.374</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>I have thought how my tanning may</td>
<td>.677</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

\(^{86}\) Consciousness raising (CR), dramatic relief (DR), self-reevaluation (SR), environmental reevaluation (ER), helping relationships (HR), self-liberation (S-L), counter conditioning (CC), reinforcement management (RM), stimulus control (SC), social liberation (SL).
<table>
<thead>
<tr>
<th>Behavior</th>
<th>Dimension</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>I have used reminders or cues to protect myself from the sun</td>
<td>3.93</td>
<td>0.525</td>
</tr>
<tr>
<td>I have thought how my sun protective behaviour could be a role model for other people</td>
<td>4.91</td>
<td>0.465</td>
</tr>
<tr>
<td>I have become afraid of the consequences for the people I love if they do not protect themselves from the sun</td>
<td>.815</td>
<td></td>
</tr>
<tr>
<td>I have become afraid of the consequences to my health if I do not protect myself from the sun</td>
<td>.709</td>
<td></td>
</tr>
<tr>
<td>I have been emotionally moved by stories about people with skin cancer</td>
<td>0.648</td>
<td></td>
</tr>
<tr>
<td>I have looked for new sunscreens, hats, clothing or products that can protect me from the sun</td>
<td>3.74</td>
<td>0.394</td>
</tr>
<tr>
<td>I have told myself that protecting myself from the sun will make me a healthier person</td>
<td></td>
<td>0.723</td>
</tr>
<tr>
<td>I have felt that taking responsibility for protecting myself from the sun is a sign of maturity</td>
<td>0.444</td>
<td>0.687</td>
</tr>
<tr>
<td>I have told myself that protecting myself from the sun will show that I am a sensible, responsible person</td>
<td>0.448</td>
<td>0.598</td>
</tr>
<tr>
<td>I have viewed a tan as a sign of skin damage</td>
<td></td>
<td>0.687</td>
</tr>
<tr>
<td>I have noticed that older people with tanned skin have skin that looks old and leathery</td>
<td></td>
<td>0.673</td>
</tr>
<tr>
<td>I have noticed that dark tans are becoming less fashionable</td>
<td>0.393</td>
<td>0.595</td>
</tr>
<tr>
<td>I have viewed sunburn as an unhealthy mistake</td>
<td>0.422</td>
<td>0.547</td>
</tr>
<tr>
<td>I have felt good about myself when I have protected myself from the sun 28 (RM)</td>
<td>0.348</td>
<td>0.390</td>
</tr>
<tr>
<td>I have noticed that my family or friends are disappointed in me when I get sunburnt</td>
<td>0.457</td>
<td>0.581</td>
</tr>
<tr>
<td>I have listened to my parents reminders to sun protect</td>
<td>0.323</td>
<td>0.320</td>
</tr>
<tr>
<td>I have felt disappointed in myself when I get sunburnt</td>
<td>0.323</td>
<td>0.537</td>
</tr>
<tr>
<td>I have read articles about skin cancer or skin damage and how to prevent it</td>
<td></td>
<td>0.7</td>
</tr>
<tr>
<td>I have looked for information about skin cancer or skin damage and how to prevent it</td>
<td>0.300</td>
<td>0.7</td>
</tr>
<tr>
<td>I have noticed that many people protect themselves from the sun</td>
<td>0.368</td>
<td>0.744</td>
</tr>
<tr>
<td>I have noticed that many famous people take good care of their skin</td>
<td>0.345</td>
<td>0.605</td>
</tr>
</tbody>
</table>
Table 8.7: Principal components on revised processes of change\(^{87}\) (n = 299)

<table>
<thead>
<tr>
<th>Components</th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Eigenvalue 1</td>
<td>5.47</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Eigenvalue 2</td>
<td>1.83</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Eigenvalue 3</td>
<td>1.47</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Eigenvalue 4</td>
<td>1.18</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Eigenvalue 5</td>
<td>1.06</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td>I have decided I must plan and prepare myself to protect myself before I go out into the sun 17 (BS)</td>
<td>.721</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>My friends and I have supported each other in protecting ourselves from the sun and not tanning 21 (BS)</td>
<td>.694</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>I have made commitments with myself to protect myself adequately from the sun 18 (BS)</td>
<td>.684</td>
<td>.453</td>
<td></td>
<td></td>
</tr>
<tr>
<td>I have told my friends to remind me to reapply sunscreen 19 (BS)</td>
<td>.660</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>I have kept things I use for sun protection handy so that I can protect myself easily 22 (BS)</td>
<td>.658</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>I have felt that taking responsibility for protecting myself from the sun is a sign of maturity 11 (SR)</td>
<td>.786</td>
<td>.302</td>
<td></td>
<td></td>
</tr>
<tr>
<td>I have told myself that protecting myself from the sun will make me a healthier person 10 (SR)</td>
<td>.730</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>I have told myself that protecting myself from the sun will show that I am a sensible, responsible person 12 (SR)</td>
<td>.710</td>
<td>.318</td>
<td></td>
<td></td>
</tr>
<tr>
<td>I have become afraid of the consequences for the people I love if they do not protect themselves from the sun 6 (DR)</td>
<td>.762</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>I have been emotionally moved by stories about people with skin cancer 4 (DR)</td>
<td>.748</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>I have become afraid of the consequences to my health if I do not protect myself from the sun 5 (DR)</td>
<td>.746</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>I have thought how my tanning may encourage others to tan 9 (ER)</td>
<td>.842</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>I have thought how my wearing of sun protective clothing would increase its social acceptance in people I care about 8 (ER)</td>
<td>.736</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>I have thought how my sun protective behaviour could be a role model for other people 7 (ER)</td>
<td>.419</td>
<td>.548</td>
<td></td>
<td></td>
</tr>
<tr>
<td>I have noticed that older people with tanned skin have skin that looks old and leathery 26 (CC)</td>
<td></td>
<td></td>
<td>.812</td>
<td></td>
</tr>
<tr>
<td>I have viewed a tan as a sign of skin damage 27 (CC)</td>
<td></td>
<td></td>
<td>.743</td>
<td></td>
</tr>
<tr>
<td>I have viewed sunburn as an unhealthy mistake 25 (CC)</td>
<td>.338</td>
<td></td>
<td></td>
<td>.605</td>
</tr>
</tbody>
</table>

\(^{87}\) Behavioural support (BS), dramatic relief (DR), self-reevaluation (SR), environmental reevaluation (ER), counter conditioning (CC).
8.8 Analysis

Contingency table and chi-square analyses were conducted to establish whether there were significant relationships between stage of change for sun protection and the variables of skin type, skin colour, gender, student status and age. These analyses were also used to examine relationships between stage of change and Brand Loyalty categories.

Relationships between stage of change for sun protection and attitudes and beliefs regarding sun protection and tanning, decisional balance, temptations to tan or not protect, self-efficacy, perceived risk for skin cancer, and thinking about sun protection, were examined through analysis of variance (ANOVA) or Kruskal-Wallis test. These analyses were also used to examine relationships between stage of change and processes of change, and Brand Loyalty categories and processes of change.
Logistic regression analysis was conducted to predict group membership on the variable of stage of change for sun protection, using independent variables found to show significant relationships on bivariate analyses. Details of these analyses were provided in Chapter Seven.

8.9 Results

8.9.1 Aim One: To describe the proportion of students within each stage of change for sun protection

A large proportion of students were categorised as being in Preparation with the second largest group being in Maintenance for sun protection (see Table 8.8). It should be noted that a number of inconsistent responses were found in the stage of change items, with some students indicating they protected themselves from the sun every time they were in the sun for more than 15 minutes (which would put them in Action or Maintenance stage) but also indicating that they did not intend to protect themselves in the next 30 days or 12 months (which would put them in Precontemplation stage); others indicated they had protected themselves from the sun for the past 12 months (Maintenance stage) but were not currently protecting themselves; others intended to protect themselves in the next 30 days (Preparation) but not in the next 12 months (Precontemplation). The data from these respondents were not used in analysis, accounting for 24% of the database, thus leaving a valid sample of 225.

Table 8.8: Stages of change for sun protection

<table>
<thead>
<tr>
<th>Segments</th>
<th>N=225**88</th>
<th>N</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Precontemplation</td>
<td>40</td>
<td>18%</td>
<td></td>
</tr>
<tr>
<td>Contemplation</td>
<td>10</td>
<td>4%</td>
<td></td>
</tr>
<tr>
<td>Preparation</td>
<td>80</td>
<td>36%</td>
<td></td>
</tr>
<tr>
<td>Action</td>
<td>21</td>
<td>9%</td>
<td></td>
</tr>
<tr>
<td>Maintenance</td>
<td>74</td>
<td>33%</td>
<td></td>
</tr>
</tbody>
</table>

**88 Missing data (1) and unable to be categorised (73) from sample of n= 299 students 17 to 25 years.
8.9.2 Aim Two: How inclusion in a stage was related to skin type, skin colour and demographic variables

i) Skin type
Contingency table analysis was conducted to establish whether there was a significant relationship between inclusion in a stage group and reported skin type. No significant relationship was found between skin type and inclusion in a stage of change category ($\chi^2=14.216$, 8 df, $p = 0.076$).

ii) Skin colour
Contingency table analysis was conducted to establish whether there was a significant relationship between inclusion in a stage of change and reported skin colour (TTM stages were collapsed into Precontemplation, Contemplation/Preparation and Action/Maintenance due to 27% of cells having an expected count of less than five.) A significant relationship was found between skin colour and inclusion in a stage of change ($\chi^2=11.79$, 4 df, $p = 0.02$). Examination of adjusted standardised residuals found: those in Contemplation/Preparation were significantly more likely to have fair or very fair skin and significantly less likely to have olive, dark, very dark or black skin; and those in Action/Maintenance were significantly more likely to have olive, dark, very dark or black skin.

iii) Gender
Contingency table analysis was conducted to establish whether there was a significant relationship between inclusion in a stage of change and gender. A significant relationship was found between gender and inclusion in a stage ($\chi^2=21.09$, 4 df, $p = 0.000$). Examination of the adjusted standardised residuals found: those in Precontemplation were significantly more likely to be male; and those in Maintenance were significantly more likely to be female.
**iv) Student status**
Contingency table analysis was conducted to establish whether there was a significant relationship between inclusion in a stage of change and student status. A significant relationship was found between student status and inclusion in a stage ($\chi^2 = 19.05, 4 \text{ df}, p = 0.001$). Examination of the adjusted standardised residuals found: those in *Precontemplation* were significantly more likely to be domestic students; and those in *Maintenance* were significantly more likely to be international students.

**v) Age**
Contingency table analysis was conducted to establish whether there was a significant relationship between inclusion in a stage and age. Age was grouped into ages 17 to 20 (‘younger’) and 21 to 25 (‘older’). A significant relationship was found between age and stage of change ($\chi^2 = 16.78, 4 \text{ df}, p = 0.002$). An examination of the adjusted standardised residuals found: those in *Precontemplation* were significantly more likely to be in the younger age group whereas those in *Maintenance* were significantly more likely to be in the older age group.

**8.9.3 Aim Three: How inclusion in a Brand Loyalty category was related to attitudes and beliefs regarding sun protection and tanning including decisional balance, temptations to tan or not protect, confidence to sun protect, perceived risk for skin cancer, and thinking about sun protection**

**i) Attitudes**
All stages had positive cognitive attitudes to sun protection (i.e. sun protection is wise/useful/beneficial) with mean scores ranging from 6.2 to 6.7.\(^8\) Kruskal-Wallis test and Mann-Whitney follow-up tests found those in *Maintenance* and *Preparation* had significantly more positive cognitive sun protection attitudes than those in *Precontemplation*.

Affective attitudes to sun protection (i.e. sun protection is enjoyable/pleasant/relaxing) were more ambivalent for all groups (mean scores 3.2 to 8.9 Midpoint of scale was 4, range was 1 to 7.

---

\(^8\) Midpoint of scale was 4, range was 1 to 7.
4.8). However, those in *Maintenance* and *Action* had significantly higher affective attitudes than those in *Precontemplation* and *Preparation*.

Tanning attitudes were also generally ambivalent (mean scores 3.5 to 4.7); however, a significant difference between stages of change was found with those in *Precontemplation* reporting significantly more positive attitudes to tans than *Preparation, Action and Maintenance* groups. See Tables 8.9 and 8.10, and Figure 8.2 (Note that mean scores are used for variables with normal distributions, median scores are used for variables with skewed distributions).

### Table 8.9: Stage of change and attitudes to sun protection and tanning

<table>
<thead>
<tr>
<th>Stage of change segment</th>
<th>Precon</th>
<th>Contem</th>
<th>Prep</th>
<th>Action</th>
<th>Main</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean sun protection attitude (cognitive)</td>
<td>Mean</td>
<td>6.2</td>
<td>6.5</td>
<td>6.7</td>
<td>6.4</td>
</tr>
<tr>
<td>Mean sun protection attitude (affective)</td>
<td>Mean</td>
<td>3.2</td>
<td>4.5</td>
<td>3.6</td>
<td>4.8</td>
</tr>
<tr>
<td>Mean tan attitude</td>
<td>Mean</td>
<td>4.8</td>
<td>4.9</td>
<td>3.8</td>
<td>3.4</td>
</tr>
</tbody>
</table>

### Table 8.10: Post hoc tests for stage of change and attitudes to sun protection and tanning

<table>
<thead>
<tr>
<th>Variable</th>
<th>F (df)</th>
<th>Sig.</th>
<th>Bonferroni test(^1)</th>
<th>Mann-Whitney U tests(^2)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean sun protection attitude (cognitive)</td>
<td>13.03 (4) (^b)</td>
<td>p = .011</td>
<td>Preparation, Maintenance&gt; Precontemplation(^2)</td>
<td></td>
</tr>
<tr>
<td>Mean sun protection attitude (affective)</td>
<td>6.27 (4) (^a)</td>
<td>p = .000</td>
<td>Action, Maintenance&gt; Precontemplation, Preparation Contemplation&gt; Precontemplation(^3)</td>
<td></td>
</tr>
<tr>
<td>Mean tanning attitudes</td>
<td>10.89 (4) (^a)</td>
<td>p = .000</td>
<td>Precontemplation &gt;Preparation, Action, Maintenance(^4)</td>
<td></td>
</tr>
</tbody>
</table>

\(^1\) Bonferroni post-hoc tests  
\(^2\) Mann-Whitney U-tests*Significant at p<0.005  
\(^3\) Significant Levene’s statistic, results should be interpreted with caution
ii) Beliefs

Students held generally positive skin protection beliefs across stages (range 19.1 to 21.6). While Kruskal-Wallis test found a significant difference between stages, post hoc Mann-Whitney U-tests were non-significant at the p< 0.005 level of significance (due to Bonferroni correction).

Tanning beliefs showed mean scores of neutral to positive (range 14.9 to 19.3). This difference was significant at p =0.000. Those in Precontemplation held stronger tanning attractiveness beliefs than those in Preparation, Action and Maintenance; those in Contemplation held significantly stronger tanning attractiveness beliefs than those in Action and Maintenance. See Table 8.11, Table 8.12, and Figure 8.3.
Table 8.11: Stage of change and beliefs about skin protection and tan attractiveness

(Range 5 to 25 – five items each scale with a range 1 to 5)

<table>
<thead>
<tr>
<th>Stage of change segment</th>
<th>Precon</th>
<th>Contem</th>
<th>Prep</th>
<th>Action</th>
<th>Maint</th>
</tr>
</thead>
<tbody>
<tr>
<td>Skin protection beliefs</td>
<td>Mean</td>
<td>20.7</td>
<td>19.1</td>
<td>21.6</td>
<td>20.4</td>
</tr>
<tr>
<td></td>
<td>Median</td>
<td>20.0</td>
<td>19.0</td>
<td>22.0</td>
<td>22.0</td>
</tr>
<tr>
<td>Tanning beliefs</td>
<td>Mean</td>
<td>18.9</td>
<td>19.3</td>
<td>16.1</td>
<td>15.0</td>
</tr>
<tr>
<td></td>
<td>Median</td>
<td>19.0</td>
<td>18.0</td>
<td>16.0</td>
<td>15.0</td>
</tr>
</tbody>
</table>

Table 8.12: Kruskal-Wallis and Mann-Whitney U-tests for stage of change and beliefs about skin protection and tan attractiveness

<table>
<thead>
<tr>
<th>Variable</th>
<th>F (df)</th>
<th>Sig.</th>
<th>Bonferroni test</th>
<th>Mann-Whitney U tests²</th>
</tr>
</thead>
<tbody>
<tr>
<td>Skin protection beliefs</td>
<td>12.58</td>
<td>.014</td>
<td>Not significant²</td>
<td></td>
</tr>
<tr>
<td>Tanning attractiveness beliefs³</td>
<td>8.71</td>
<td>.000</td>
<td>Precontemplation &gt;Preparation, Action, Maintenance Contemplation&gt; Action, Maintenance¹</td>
<td></td>
</tr>
</tbody>
</table>

¹ Bonferroni post-hoc tests Significant at p<0.05
² Mann-Whitney U-tests Significant at p<0.005
³Significant Levene’s statistic, results should be interpreted with caution
Figure 8.3: Bar chart showing stage of change and beliefs about skin protection and tan attractiveness

**iii) Decisional balance**

Significant differences were found for stage of change and pros of sun protection with *Preparation, Action* and *Maintenance* groups reporting significantly more pros than those in *Precontemplation* groups; and *Maintenance* groups reporting significantly more pros than *Contemplation* and *Preparation* groups (see Tables 8.13 and 8.14). No significant differences were found between stages for cons of sun protection; however significant differences were found for differences in pros minus cons for stages with *Preparation, Action* and *Maintenance* groups having a higher weighing of pros to cons than those in *Precontemplation* (see Table 8.14).
Table 8.13: Mean scores of pros and cons for stage of change

<table>
<thead>
<tr>
<th>Stage of change</th>
<th>Precont</th>
<th>Cont</th>
<th>Prep</th>
<th>Action</th>
<th>Maint</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean pros</td>
<td>Mean</td>
<td>3.34</td>
<td>3.28</td>
<td>3.82</td>
<td>3.92</td>
</tr>
<tr>
<td></td>
<td>Median</td>
<td>3.30</td>
<td>3.40</td>
<td>3.80</td>
<td>4.20</td>
</tr>
<tr>
<td>Mean cons</td>
<td>Mean</td>
<td>2.71</td>
<td>2.20</td>
<td>2.42</td>
<td>2.35</td>
</tr>
<tr>
<td></td>
<td>Median</td>
<td>2.75</td>
<td>1.75</td>
<td>2.25</td>
<td>2.00</td>
</tr>
<tr>
<td>Mean pros minus cons (Z score) 90</td>
<td>Score (SE)</td>
<td>-.10</td>
<td>-.54</td>
<td>.09</td>
<td>.33</td>
</tr>
</tbody>
</table>

Plotting standardised mean scores for pros and cons against stage of change, it was found that from Contemplation to Maintenance, the pros of sun protection became of higher importance with an increase in pros of approximately one standard deviation from Precontemplation to Action crossing with cons around Preparation. This is consistent with TTM research (Prochaska et al. 2002). However, while there was an overall change in cons from Precontemplation to Action of 0.4 of a standard deviation, the change in cons was inconsistent across stages with those in

Table 8.14: Kruskal-Wallis and Mann-Whitney U-tests for stage of change and pros and cons of sun protection

<table>
<thead>
<tr>
<th>Variable</th>
<th>Chi sq (df)</th>
<th>Sig.</th>
<th>Mann-Whitney U tests²</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pros</td>
<td>51.42 (4)</td>
<td>p = .000</td>
<td>Preparation, Action, Maintenance &gt; Precontemplation Maintenance &gt; Contemplation, Preparation</td>
</tr>
<tr>
<td>Cons</td>
<td>6.15 (4)</td>
<td>p = .188</td>
<td>Not significant</td>
</tr>
<tr>
<td>Pros minus cons</td>
<td>39.20 (4)</td>
<td>p = .000</td>
<td>Preparation, Action, Maintenance &gt; Precontemplation</td>
</tr>
</tbody>
</table>

²Mann-Whitney U-tests Significant at p<0.005

90 This score is the difference between the Z scores of these two variables.
Contemplation reporting lower scores for cons than Preparation, Action and Maintenance (See Figure 8.4).

**Figure 8.4:** Standardised graph showing standardised mean scores for pros and cons and stage of change for sun protection showing the crossing of pros and cons around Preparation\(^9^1\)

\(^9^1\) While these variables are distinct categories, line graphs are used to highlight response patterns

\(d\) Self-efficacy

Mean confidence in the ability to protect themselves from the sun in a variety of situations ranged from 3.23 to 3.87, which puts students between ‘neither agree or
disagree’ (3) to ‘agree’ (4) scores. Students in \textit{Precontemplation}, \textit{Preparation} and \textit{Action} were significantly less likely to feel confident in their ability to protect themselves in various situations than those in \textit{Maintenance}. See Table 8.15 and Table 8.16, and Figure 8.5.

\begin{figure}[h]
\centering
\includegraphics[width=\textwidth]{bar_chart.png}
\caption{Bar chart of confidence to sun protect for stage of change}
\end{figure}

\textbf{Table 8.15: Stage of change and confidence to sun protect (Scale 1-5)}

<table>
<thead>
<tr>
<th>Confidence</th>
<th>Stage of change segment</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Precon</td>
</tr>
<tr>
<td>Mean</td>
<td>3.48</td>
</tr>
<tr>
<td>Median</td>
<td>3.67</td>
</tr>
</tbody>
</table>
Table 8.16: Kruskal-Wallis and Mann-Whitney U-tests for stage of change and confidence to sun protect

<table>
<thead>
<tr>
<th>Variable</th>
<th>Chi sq (df)</th>
<th>Sig.</th>
<th>Mann-Whitney U tests²</th>
</tr>
</thead>
<tbody>
<tr>
<td>Confidence</td>
<td>23.56 (4)</td>
<td>p=.000</td>
<td>Maintenance&gt; Precontemplation, Preparation, Action</td>
</tr>
</tbody>
</table>

²Mann-Whitney U tests *Significant at p<0.005

Respondents in different stages were ‘rarely’ and ‘occasionally’ tempted not to protect and ‘rarely’, ‘occasionally’ and ‘often’ tempted to tan (See Table 8.17). Significant differences were found with those in Maintenance, Action and Preparation less tempted not to protect than those in Precontemplation, and those in Maintenance also less tempted not to protect than Preparation and Contemplation groups. Temptation to tan showed significant differences with those in Maintenance significantly less tempted to tan than those in Precontemplation (see Table 8.18).

Table 8.17: Stage of change and temptations not to protect or to tan
(Scale 1- 5)

<table>
<thead>
<tr>
<th>Stage of change</th>
<th>Precon</th>
<th>Contem</th>
<th>Prep</th>
<th>Action</th>
<th>Maint</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Median</td>
<td>Median</td>
<td>Median</td>
<td>Median</td>
<td>Median</td>
</tr>
<tr>
<td>Temptation to not sun protect</td>
<td>3.0</td>
<td>3.0</td>
<td>3.0</td>
<td>2.0</td>
<td>2.0</td>
</tr>
<tr>
<td>Temptation to tan</td>
<td>3.5</td>
<td>4.0</td>
<td>3.0</td>
<td>3.0</td>
<td>2.0</td>
</tr>
</tbody>
</table>
Table 8.18: Kruskal-Wallis and Mann-Whitney U-tests for stage of change and temptation not to protect and temptation to tan

<table>
<thead>
<tr>
<th>Variable</th>
<th>Chi sq (df)</th>
<th>Sig.</th>
<th>Mann-Whitney U tests²</th>
</tr>
</thead>
<tbody>
<tr>
<td>Temptation to not protect</td>
<td>45.48 (4)</td>
<td>p = .000</td>
<td>Precontemplation &gt; Preparation, Action, Maintenance</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Contemplation, Preparation &gt; Maintenance</td>
</tr>
<tr>
<td>Temptation to tan</td>
<td>18.59 (4)</td>
<td>p = .001</td>
<td>Precontemplation &gt; Maintenance</td>
</tr>
</tbody>
</table>

²Mann-Whitney U tests *Significant at p<0.05

e) Think about sun protection
Stage groups varied in how often they think about sun protection when they are out in the sun, with median responses from ‘occasionally’ to ‘often’. A significant difference was found for stage of change with those in Maintenance significantly more likely to think about sun protection than those in Precontemplation, Contemplation and Preparation, and those in Action stage significantly more likely to think about sun protection than those in Precontemplation stage (see Tables 8.19 and 8.20).
Table 8.19: Stage of change and thinking about sun protection

<table>
<thead>
<tr>
<th>Stage of change</th>
<th>Precon</th>
<th>Contem</th>
<th>Prep</th>
<th>Action</th>
<th>Maint</th>
</tr>
</thead>
<tbody>
<tr>
<td>Median</td>
<td>3.0</td>
<td>3.0</td>
<td>4.0</td>
<td>4.0</td>
<td>4.0</td>
</tr>
<tr>
<td>Think about sun protection</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table 8.20: Kruskal-Wallis and Mann-Whitney U-tests for stage of change and thinking about sun protection

<table>
<thead>
<tr>
<th>Variable</th>
<th>Chi sq (df)</th>
<th>Sig.</th>
<th>Mann-Whitney U tests²</th>
</tr>
</thead>
<tbody>
<tr>
<td>Think about sun protection</td>
<td>36.85 (4)</td>
<td>p = .000</td>
<td>Action, Maintenance &gt; Precontemplation Maintenance &gt; Contemplation, Preparation</td>
</tr>
</tbody>
</table>

²Significant at p<0.005

f) Perceived risk for skin cancer

Median response for perceived risk of skin cancer was ‘moderate’ across stages of change for sun protection with no significant differences found between groups.

8.9.4 Aim Four: How inclusion in a Brand Loyalty category related to actual incidence of sunburn and tanning behaviours over the previous summer

To explore the incidence of sunburn over the current summer by stage of change for sun protection over the past summer, incidence of sunburn was plotted against stage of change (shown in Figure 8.6, with mean and median scores in Table 8.21).
Figure 8.6: Bar chart showing mean and median burns over the summer for stage of change

<table>
<thead>
<tr>
<th>Transtheoretical Model Stages</th>
<th>Burns this summer</th>
</tr>
</thead>
<tbody>
<tr>
<td>Precon</td>
<td>Contem</td>
</tr>
<tr>
<td>Mean</td>
<td>3.1</td>
</tr>
<tr>
<td>Median</td>
<td>3.0</td>
</tr>
</tbody>
</table>

Due to mean scores being affected by some extreme scores of 20 or 30 sunburns, incidence of sunburn was then collapsed to form five categories: 1. No sunburns; 2. One sunburn; 3. Two or three sunburns; 4. Four or five sunburns; and 5. Six or more sunburns. A Kruskal-Wallis test was conducted with stage of change as the grouping variable and collapsed ‘burns this summer’ as the dependent variable. No significant
differences were found for incidence of sunburn and stage of change ($\chi^2=7.86$, 4 df, $p=0.097$).

Relationships between outdoor and indoor tanning behaviour and stage of change were explored through contingency table analysis. See Table 8.22 for a breakdown of students attempting to tan through outdoor or indoor UV sources for stage of change. A significant relationship was found between outdoor tanning behaviour and stage of change ($\chi^2=18.01$, 4 df, $p=0.001$), with Precontemplators and Contemplators significantly more likely and those in Maintenance less likely to report attempts to tan. A significant relationship was found between indoor tanning behaviour and stage of change ($\chi^2=7.78$, 4 df, $p=0.02$) with, surprisingly, Precontemplators significantly less likely, and Actors/Maintainers more likely, to report attempts to tan indoors.

Table 8.22: Attempts to tan through outdoor and indoor UV exposure (n=225)

<table>
<thead>
<tr>
<th></th>
<th>Precon</th>
<th>Contem</th>
<th>Prep</th>
<th>Action</th>
<th>Main</th>
</tr>
</thead>
<tbody>
<tr>
<td># Outdoor UV exposure</td>
<td>28</td>
<td>8</td>
<td>34</td>
<td>12</td>
<td>26</td>
</tr>
<tr>
<td>Percentage of stage group</td>
<td>70.0%</td>
<td>80.0%</td>
<td>42.5%</td>
<td>57.1%</td>
<td>35.6%</td>
</tr>
<tr>
<td># Indoor UV exposure</td>
<td>0</td>
<td>3</td>
<td>4</td>
<td>3</td>
<td>11</td>
</tr>
<tr>
<td>Percentage of stage group</td>
<td>0.0%</td>
<td>30.0%</td>
<td>5.0%</td>
<td>14.3%</td>
<td>15.1%</td>
</tr>
</tbody>
</table>

8.9.5 Aim Five: How Brand Loyalty categories relate to the ‘stages of change’ for sun protection

Table 8.23 shows the breakdown of stage inclusion for Brand Loyalty categories. Contingency table analysis was conducted to explore whether there was a significant relationship between Brand Loyalty and stage of change for sun protection. Due to 56.0% of cells having an expected count of less than five, Brand Loyalty segments NCUs and OBLs were combined, and TTM segments Contemplation and Preparation, and Action and Maintenance were combined. A significant relationship
was found between inclusion in a Brand Loyalty group and inclusion in a stage of change for sun protection ($\chi^2 = 48.34$ (df 6) $p = .000$).

Table 8.23: Stage of change and Brand Loyalty

<table>
<thead>
<tr>
<th>Brand Loyalty</th>
<th>Stage of change</th>
<th>Precontemplation</th>
<th>Contemplation</th>
<th>Preparation</th>
<th>Action</th>
<th>Maintenance</th>
</tr>
</thead>
<tbody>
<tr>
<td>NCU</td>
<td></td>
<td>(2) 40%</td>
<td>(0) 0%</td>
<td>(2) 40%</td>
<td>(0) 0%</td>
<td>(1) 20%</td>
</tr>
<tr>
<td>OBL</td>
<td></td>
<td>(3) 30%</td>
<td>(1) 10%</td>
<td>(3) 30%</td>
<td>(0) 0%</td>
<td>(3) 30%</td>
</tr>
<tr>
<td>OBS</td>
<td></td>
<td>(19) 40%</td>
<td>(1) 2%</td>
<td>(17) 36%</td>
<td>(3) 6%</td>
<td>(7) 15%</td>
</tr>
<tr>
<td>FBS</td>
<td></td>
<td>(16) 12%</td>
<td>(7) 5%</td>
<td>(54) 41%</td>
<td>(12) 9%</td>
<td>(42) 32%</td>
</tr>
<tr>
<td>BL</td>
<td></td>
<td>(0) 0%</td>
<td>(0) 0%</td>
<td>(4) 14%</td>
<td>(4) 14%</td>
<td>(21) 72%</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(40) 18%</td>
<td>(9) 4%</td>
<td>(80) 36%</td>
<td>(19) 9%</td>
<td>(74) 33%</td>
</tr>
</tbody>
</table>

NCU = New Category Users, OBL = Other Brand Loyals, OBS= Other Brand Switchers, FBS= Favourable Brand Switchers, BL = Brand Loyals

Examination of the adjusted standardised residuals, using an absolute value of two as showing a significant relationship between variables, found: those in Precontemplation were significantly less likely to be Favourable Brand Switchers (FBSs) or Brand Loyals (BLs); those in Contemplation/Preparation were significantly more likely to be FBSs and significantly less likely to be BLs; and those in Action/Maintenance were significantly more likely to be BLs and significantly less likely to be OBSs.

8.9.6 Relationships between processes of change and Brand Loyalty categories and stage of change for sun protection

Mean and median scores are given for TTM processes of change across stage of change (Table 8.24) and Brand Loyalty (Table 8.25), and mean scores graphed in Figures 8.7 and 8.8 overleaf.
Table 8.24: Mean scores for processes of change per stage of change

<table>
<thead>
<tr>
<th>Stage of change segment</th>
<th>Precon</th>
<th>Contem</th>
<th>Prep</th>
<th>Action</th>
<th>Main</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dramatic relief</td>
<td>Mean</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>2.38</td>
<td>2.00</td>
<td>2.92</td>
<td>2.88</td>
<td>3.07</td>
</tr>
<tr>
<td></td>
<td>Median</td>
<td>2.33</td>
<td>2.00</td>
<td>3.00</td>
<td>2.67</td>
</tr>
<tr>
<td>Environmental reevaluation</td>
<td>Mean</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>1.75</td>
<td>1.80</td>
<td>1.88</td>
<td>2.33</td>
<td>2.21</td>
</tr>
<tr>
<td></td>
<td>Median</td>
<td>1.67</td>
<td>1.83</td>
<td>1.67</td>
<td>2.33</td>
</tr>
<tr>
<td>Self-reevaluation</td>
<td>Mean</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>2.15</td>
<td>2.33</td>
<td>2.80</td>
<td>3.10</td>
<td>2.97</td>
</tr>
<tr>
<td></td>
<td>Median</td>
<td>2.17</td>
<td>3.83</td>
<td>2.67</td>
<td>3.00</td>
</tr>
<tr>
<td>Behavioural support</td>
<td>Mean</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>2.08</td>
<td>2.15</td>
<td>2.66</td>
<td>3.19</td>
<td>3.15</td>
</tr>
<tr>
<td></td>
<td>Median</td>
<td>2.00</td>
<td>2.30</td>
<td>2.60</td>
<td>3.20</td>
</tr>
<tr>
<td>Counter conditioning</td>
<td>Mean</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>2.57</td>
<td>2.38</td>
<td>3.07</td>
<td>3.37</td>
<td>3.20</td>
</tr>
<tr>
<td></td>
<td>Median</td>
<td>2.67</td>
<td>2.50</td>
<td>3.00</td>
<td>3.67</td>
</tr>
</tbody>
</table>

Table 8.25: Mean scores for processes of change per Brand Loyalty segment

<table>
<thead>
<tr>
<th>Brand Loyalty segment</th>
<th>NCU</th>
<th>OBL</th>
<th>OBS</th>
<th>FBS</th>
<th>BL</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dramatic relief</td>
<td>Mean</td>
<td>2.60</td>
<td>2.43</td>
<td>2.66</td>
<td>2.88</td>
</tr>
<tr>
<td></td>
<td>Median</td>
<td>2.67</td>
<td>2.67</td>
<td>2.67</td>
<td>3.00</td>
</tr>
<tr>
<td>Environmental reevaluation</td>
<td>Mean</td>
<td>2.00</td>
<td>2.13</td>
<td>1.91</td>
<td>1.96</td>
</tr>
<tr>
<td></td>
<td>Median</td>
<td>2.00</td>
<td>2.50</td>
<td>2.00</td>
<td>2.00</td>
</tr>
<tr>
<td>Self-reevaluation</td>
<td>Mean</td>
<td>2.13</td>
<td>2.23</td>
<td>2.52</td>
<td>2.84</td>
</tr>
<tr>
<td></td>
<td>Median</td>
<td>2.00</td>
<td>2.17</td>
<td>2.67</td>
<td>3.00</td>
</tr>
<tr>
<td>Behavioural support</td>
<td>Mean</td>
<td>2.28</td>
<td>2.16</td>
<td>2.40</td>
<td>2.80</td>
</tr>
<tr>
<td></td>
<td>Median</td>
<td>2.20</td>
<td>2.20</td>
<td>2.40</td>
<td>2.80</td>
</tr>
<tr>
<td>Counter conditioning</td>
<td>Mean</td>
<td>2.13</td>
<td>3.00</td>
<td>2.74</td>
<td>3.15</td>
</tr>
<tr>
<td></td>
<td>Median</td>
<td>2.00</td>
<td>3.00</td>
<td>3.00</td>
<td>3.00</td>
</tr>
</tbody>
</table>
Figure 8.7: Graph showing processes of change for stage of change.\textsuperscript{92}
ANOVA and Kruskal-Wallis tests with Mann-Whitney U-tests were used to examine differences in processes of change across stages. For stage of change for sun protection, a number of significant differences were found, although, in general, those in *Action* and *Maintenance* reported a higher use of all processes than those in earlier stages (see Table 8.26)\(^\text{94}\). Of interest was the point of greatest change in use of processes, as shown by Figure 8.7. For dramatic relief and counter conditioning, this change occurred between *Contemplation* and *Preparation*. For behavioural support this change occurred at a similar rate for *Contemplation* to *Preparation* to *Action*. For self reevaluation this change appeared to occur between *Precontemplation* and *Contemplation*. For environmental reevaluation this change appeared greatest from

\(^{93}\) While these variables are distinct categories, line graphs are used to highlight response patterns
\(^{94}\) An exception was seen for Dramatic Relief where *Preparation* showed higher scores than *Action*. 

246
Preparation to Action. It should be noted that not all of these changes were statistically significant.

Table 8.26: Kruskal-Wallis and Mann-Whitney U-tests for stage of change and processes of change variables

<table>
<thead>
<tr>
<th>Variable</th>
<th>F (df)a</th>
<th>Sig.</th>
<th>Bonferroni(^1) Mann-Whitney U tests(^2)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dramatic relief</td>
<td>8.84 (4)a</td>
<td>p = .000</td>
<td>Precontemplation, Contemplation &lt; Preparation, Maintenance(^1)</td>
</tr>
<tr>
<td>Environmental reevaluation</td>
<td>4.26 (4)a</td>
<td>p = .002</td>
<td>Precontemplation &lt; Action, Maintenance(^1)</td>
</tr>
<tr>
<td>Self-reevaluation</td>
<td>9.01 (4)a</td>
<td>p = .000</td>
<td>Precontemplation &lt; Preparation, Action, Maintenance(^1)</td>
</tr>
<tr>
<td>Behavioural support</td>
<td>26.16 (4)a</td>
<td>p = .000</td>
<td>Precontemplation &lt; Preparation, &lt;Action, Maintenance(^1) Contemplation &lt; Action, Maintenance(^1)</td>
</tr>
<tr>
<td>Counter conditioning</td>
<td>27.80 (4)b</td>
<td>p = .000</td>
<td>Precontemplation, Contemplation &lt; Preparation, Action, Maintenance(^2)</td>
</tr>
</tbody>
</table>

\(^1\) Bonferroni post hoc tests Significant at p<.05
\(^2\) Mann-Whitney U-tests Significant at p<.005

ANOVA and Kruskal-Wallis tests with Mann-Whitney U-tests were used to examine differences in processes of change across Brand Loyalty segments. In general BLs showed a higher use of all processes on raw data, except for counter conditioning which was used most often by FBSs. Significant differences were found for dramatic relief, self-reevaluation, behavioural support and counter-conditioning across particular segments (see Table 8.27). Environmental reevaluation showed no significant differences across Brand Loyalty segments. Points of greatest change appeared to occur between OBS – FBS, and FBS – BL for dramatic relief, self-reevaluation and behavioural support. Counter-conditioning showed greatest change between NCU – OBL. Environmental reevaluation showed a mixed response pattern across Brand Loyalty segments (see Figure 8.8).
### Table 8.27: ANOVA and Kruskal-Wallis tests with Mann-Whitney U-tests for Brand Loyalty and processes of change

<table>
<thead>
<tr>
<th>Variable</th>
<th>F (df)</th>
<th>Chi sq (df)</th>
<th>Sig.</th>
<th>Bonferroni¹</th>
<th>Mann-Whitney U tests²</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dramatic relief</td>
<td>5.35(4)</td>
<td>p = .000</td>
<td></td>
<td></td>
<td>OBS &lt; BL</td>
</tr>
<tr>
<td>Environmental reevaluation</td>
<td>1.82 (4)</td>
<td>p = .125</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Self-reevaluation</td>
<td>4.93 (4)</td>
<td>p = .001</td>
<td></td>
<td></td>
<td>OBS &lt; BL</td>
</tr>
<tr>
<td>Behavioural support</td>
<td>10.92 (4)</td>
<td>p = .000</td>
<td></td>
<td></td>
<td>OBL, OBS &lt; FBS &lt; BL</td>
</tr>
<tr>
<td>Counter conditioning</td>
<td>25.23 (4)</td>
<td>p = .000</td>
<td></td>
<td></td>
<td>NCU, OBS &lt; FBS</td>
</tr>
</tbody>
</table>

¹ Bonferroni post-hoc tests Significant at p<0.05
² Mann-Whitney U-tests Significant at p<0.005
³ Significant Levene’s statistic, results should be interpreted with caution

### 8.9.7 Prediction of stage of change for sun protection

As relationships were found on bivariate analyses between stage of change for sun protection and a number of variables, a logistic regression was performed to examine which variables most strongly predicted group membership on the variable of stage of change. Due to low numbers in the sample subgroups of Precontemplation, Contemplation and Action, the stage of Contemplation was combined with Preparation and the stage of Action was combined with Maintenance. Analysis was then confined to exploring the predictors for Contemplation/Preparation compared to Action/Maintenance, in order to examine the transition from intending to sun protect to actually protecting. An examination for multicollinearity between variables found no strong correlations likely to inflate the variances of parameter estimates.

---

95 These stages were combined as they differentiate clearly between those who were thinking of, or making plans to, sun protect and those who were actively utilising sun protection behaviours. This is in line with Pagoto et al. (2004) who combined these same stages for analysis, and Kristjansson et al. (2004) who combined Action/Maintenance for analysis.

96 Examination of Variance Inflation Factor found temptation to tan with variable at 2.7, and tan attitudes at 2.6, however tolerance was below 0.4.
All variables that were found to show significant relationships to stage of change for sun protection on ANOVA or Kruskal-Wallis tests were entered into the logistic regression equation\(^{97}\). A test of the full model with all 14 predictors against a constant-only model was statistically reliable, \(\chi^2 (df =14, n=135) = 74.58, p = 0.000\), indicating the predictors as a set reliably distinguished between the Contemplation/Preparation and Action/Maintenance groups. Using Wald’s criterion, four predictors made a significant contribution to the prediction of stage membership. These were: age, affective sun protection attitudes, thinking about sun protection when out in the sun, and confidence to sun protect.

In order to produce a model with fewer predictors, those predictors with p values over 0.2 were removed from analysis, leaving five independent variables. A test of the full model with five predictors against a constant-only model was statistically reliable; however, \(\chi^2\) was reduced and correct classification of cases to stage of change was reduced by 8%. Variables were therefore returned to the model on a case by case basis, with each examined for the resulting improvement in \(\chi^2\) and prediction. This resulted in 12 predictors showing a statistically reliable model \(\chi^2 (df =12, n=137) = 77.47, p = 0.000\). This model correctly predicted 87.3% of stage membership for Contemplation/Preparation and 78.8% of stage membership for Action/Maintenance (overall 83.2%), and identified the same four significant predictors as previously noted (See Table 8.28). For every one-unit increase in confidence to sun protect the odds of belonging to the Action/Maintenance stage increased by a factor of 3.5 (CI 1.6 – 7.7). For every one-unit increase in thinking about sun protection when out in the sun, the odds of belonging to the Action/Maintenance stage increased by a factor of 2.0 (CI 1.1 – 3.9). For every one-unit increase in affective sun protection attitudes, the odds of belonging to the Action/Maintenance stage increased by a factor of 2.1 (CI 1.4 -3.3). For every increase in age by year the odds of belonging to the Action/Maintenance stage increased by a factor of 1.3 (CI 1.0 -1.8).

\(^{97}\) An examination of outliers via boxplots was conducted, and outliers deleted as suggested by Tabachnick and Fidell (2007).
Table 8.28: Logistic regression analysis of variables predicting stage of change including bivariate p values (Homer and Lemeshow $\chi^2 = 7.346$ (df 8) $p = .500$)

<table>
<thead>
<tr>
<th>Predictor</th>
<th>$\beta$</th>
<th>SE $\beta$</th>
<th>Wald’s $\chi^2$</th>
<th>$p$</th>
<th>$e^\beta$ (odds ratio)</th>
<th>Bivariate $p$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Constant</td>
<td>-8.803</td>
<td>5.596</td>
<td>2.474</td>
<td>.116</td>
<td>.000</td>
<td></td>
</tr>
<tr>
<td>Skin colour</td>
<td>.463</td>
<td>.275</td>
<td>2.840</td>
<td>.092</td>
<td>1.589</td>
<td>.02</td>
</tr>
<tr>
<td>Age</td>
<td>.297</td>
<td>.140</td>
<td>4.543</td>
<td>.033</td>
<td>1.346</td>
<td>.002</td>
</tr>
<tr>
<td>Gender</td>
<td>.251</td>
<td>.622</td>
<td>.163</td>
<td>.687</td>
<td>1.285</td>
<td>.000</td>
</tr>
<tr>
<td>Student status</td>
<td>.770</td>
<td>.624</td>
<td>1.523</td>
<td>.217</td>
<td>2.160</td>
<td>.001</td>
</tr>
<tr>
<td>Cognitive sun protection attitudes</td>
<td>-.651</td>
<td>.588</td>
<td>1.228</td>
<td>.268</td>
<td>.521</td>
<td>.011</td>
</tr>
<tr>
<td>Affective sun protection attitudes</td>
<td>.758</td>
<td>.229</td>
<td>10.953</td>
<td>.001</td>
<td>2.133</td>
<td>.000</td>
</tr>
<tr>
<td>Pros minus cons</td>
<td>.337</td>
<td>.271</td>
<td>1.554</td>
<td>.213</td>
<td>1.401</td>
<td>.000</td>
</tr>
<tr>
<td>Tempted to tan</td>
<td>-.299</td>
<td>.246</td>
<td>1.479</td>
<td>.224</td>
<td>.741</td>
<td>.001</td>
</tr>
<tr>
<td>Tempted to not protect</td>
<td>-.190</td>
<td>.312</td>
<td>.371</td>
<td>.542</td>
<td>.827</td>
<td>.000</td>
</tr>
<tr>
<td>Think about sun protection</td>
<td>.709</td>
<td>.330</td>
<td>4.613</td>
<td>.032</td>
<td>2.031</td>
<td>.000</td>
</tr>
<tr>
<td>Confidence to sun protect</td>
<td>1.263</td>
<td>.400</td>
<td>9.964</td>
<td>.002</td>
<td>3.535</td>
<td>.000</td>
</tr>
<tr>
<td>Skin protection beliefs</td>
<td>-.451</td>
<td>.435</td>
<td>1.078</td>
<td>.299</td>
<td>.637</td>
<td>.014</td>
</tr>
</tbody>
</table>
8.10 Discussion

8.10.1 Stages of change as a segmentation tool

Similarly to Brand Loyalty, significant differences were found between stage of change for sun protection on a number of demographic variables (i.e. skin colour, gender, student status, and age), as well as attitudes and beliefs (i.e. cognitive and affective sun protection attitudes, tan attitudes, tanning beliefs, self-efficacy and temptations not to protect and tan, thinking about sun protection, and the weighing of pros and cons). In general, these findings support the premise that stage of change can segment a sun protection audience, and that these groups will differ on a number of key variables.

However, the inability of the TTM questions on sun protection intentions and behaviour, and the staging algorithm, to consistently and logically categorise the student participants into the five stages of change for sun protection is a major concern. Twenty-four percent of the survey population were unable to be categorised using the staging algorithm based on their answers to the questions about current sun protection behaviour, intentions to sun protect, and past sun protection behaviour. While this does not necessarily reflect the inability of the TTM to adequately segment the market, it does show major deficiencies in the staging algorithm to adequately define these segments. The wording of the introductory statement asking about sun protection intentions and behaviours was changed from ‘the following questions are about protecting yourself from summer sun exposure’ to ‘the following questions are about protecting yourself from sun exposure’ in order to improve the logic of the subsequent questions; however, many respondents still did not follow this logic. This suggests that the intentions and behaviours of a large proportion of the survey population do not follow the ordered logic inherent in the TTM staging algorithm.

8.10.2 Response patterns for stage of change

On viewing a graphical representation of standardised mean scores, it can be seen that there were a number of inconsistent response patterns across stages (see Figure 8.9).
It should be noted that standardising the mean scores can magnify differences that may be in practical terms quite small. This graph, however, highlights the inconsistency in affective sun protection attitudes (sun protection is enjoyable, pleasant and relaxing) across stage of change, which was also apparent in the raw data. This variable was found to be a predictor for delineating between those intending to sun protect (Contemplation/Preparation) and those actually protecting themselves consistently (Action/Maintenance), with an increase in affective attitudes of one unit doubling the odds of being in Action/Maintenance. However, on viewing the graphical representation, it is obvious that the differences between these collapsed categories come from differences between Preparation and Action, as Contemplation and Maintenance have very similar standardised scores. While it may

98 While these variables are distinct categories, line graphs are used to highlight response patterns
be that affective attitudes to sun protection become more negative as individuals prepare to sun protect due to the issue becoming more salient, and then revert as action is taken to sun protect, the inconsistency in responses from Precontemplation to Maintenance for affective sun protection attitudes do cast some doubt on the ability of this variable to predict stage of change for sun protection. Further research is needed to clarify this issue.

The graphical representations of scale variables are also useful to view the patterns of response across stage of change, particularly in view of the assumption of the TTM that progression towards consistent sun protection is achieved via a series of stages. This suggests that different causal factors should, theoretically, be important at different stages (Sutton 2000). Sutton (2000) states that when interpreting cross-sectional data for stage models, researchers should look for discontinuity patterns, where inconsistent increments or decrements occur across stages, rather than linear patterns which are more indicative of a continuum of behavioural intention. This can be seen with some of the variables shown in Figure 8.9 where there is a noticeable plateauing of mean scores across tan attitudes, tanning attractiveness beliefs and skin protection beliefs from Preparation to Maintenance, subsequent to relatively large changes in these variables between Contemplation and Preparation. It is also shown for ‘confidence to sun protect’ where there is a plateauing between Contemplation to Action, preceding a relatively large increase from Action to Maintenance. These discontinuity patterns do give some support to the TTM assumption that different stages exist in sun protection behaviour; however, the limitations of cross-sectional data mean that the TTM assumption that people progress linearly through stages towards adequate sun protection could not be tested.

8.10.3 Comparisons between ‘stage of change’ and Brand Loyalty segmentation
As would be expected, a significant relationship was found between Brand Loyals (BLs) and Action and Maintenance groups with 86% of Brand Loyals in Action or Maintenance, thereby denoting a consistent pattern of ‘adequate’ sun protective behaviour. However, a number of FBSs (32%) were also categorised as being in Maintenance. As the defining sentence for FBSs was that ‘I generally protect myself adequately, but at times I don’t’, it is apparent that a number of those categorised as
Maintenance recognise that they are not actually in a consistent pattern of adequate sun protective behaviour. If those in Maintenance are viewed as having achieved success in realising a ‘good’ pattern of behaviour in terms of sun protection and therefore in no further need for intervention to improve sun protection, this view is shown to be flawed. This could mean that a potential target group, with positive attitudes to sun protection, would be missed for intervention even though their sun protection behaviours were not consistently ‘adequate’.

Similarly, 40% of those categorised as Precontemplation came from the FBS group. As the definition of Precontemplation in the TTM is that people ‘have no intention to protect themselves from the sun for the next six months’, the contradiction inherent in people who ‘generally protect but at times don’t’ also being defined as being in Precontemplation is obvious. These issues highlight the ongoing dilemma in using a construct (stage of change) which has been developed for a dichotomous behaviour (smoking) and adapting it for use for a pattern of behaviour which can consist of multiple behaviours used in varying combinations and intensity, and where it is difficult for individuals and researchers to judge ‘adequacy’ due to the complex interplay of weather, UV levels and skin type. Prochaska et al. (2002) state that to reach Action people must attain a level of behaviour change that scientists and professionals agree is sufficient to reduce risks for disease. For sun protection this criterion contains elements of ‘adequacy’ per occasion and ‘consistency’ over occasions, yet the concept of adequacy is missing from the staging questions – an issue equally applicable to TTM categorisation of diet, exercise or other complex health-enhancing behaviours.

As discussed in Chapter Seven, the inadequacy of reported ‘adequate’ sun protection behaviour can be seen with 69% of those in Maintenance reporting one or more burns over the previous summer. This is very similar to the 70% reported by BLs, although BLs reported a lower incidence of two or more burns (27% compared to 49%), and a lower incidence of intentional outdoor tanning (18% compared to 36%) and indoor tanning (12% to 15%) (these differences were not statistically significant). Also, as noted previously for BLs, the high number of those in

---

99 As maintenance is defined as consistent sun protection behaviour for six months or more, this group would have been in this stage for the whole of the previous summer.
Maintenance that reported they had attempted to tan through an indoor UV source was surprising. Further investigation of the variable of indoor tanning found that all BLs (4) and 10 out of 11 of those in Maintenance who reported indoor tanning were international students. As a number of international students wear clothing that fully covers their body due to cultural or religious customs, it may be that indoor tanning is seen by these students as a legitimate way to maintain Vitamin D levels in the absence of outdoor UV exposure\textsuperscript{100}, and/or that indoor tanning is safer than outdoor tanning. This is supposition, however, and would need further research to clarify.

The cross-over of pros and cons around Preparation and the larger increase in pros (approximately one standard deviation) compared to the decrease in cons (approximately a half standard deviation) from Precontemplation to Action supports empirical research into the TTM, although statistical analysis found no significant differences between stages for cons. When viewing results for TTM stages compared to Brand Loyalty segments (see Figures 8.10 and 8.11), it appears that the changes in the weighing of pros and cons for TTM stages is driven more by changing perceptions of the pros of sun protection, whereas for Brand Loyalty segments it is more a balance between the two. This is also reflected in the change in pros between OBLs to BLs being 0.9 of a standard deviation, and the change in cons being 1.1 of a standard deviation, compared to 0.9 and 0.4, respectively, for TTM from Precontemplation to Action\textsuperscript{101}. For both models the change in pros minus cons is a consistent increase across stages, except for NCUs in Brand Loyalty which shows regression to the mean. As discussed in Chapter Seven, this is not unexpected for this model of segmentation as for OBLs the weighing of the benefits and costs of sun protection is more likely to show extreme values from BLs, as this group is aware that they should sun protect but do not due to negative perceptions of the cost over benefit ratio.

\textsuperscript{100} This is not recommended by health authorities Cancer Council Australia. (2007). "Risks and benefits of sun exposure: position statement." from http://www.cancer.org.au//cancersmartlifestyle/SunSmart/sunsmart/risksandbenefitsofsunexposure.htm...

\textsuperscript{101} The difference between Precontemplation and Action was chosen as these stages have been compared in other TTM research. However, even when using the most extreme scores for pros and cons the changes in pros is still more than the change in cons in terms of standard deviations (1.0 compared to 0.6).
Figure 8.10: Pros and cons for stage of change
When defining specific predictors delineating between those intending to consistently sun protect (*Contemplators and Preparers*) and those actually doing it (*Actioners and Maintainers*), only four predictors were found to be significant: age, affective attitudes to sun protection, confidence to sun protect adequately, and thinking about sun protection. These predictors differed somewhat to those for delineating between *OBSs* and *FBSs*, with cognitive attitudes to sun protection, temptations to not protect, temptations to tan, age and thinking about sun protection found as significant predictors. Thus, the only two significant predictors that were common to both types of categorisation were age and thinking about sun protection. If thinking about sun protection is seen as a partial measure of the level of
involvement individuals feel for sun protection, then both segmentation models give an indication of an increasing involvement in sun protection. This is logical given the amount of planning and commitment which is needed for an adequate level of sun protection behaviour.

Both models of segmentation show the importance of self-efficacy, with confidence to sun protect a predictor of being in Action/Maintenance compared to Contemplation/Preparation, and temptation not to protect and to tan being predictors of belonging to FBSs compared to OBSs. It should be noted that for prediction of belonging to FBS or OBS groups, confidence to sun protect approached significance at p<0.054 with an odds ratio of 1.7; bivariate analysis also found OBSs to be significantly less confident than FBSs and BLs. Additionally, significant differences were found for temptations not to protect and to tan between some stages of change for sun protection. Therefore both expressions of self-efficacy appear important to each model, however, Brand Loyalty segmentation appears to be more sensitive to the competitive thoughts against sun protection which are measured via temptations not to protect or to tan.

Prochaska et al. (2002, pg. 104) state that a critical assumption of the TTM is that ‘the majority of at-risk populations are not prepared for action and will not be served by traditional action-orientated prevention programs’. However, this becomes more complex when used for multiple behaviour patterns such as sun protection. As shown by the Brand Loyalty categorisation, 94% of respondents in this survey population were performing some degree of sun protection (although 83% recognised that their level was inadequate). If, instead of viewing the stage of sun protection as a difference between not acting/acting, the stage of sun protection is viewed as the difference between not acting adequately/acting adequately, this does bring the model more into line as a descriptor of complex behaviour. However, we then lose the ability to recognise those people who are not engaging in any sun protection behaviour with the staging categorisation. For example, a Precontemplator may be not use any sun protection because they are unaware of the need for it, or because they do not see the benefit as outweighing the cost, or they may be performing sun protection but feel it is inadequate on some or many
occasions. It could be assumed that these people would differ in their needs and motivators in sun protection interventions, but would not be differentiated by this interpretation of stage of change.

In contrast, Brand Loyalty recognises levels of varying action, but also differentiates between two levels of inaction – those who lack awareness of the need for sun protection, and those who perceive a need yet weigh the benefit/cost ratio in favour of no sun protection. Additionally, the more consistent response patterns for pros and cons that were found for Brand Loyalty follow the logic of a price dependent behaviour more closely than the response patterns seen for TTM. Brand Loyalty acknowledges sun protection as a contingent and complex behaviour, recognising that at any time the sun protective behaviour that is performed is a consequence of a moment to moment weighing of benefit and cost ratios which are influenced by mood, time and physical and social environments. It therefore appears to be a better descriptor of the ‘how’ of sun protection behaviour than the TTM, and also gives some intimation of the ‘why’ of sun protection behaviour, providing more clues to strategies. As the main aim of segmentation is to match the needs of customers with the product, Brand Loyalty appears to provide more insight into the needs of sun protection audiences.

**8.10.4 Processes of change**

All processes of change (dramatic relief, self-reevaluation, environmental reevaluation, behavioural support and counter-conditioning) showed an overall increase from *Precontemplation* to *Maintenance* or *NCU* to *BL* segments, except for environmental reevaluation in Brand Loyalty. As discussed previously, Prochaska et al. (2002) suggest that the typical use of processes across stages is for a greater use of cognitive-affective processes in earlier stages of change and a greater use of behavioural processes in *Action* and *Maintenance*. This is not replicated in this research. When comparing the higher order of cognitive-affective processes (dramatic relief, self-reevaluation and environmental reevaluation) to behavioural process (behavioural support and counter-conditioning) there appeared to be a slightly higher use of behavioural processes overall for both segmentation models,
but in general both cognitive-affective and behavioural processes followed a similar pattern across stages or segments (see Figures 8.12 and 8.13).

**Figure 8.12:** Cognitive-affective and behavioural processes across Brand Loyalty segments
These patterns, however, are consistent with the results of a meta-analysis of cross-sectional studies on TTM across a number of health behaviours by Rosen (2000), where he found that the sequencing of processes was not uniform across all health problems; and that for exercise adoption and diet change, the use of cognitive-affective and behavioural processes increased together. Using the example of exercise, Rosen suggests that the higher use of cognitive-affective processes in Action and Maintenance stages may reflect differences between ceasing an addictive behaviour and initiating a health-enhancing behaviour. He reasons that when there is a need to constantly reinitiate behaviour, a continuing use of cognitive-affective processes may assist in the maintenance of the behaviour. This reasoning is equally applicable to sun protection behaviour. It may be that to maintain an adequate level of sun protection behaviour there is a constant need for processes that, rather than helping you modify your thinking, feelings or behaviour, instead help you reassert or

---

**Figure 8.13:** Cognitive-affective and behavioural processes across stage of change
maintain your thinking, feelings or behaviour. On examining the patterns of response for the different processes of change over TTM stages, there are areas of plateau followed by increases followed by further plateaus. It does, therefore, appear that processes in general become important at differing stages but are then maintained at those levels. Similarly, but less distinctively, Brand Loyalty segments show relatively minor changes in the use of processes for NCU, OBL and OBS segments, and then increases for FBS and BL segments (except for environmental reevaluation). The differences in the response patterns for processes for TTM stages and Brand Loyalty may be indicative of the different basis of their segmentation strategies, as stage of change represents a pathway to change whereas Brand Loyalty is conceptualised more as a description of the relationship that people have with the ‘brand’ of sun protection behaviour. While there is an inference within this conceptualisation that people could actually move along a pathway of growing brand attitude through different levels of Brand Loyalty until they reach BL status, there is no empirical evidence that this is a typical pathway for people to achieve ‘adequate sun protection behaviour’. Longitudinal research would be needed to explore this issue.

The lack of significant change for environmental reevaluation is curious considering the increase in other processes over segments. This process is defined as realising the ‘positive impact of the healthy behaviour on one’s proximal social and physical environment’ (Prochaska et al. 2002, pg. 101), and in general showed lower response scores than other processes across all stages or Brand Loyalty segments. Exploration of the items combined for this process via Chi square analysis found that while Brand Loyalty segments showed significant differences on the item ‘I have thought how my sun protective behaviour could be a role model for other people’\(^{102}\), no significant differences were found for ‘I have thought how my wearing of sun protective clothing would increase its social acceptance in people I care about’\(^{103}\) or ‘I have thought how my tanning may encourage others to tan’\(^{104}\). Also, for TTM stages significant differences were found for the first two items, but, again, no significant differences were found for the item ‘I have thought how my

\(^{102}\) \(\chi^2=18.24\) (9df) \(p=0.002\)
\(^{103}\) \(\chi^2=11.32\) (9df) \(p=0.25\)
\(^{104}\) \(\chi^2=9.19\) (9df) \(p=0.42\)
tanning may encourage others to tan\textsuperscript{105}. While the lower scores in general are perhaps indicative of this demographics’ lowered awareness or concern for how their personal behaviours affect others, and the lower scores for OBS and FBS groups may be indicative of more positive tanning attitudes and less use of clothes as a means of sun protection amongst these groups, the underlying reasons for the differences between TTM and Brand Loyalty for this process require further research to explain.

8.11 Limitations

General limitations to this research were noted in Chapter Seven and are applicable here; however, one further point relevant to this chapter needs to be stated. The major limitation to this research on TTM stage of change and sun protection is the limitation previously described in the algorithm for stage of change for sun protection. Due to inconsistencies in responses, almost one quarter of the survey sample was not able to be used for analysis. This lowered the power to find significant results, but also raises questions about the validity of the algorithm to give a true reflection of the respondent’s actual sun protection stage of change.

The operationalisation of the stage of change construct for this research utilised the algorithm validated by the Cancer Prevention Centre (Rossi et al. 1995); although, as stated previously, the term ‘summer’ was removed from the sentence ‘The following questions are about protecting yourself from summer sun exposure’ following feedback from colleagues on the contradiction in asking about sun protection for the next 12 months, combined with the limitation inherent in ‘summer’. Additionally, at the time of the survey, no recommendations not to sun protect at specific times of the year had been noted. However, current recommendations (2010) suggest there is no need to sun protect during July and August in the region that research was conducted\textsuperscript{106}. While this is unlikely to have substantially affected participants’ responses to the stage questions, it is a limitation to the research which suggests caution when interpreting results.

\textsuperscript{105} \chi^2 = 3.89 (6df) p=0.69

\textsuperscript{106} It is not known whether this recommendation is widely known by the young adult population.
The pattern of results, reported in this study, for tan attitudes, tanning attractiveness beliefs, skin protection beliefs and confidence to sun protect, as well as the pattern of results for processes, is supportive of the segmentation method used as describing a ‘change pathway’. It is therefore likely that the research does give a true exploration of TTM as a segmentation method despite the inadequacies of the staging algorithm used, and that the limitations of the TTM in describing sun protection behaviour stem more from problems in the model to describe complex health behaviours, rather than inadequacies in the research methods.

8.12 Conclusions

As an investigation of the TTM to segment sun protection audiences this study has shown that most young adults can be categorised on their stage of change for sun protection and that these groups appear to have differences in their attitudes, beliefs, efficacy, and their perceptions of the benefits related to sun protection. It has also supported, to a limited degree, the potential utility of processes of change as strategies to encourage movement through stages, particularly for Contemplation, Preparation, and Action, however, as the study was a cross-sectional survey results for this need to be treated with caution. Additionally, a number of inconsistencies in the ability of the staging algorithm to adequately categorise people into the correct stage of change, the contradictions between respondents’ actual behaviours and their inclusion in a particular stage, and its limited ability to adequately describe sun protection behaviour, does raise questions as to its appropriateness in segmenting groups/populations on a complex behaviour such as sun protection.

This is not to say that Brand Loyalty segmentation, as explored in Chapter Seven and Eight, is without limitations. The large proportion of respondents in FBS groups point to the need for further segmentation within this group, perhaps based on competition to sun protection (eg. on attitudes to tanning or forgetfulness and lack of planning), or perhaps on individual motivations to sun protect (eg. brand attitude motives such as problem avoidance as compared to social approval). Also, the use of processes of change within Brand Loyalty would need further research as to what processes are most relevant to this demographic, and how best to operationalise
those processes that were removed from the survey results due to poor factor loading. This research has, however, shown that as a segmentation tool Brand Loyalty can distinguish between groups equally or better than the TTM for sun protection behaviours in a young adult audience. The implications of this research will be discussed further in Chapter Nine.
Chapter Nine: Discussion and Conclusions

‘Knowledge is contingent and contextual rather than universal, determinate and invariable’.

(Buchanon 1994, pg. 274)

9.1 Introduction

There is a need for evidence-based research that progresses health promotion theory and practice. There is also a need to provide practitioners with easy access to the evidence accumulated in a form that is readily available to inform practice decisions (South and Tilford 2000). This project aimed to provide an evidence-base for the specific application of social marketing and advertising communications theory to sun protection interventions, and was conducted with the view to informing the development of sun protection programs targeting adolescents and young adults.

Throughout the research, a social marketing framework has been used. However, a need was also seen to integrate the advantages of a social marketing approach more wholly within its public health context. The research was not, therefore, limited only to examining elements traditionally viewed as social marketing.

This chapter provides an overview of the process and limitations of this project, as well as discussing the implications for research and practice in the field of social marketing.

9.2 Summary of the research

The research aims were addressed through three stages of research, with each stage informing the next according to its ‘success’ in fulfilling the aims of the research. This has ensured that the research has adapted to gaps in evidence which were highlighted through the first and second stage of the project.
9.2.1 Stage One

The first stage of the project was a systematic review of primary prevention interventions targeting adolescents and young adults that had been implemented since 1980. It aimed to examine the extent of use of social marketing and communication theory within sun protection programs and ascertain ‘best practice’ in the implementation of programs.

The review utilised a social marketing framework developed by this researcher, incorporating key elements of a social marketing approach. A systematic search for literature, strict inclusion and exclusion criteria, pre-established data coding forms incorporating an assessment for quality, and coding by two researchers ensured a systematic and transparent process, heightening the validity of results.

A number of observations were made from the review evidence, in particular, the utility of strategies targeting appearance issues; however, as a means of identifying ‘best practice’ the results were, generally, inconclusive. This was largely due to the inability to conduct meta-analysis on the data due to a limited number of studies coupled with a range of different study designs, behavioural outcomes, and measures.

9.2.2 Stage Two

Stage two consisted of a Delphi consensus process with experts in the fields of social marketing and sun protection, conducted in order to develop operational guidelines for social marketing projects in sun protection for adolescents and young adults. This process synthesised the opinion of academics and practitioners in the field of social marketing and sun protection, using a systematic and transparent process. It resulted in 15 guidelines covering the structure, timing, and content of social marketing interventions for the target audience. The guidelines were then graded via a traditional hierarchy of evidence table, as well as being rated by the experts via a visual analogue score, based on their knowledge and practical opinion. This process was able to fill some gaps in evidence apparent from the systematic review; however, a number of questions remained unanswered. Specifically, despite segmentation
being a core component of social marketing, limited direction was given on the most appropriate variables to be used to segment target audiences.

9.2.3 Stage Three

The gap in evidence and practice highlighted by the first two stages formed the basis for stage three of the project. This consisted of primary research into the segmentation of target audiences for sun protection interventions, using the Rossiter-Percy Model of advertising theory (Brand Loyalty). This theory was identified during the initial literature search into social marketing and advertising theory as a potential model for segmenting target audiences for the ‘promotion’ of social marketing interventions. As no previous research was identified into the use of this model in sun protection, the research was exploratory. The Rossiter-Percy model was also compared to the Transtheoretical Model on the utility of the two models for the segmentation of sun protection audiences. While both models were shown to be able to categorise young adult sun protection audiences into groups that had significant differences in terms of attitudes, beliefs and efficacy to sun protect, Brand Loyalty was shown to have more consistent response patterns over segments, and to give more insight into the complexity of sun protection behaviour – thus providing more guidance for sun protection strategies.

9.3 Discussion

As the findings from each stage of research have been discussed in their respective chapters, the discussion concentrates on major observations found through the research process and areas for future work.

9.3.1 Social marketing and sun protection

There was little use of social marketing described in the sun protection literature, and only one reference to social marketing in the systematic review of sun protection interventions; however, this appears to be indicative of limited ‘academic’ research using a social marketing process rather than a lack of social marketing practice within sun protection programming. Social marketing is a growing area of practice for government and non-government organisations, but has not yet built a strong
academic tradition within ‘practice’. This academic/practitioner gap is recognised within marketing literature generally, but has also been identified as a major issue affecting social marketing’s acceptance within the ‘social change’ field (Andreason 2002; November 2004). McDermott et al. (2005), when attempting to conduct a systematic review of social marketing interventions related to nutrition, also found a limited number of self-defined ‘social marketing’ interventions, many of which lacked a number of key criteria which the authors considered defining features of a social marketing program. The authors therefore explored ‘whether social marketing ideas work rather than whether social marketing labels work’ (pg. 549), and examined interventions for evidence of six social marketing criteria (Andreason 2002). To be defined as a social marketing intervention, the interventions had to show evidence of: 1. a focus on behaviour change with specific behavioural objectives; 2. formative research and pre-testing of intervention elements; 3. use of segmentation and tailoring of strategies; 4. a consideration of exchange where the target audience is offered a tangible or intangible benefit to encourage voluntary behaviour change; 5. use of promotions and at least one other marketing ‘P’107; and 6. the use of strategies which seek to minimise the appeal of competing behaviours (including the current behaviour).

This is very similar to the social marketing framework used in this project; however, the aim of this project’s systematic review was to examine useful strategies/processes that could be used within social marketing interventions for sun protection, rather than a validation of specific social marketing ideas. Additionally, the concepts of ‘exchange’ and ‘competition’ were not specifically emphasised within this project’s systematic review framework. This was due to the difficulties in defining these concepts in a manner which would offer meaningful comparisons between interventions. All interventions reviewed via systematic review could be regarded as offering an intangible benefit of lowered skin cancer or skin damage risk in exchange for improved sun protection behaviour; similarly, all interventions could be viewed as seeking to minimise the appeal of not sun protecting or tanning either by imparting knowledge on the dangers of UV exposure and the risks of skin cancer/skin damage, or changing attitudes and beliefs on UV exposure. The focus on

---

107 The marketing mix of product, price, place or promotion
specific strategies, such as the targeting of appearance concern or social norms, was therefore more useful in terms of potential strategies to use in future sun protection interventions than a generic focus on whether interventions targeted competition.

A consideration of these concepts is still useful; however, to be able to review the effect of ‘a consideration of exchange’ and ‘the use of strategies that seek to minimise the appeal of competition’ such as suggested by McDermott et al. (2005), there is a need for researchers/authors to be explicit in how the strategies they used operationalised the concepts of exchange and competition. Without this level of detail, critical review of the use of these concepts for social marketing interventions in sun protection would be reliant on supposition.

9.3.2 Methodological issues in systematic review

The major observation from the systematic review of the literature was the essential need for a standardisation of outcome measures. Outcome measures chosen by the 23 interventions varied widely, and while 12 used an overall measure of sun protection, only three used the same index (which divided sun protection into an incidental exposure index and an intentional exposure (tanning) index). Other studies reported on sunscreen use, which could be measured in a variety of ways from a simple yes/no to a specification of SPF factor, or a percentage of body covered; use of clothing, which could be measured through a yes/no for separate clothing items, a combined shirt and pants with a separate hat measure, a combined hat and clothing measure, or a percentage of body covered by clothing; number of tanning hours; incidence of sunburn; and/or use of shade which may be incorporated into percentage of body covered or may be a simple yes/no. The varying combinations of different outcomes made these measures unable to be validly compared. While the appropriateness of meta-analysis for public health interventions is a matter of continued debate (Waters et al. 2001; Victora et al. 2004), there is still undoubted worth in being able to make comparisons of the effectiveness of sun protection interventions through systematic review. However, to do this, what is needed is one standardised and validated measure of sun protection which can still be divided into individual behaviours, and which is accepted and used by sun protection researchers. This will then allow different types of interventions to be compared.
To compare interventions, there is also a need for more detail in journal articles. Many of the papers reviewed lacked information about one or more aspects of their intervention. While this made review difficult, more importantly it meant that opinions were formed with incomplete information. The efforts given to in-depth coding and review, with detailed data information sheets with which to make decisions, attempted to minimise bias, but those programs which were clearly described were more likely to have their details correctly reported.

Jarlais et al. (2004) describe similar issues arising in HIV/AIDS research synthesis at the Centers for Disease Control and Prevention in the United States. This has led this organisation to develop a checklist- The Transparent Reporting of Evaluations with Non-randomised Designs (TREND). The authors state the checklist was developed in order to standardise the reporting of interventions and data in peer-reviewed publications so that ‘the conduct and findings of research are transparent’ (p. 362). This list is consistent with the CONSORT statement (Consolidated Standards of Reporting Trials) which was developed for randomised-controlled trials, but expands on the information requested to include items relevant to public health interventions such as information on the target population, the use of behavioural theory, the setting where the intervention was delivered, and added data on baseline equivalence between groups (Moher et al. 2001; Jarlais et al. 2004). The use of these checklists by authors when preparing reports on sun protection interventions would greatly reduce the problems encountered when attempting to synthesise outcomes over a number of studies and, combined with a standardised measure for sun protection, would allow for a greater validity in the final results.

However, some reporting needs which are particular to sun protection should also be incorporated into reports. These are related to the season and weather conditions in which interventions and testing are conducted. Sun protection requirements differ on a seasonal basis, and evaluation of some outcomes can be greatly affected by environmental characteristics of the follow-up period, especially when looking at incidents of sunburn which are highly related to UV levels and temperature (Dobbinson and Hill 2004; Adams et al. 2009). Ideally, testing should also be
conducted at similar times of the year to allow some standardisation in seasonal behaviours.

Another issue related to the reporting of interventions is the importance of context when evaluating public health initiatives. The debates on the appropriateness of meta-analysis for public health interventions largely stem from the inherent conflict between the ‘reductionist’ methods of systematic review where the contributions of context in influencing an intervention’s success are unable to be captured in evidence synthesis (Waters et al. 2001; Victora et al. 2004). Increasingly, researchers evaluating complex public health interventions are using mixed methods approaches where qualitative methods are combined with quantitative methods to give a triangulation of data and an in-depth understanding of issues influencing an interventions process (Harden and Thomas 2005; Roen et al. 2006). These approaches are needed in sun protection research in order to understand the role of contextual issues in sun protection outcomes. Accordingly, this then entails new methods to incorporate this evidence in systematic review – an area of ongoing research (Roberts et al. 2002; Thomas et al. 2004; Pluye et al. 2009).

9.3.3 The ‘positioning’ of sun protective behaviour for adolescent and young adult audiences

Positioning is defined as ‘the art and science of fitting the product or service to one or more segments of the broad market in such a way as to set itmeaningfully apart from the competition’ (Ayer's Dictionary of Advertising Terms cited in Belch and Belch 2001, pg. 52). While, in general, social marketing is rarely in the situation where it can markedly alter the ‘product’ of interventions, social marketers can and do attempt to alter the image of the product and where it sits in relation to the competition in the target group’s mind (Hastings 2003). For sun protection interventions targeting adolescents and young adults, this project has suggested that there is a need to move the positioning of sun protection away from a singular focus on the ‘prevention of skin cancer’ to a positioning that includes the ‘prevention of skin damage’. While beliefs on skin protection were not found to be significant influences on Brand Loyalty categorisation, and were not reported in the literature as major predictors of sun protective behaviour (rather positive tan attitudes were a
predictor of not protecting), the strongest observation from the systematic review in terms of strategies was the general efficacy of appearance-based interventions in producing positive sun protection behaviour change. Even short-duration interventions were shown to be effective in influencing changes in sun protective behaviour, with one ‘one off’ study showing positive changes up to one year post-intervention. This approach was also shown to be effective in a ‘real world’ setting where the use of ‘dermascans’, which show UV damage imperceptible to the naked eye, were used as a major component of a community-based intervention that found positive behaviour change in students in years six to eight (Olson et al. 2007). This intervention, in particular, showed that this approach could be effectively utilised on a larger scale than the smaller university-based experiments which constituted the majority of reported research on this approach.

Despite limited discussion on this area in the academic literature, the use of an appearance-based approach was also strongly supported by participants in the Delphi process with a consensus of 90.9% and a VAS of 8.44 (7.62- 9.25). The strength of this support in the absence of a body of academic discourse may be indicative of the time lag between academic/practitioner opinion and validation of this opinion through weight of evidence. There is, therefore, a need for continued research on the effectiveness of appearance-based sun protection interventions for adolescents and young adults, to strengthen the evidence-base of this approach.

In terms of positioning, there may also be a need for social marketers and cancer organisations to accept a (partial) tactical retreat on the competition to sun protection that comes from strong attitudes towards tanning for appearance. While continued sun protection campaigns over many years have decreased the level of tan that adolescents and young adults find attractive (Cokkinides et al. 2006; Dobbinson et al. 2007), the academic literature reports a continued attraction for a light to moderate tan by the majority of this demographic, with tan attitudes consistently reported as major predictors of sun protective behaviour (Wichstrom 1994; Davis et al. 2002; Lazovich and Foster 2005; Cokkinides et al. 2006; Dobbinson et al. 2007). These entrenched pro-tan attitudes do increase the potential for reactance against a strict ‘no tan’ message. Additionally, while sunscreen is generally viewed as a poor sun
protective measure by cancer organisations, for adolescents and young adults it continues to be the sun protective behaviour of choice (Hill et al. 2004). These facts, and the ambiguity on the dangers of UV exposure for skin cancer versus the benefits of UV exposure for vitamin D levels (Lucas and Ponsonby 2006), suggest a harm minimisation approach that incorporates an increased sun protection literacy in regards to safe sun exposure times, an acceptance that this demographic will continue to prefer some level of ‘colour’ on their skin, and a strong push for self-efficacy in terms of the use of sunscreen for sun protection. This does not have to mean that cancer organisations are seen to accept UV tanning, as the use of spray and fake tans present avenues to gain some ‘colour’ without promoting UV exposure. It does, however, allow social marketers to create strategies/messages more congruent with the prevailing social norms of this demographic, and position sun protection as more strategically aligned with an appearance and health enhancing behaviour that can fit easily within the lifestyle of adolescents and young adults.

9.3.4 Segmentation strategies

The systematic review of sun protection interventions was unable to provide evidence on useful segmentation strategies for adolescent and young adult sun protection audiences. However, the Delphi process did identify a number of variables which could (and should) be used to segment the target group. Additionally, stage three of this project supported the potential usefulness of a Brand Loyalty approach in grouping target audiences that were similar in terms of their continuing awareness and attitude to the ‘brand’ of adequate sun protection. This approach is in accord with the variables identified in the Delphi process, as it categorises the target audiences on their attitudes and patterns of sun protective behaviour.

The use of multiple tailoring variables has previously been shown to be beneficial for behaviour change programs, with a meta-analysis of health behaviour change studies using tailored print materials finding that tailoring on four to five theoretical concepts produced larger effect sizes than tailoring on zero to three concepts ($r = .062$ compared to $r = .093$) $p < .001$ (Noar et al. 2007). It may therefore be beneficial for Brand Loyalty segmentation to be used alongside those other variables recommended by the Delphi guidelines – i.e. age, gender, risk, and benefits and barriers (pros and
cons) – all of which were shown to have significant relationships with Brand Loyalty categorisation. This is especially indicated for the *Favourable Brand Switchers* segment which was shown to make up 62% of the survey sample, and would benefit from additional segmentation in order to further refine potential strategies to influence sun protective behaviour.

The use of benefits and barriers as segmentation variables is also indicated for use with a Brand Loyalty approach, as Brand Loyalty segments are defined by their price resistance which is synonymous with a weighing of benefits against barriers or pros and cons. Some insight into these barriers was provided in the survey where students in the *FBS* group reported the reasons for not protecting as, wanting a tan (34%), forgetting (70%), unpreparedness (14%), and difficulties outweighing benefits (14%). These divisions were incorporated into the survey based on a reading of the literature on sun protection for this demographic, but would benefit from qualitative work to further define the specific barriers that adolescents and young adults perceive that prevent them from adequately protecting themselves from the sun on all occasions.

Previous research by Carmel et al (1994), which examined the power of the Health Belief Model (HBM) in predicting sun protective behaviours for people aged from 15 to over 60 years old, also supports the use of benefits and barriers to sun protection as important variables defining sun protective behaviour for this demographic. They found the predictive power of the HBM for sun protective behaviour to be statistically significant with 24% of the variance in behaviour explained in the 15 to 29 year old group, mostly through the variables of ‘barriers’ and ‘cues to action’. The authors then expanded the model to include variables of ‘concern with the disease’, ‘the value of health’, ‘the value of appearance’, and ‘internal locus of control’, finding that this significantly increased the overall power of the original HBM to predict sun protective behaviour in terms of variance explained. However the increase occurred mainly in the older age groups (45 to 59 years increased by 10%, 60 years and over increased by 34%), rather than the younger groups (15 to 29 years increased by 4%). The authors described this finding as indicative of older persons being more motivated to undertake behaviours based
on generalised beliefs on the value of health and appearance, while younger persons are more motivated by benefits, barriers, and cues for action specifically relevant to the recommended protective behaviours. The research also found that adolescents and young adults, while having lower levels of sun protective behaviours, had similar scores to older age groups on beliefs such as susceptibility to, and perceived severity of, skin cancer as well as generalised measures on the value of health and internal locus of control. The authors suggest these groups must therefore perceive more barriers to sun protection than older age groups. Gender was also found to be an important explanatory factor in predicting sun protection, but only for adolescents and young adults, indicating that the barriers faced by males at these ages which inhibit sun protective behaviour may diminish with age.

This research is significant as it highlights the importance of recognising that improving adolescents’ and young adults’ perceptions of susceptibility and severity for skin cancer will probably not change their sun protective behaviours if nothing is done to reduce the barriers they perceive to sun protection or they are not offered benefits which are important to them. This demographic is significantly different in how it perceives and performs sun protection (Hill et al. 2004); it therefore needs interventions which acknowledge this difference, developing messages and strategies to minimise the barriers to sun protection, and provide salient benefits which can be realised in the short rather than long term.

9.3.5 Behavioural theory

A noticeable omission in the Delphi developed guidelines is the lack of comment on behavioural theory. Interestingly, only two comments on theory were in the original recommendations put forward by Delphi participants. The first recommended that ‘established behavioural principles/models (eg including incentives, minimizing barriers) should be a part of any program seeking to achieve behaviour change’, and the second recommended that ‘developmental theory/evidence should be incorporated’ when segmenting on age. These recommendations did not make it through the consensus process, thus were not included in the final guidelines. Similarly, the systematic review of sun protection programs was unable to determine the most effective theory to use in developing programs although many programs
used one or a combination of two or more behavioural theories as a basis for program development. Eight different behavioural theories or models were used by 16 of the 23 interventions, with the Theory of Reasoned Action/Planned Behaviour, Transtheoretical Model, Social Cognitive Theory, Health Belief Model, and Protection Motivation Theory being most commonly used, and the Theory of Alternative Behaviour, Triandis Theory of Attitude-Behaviour Relations, and unspecified ‘communication theories’ being used by single interventions. The varied use of behavioural theory as shown in systematic review suggests that the lack of comment on behavioural theory during the Delphi process is probably indicative of a lack of consensus on which theory is the most effective to use for sun protection programs or, perhaps, that researchers prefer an eclectic approach to use of behavioural theory as they develop their initiatives, using those elements of theories that are most relevant to the initiative’s goals and the target population.

It may be that one or two behavioural theories are not sufficient to inform the complexity of sun protection programs, particularly when targeted at equally complex target groups. Reviewing the three stages of this project has indicated that constructs that would be useful to examine would include: attitudes and beliefs about sun protection and tanning, social norms surrounding tanned skin and sun protection, self-efficacy for sun protection, and measures of temptation to tan or not protect. Additionally, the contingent nature of sun protection indicates that the investigation of how environmental factors interact to influence behaviour in different situations should be included, with strategies developed accordingly.

On a theoretical level, the strong interplay of environment (physical and social) and individual factors influencing sun protection behaviours in this demographic does suggest Social Cognitive Theory as a good basis for formative development of sun protection interventions. However, other theories would add useful insights – such as investigation of social norms from the Theory of Planned Behaviour (or more specifically group norms as suggested by Robinson’s research in this area), effects of threat appeals such as in Protection Motivation Theory, and the use of pros and cons and processes of change from the Transtheoretical Model. Additionally, theories which attempt to understand the gap between intentions and action are
essential (this is discussed in the next section). This eclectic approach to incorporation of behavioural theory in social marketing interventions has been suggested previously by Winett (1995) where different theories are used for each variable of the marketing mix (see Table 9.1).

Table 9.1 Interactive marketing Variables and Relevant Theory and Models, and Principles (adapted from Winett 1995, pg 345)

<table>
<thead>
<tr>
<th>Variable</th>
<th>Theory</th>
<th>Principles</th>
</tr>
</thead>
<tbody>
<tr>
<td>Product</td>
<td>Diffusion theory</td>
<td>Product design</td>
</tr>
<tr>
<td></td>
<td>Stages of change</td>
<td>Matching</td>
</tr>
<tr>
<td>Price</td>
<td>Behaviour analysis</td>
<td>Reinforcement</td>
</tr>
<tr>
<td></td>
<td>Social cognitive theory</td>
<td></td>
</tr>
<tr>
<td>Promotion</td>
<td>Theory of reasoned action</td>
<td>Cognition-Behaviour</td>
</tr>
<tr>
<td></td>
<td>Health belief model</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Protection motivation theory</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Social cognitive theory</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Behaviour analysis</td>
<td></td>
</tr>
<tr>
<td>Place</td>
<td>Public health</td>
<td>Environmental design</td>
</tr>
<tr>
<td></td>
<td>Ecological health</td>
<td></td>
</tr>
<tr>
<td>Positioning</td>
<td>Stages of change</td>
<td>Matching</td>
</tr>
<tr>
<td></td>
<td>Developmental</td>
<td></td>
</tr>
</tbody>
</table>

While little or no research has been conducted on how this multi-theoretical framework may be utilised within sun protection, it may be a useful approach to sun protection social marketing; this project would, however, suggest that Brand Loyalty may give more insight to product and positioning than Stages of Change theory.
9.3.6 Self-efficacy and planning for sun protection

As shown in stage three of the project, many young adults have good intentions to protect themselves from the sun but fail to do so because they forget, they are unprepared or they feel the difficulties of doing so outweigh the benefits. Also, it is obvious that those that do try to sun protect often fail to protect themselves adequately, with 31% of Australian adolescents burnt during the summer of 2003-4 reporting that they had tried to protect the area that was sunburnt (Centre for Behavioural Research in Cancer 2005a), and high proportions of Brand Loyals in stage three reporting sunburn. There is, therefore, a need to improve adolescents’ and young adults’ efficacy and planning for sun protection – a need also identified in the Delphi guideline which states:

‘Sun protection programs for this target group need to promote their perceived self-efficacy for sun protection, by showing how sun protection can fit into current lifestyle and fashion choices, and offering specific strategies to incorporate sun protection into their daily lives’

Yet there were few interventions noted in the systematic review where the target group were taught specific planning skills for using sun protection, or skills to improve their self-efficacy for sun protection. One intervention of note was Jackson (1997) where participants took part in visualisation and planning tasks for sunscreen, and were given advice on the best sunscreens and where to purchase them at lowest cost within their locality – an attempt to realise sun protection intentions into action. While these were only two strategies within the intervention ‘black box’, mediational analyses did find that self-efficacy mediated the program’s effect on intention to sun protect (Jackson and Aiken 2006). Other evidence supports the efficacy of ‘planning’ with De Vries et al. (2006) finding that Belgian adolescents who were frequent users of sunscreen were more likely to indicate that they used action plans related to sunscreen – planning to take sunscreen with them, and planning to use sunscreen when at the beach or pool.

The gap between intentions and action has been noted previously in sun protection research, with Robinson (2004) finding only 9% of the variance in actual sun
protection behaviour accounted for by intentions. The author suggests a need for research on post-intentional behaviours in order to bridge this intention-behaviour gap. However there is a need to identify useful theories and models to assist this. Jones et al. (2001), finding a moderating and mediating influence of planning on sun protection intentions, have called for post-decisional cognitions to be added to current theoretical models. This position is supported by Armitage and Connor (2000) who, in a structured review of social cognition models, suggest that behavioural enactment models such as Gollitzer’s ‘implementation intentions’ (Gollwitzer 1993) and Bagozzi’s Goal Theory (Bagozzi 1992; Bagozzi 1993) provide additional variables which can mediate the intentions to behaviour relationship, significantly increasing the proportion of variance explained. Previous work on the intention-behaviour gap in physical activity, based on these models, has explored concepts of: action planning (‘the process of linking goal-directed behaviours to certain environmental cues by specifying when, where, and how to act’) (Sniehotta et al. 2005a, pg. 567); coping planning (‘a barrier-focused self-regulation strategy…a mental link between anticipated risk situations and suitable coping responses’) (Sniehotta et al. 2005a, pg.567); and maintenance self-efficacy which is described as the perceived capability to maintain a newly adopted behaviour, develop routines, and cope with unexpected barriers during the maintenance phase (Sniehotta et al. 2005b, pg. 567). These concepts appear equally relevant to sun protection, yet to date, appear not to have been investigated for sun protection behaviour. The high failure rate of ‘good’ sun protection intentions to actualise into adequate sun protection behaviour indicates a need for these, or similar, concepts to be explored for sun protection behaviour.

9.3.7 Message factors

In this project, issues related to message factors were explored via systematic review in terms of the use of tailored message content to specific target groups, the use of secondary detection messages with primary prevention messages, and the use of negative versus positive persuasion appeals (i.e., framing). However, while there is evidence of a continuing field of research being conducted in relation to message factors and sun protection (Cody and Lee 1990; Rothman et al. 1993; Prentice-Dunn
et al. 1997; Buller et al. 1998; Stephenson and Witte 1998; Detweiler et al. 1999; Greene and Brinn 2003; Robinson 2004; McMath and Prentic-Dunn 2005), none of this research was included in the systematic review because it did not involve adolescent or young adult populations or used outcomes that recorded intentions to sun protect rather than actual behaviour. Recommendations related to message factors were not included in the final consensus of recommendations, despite a number of message recommendations being put forth in the initial Delphi rounds. Recommendations included in the early Delphi rounds addressed the issues of: the use of peers or people close in age for spokespeople; not preaching or coming out too strongly against tanning due to dangers of reactance; not trying to be ‘cool’; using new ‘news’ to cut through clutter; the need for adequate exposure to a message; the use of emotive appeals or fear appeals; and the increased efficacy of negative appeals over positive appeals. The lack of support for any of these recommendations suggests that the Delphi panel saw these recommendations as less important than those that were finally chosen, and/or that there is still a lack of consensus on the most effective approach for framing of messages for this demographic.

While there is a lack of knowledge surrounding message factors which are appropriate for adolescents and young adults, the use of the Rossiter-Percy Model (Brand Loyalty approach) does provide important additional guidance for the development of messages, by recommending creative execution tactics for ads in all media. As discussed in Chapter Three, the model differentiates execution tactics on the two main communication objectives of brand awareness and brand attitude, recommending differing tactics based on the need for brand recognition and/or brand recall, people’s level of perceived decisional risk (involvement) and the nature of the motivation on which the decision is based, via the Rossiter-Percy grid (Rossiter et al. 2000). While this project has not investigated the use of this grid for adolescent and young adult sun protection audiences, the strong influence of ‘price’ in determining sun protection behaviours, as shown in stage three of this research, does suggest that the methods utilised by advertising theory to maximise ‘buyer’ response should transfer to a sun protection context.
9.4 Conclusion

Sun behaviour is contingent and contextual – its complexity makes it difficult to identify specific strategies that will work across all settings. This project, however, resulted in the development of a framework for social marketers to use when developing sun protection interventions. It also provides a focus for practice and research in a number of areas:

- The re-positioning of sun protection behaviour from a skin cancer prevention behaviour to an appearance and health enhancing behaviour, which fits easily within the lifestyle of adolescents and young adults. This entails further research into appearance-based strategies in ‘real world’ settings, and the investigation of harm minimisation for some segments of the adolescent and young adult sun protection audience.
- The use or building of theory to bridge the gap between intentions to sun protect and actual sun protection behaviour.
- The need for further research on use of Brand Loyalty as a segmentation method. While this project has established Brand Loyalty as a valid segmentation method in terms of identifying groups that differ on key attitudinal variables and are able to be described in terms of age, gender, and skin type, there remains a need to investigate specific segments for insight into the barriers and benefits they perceive for sun protection behaviour, and to apply the model in the development of communication for sun protection audiences.
- The standardisation of methods and measures used in sun protection research and reporting to allow sun protection interventions to be compared on a more equal footing, and to begin to differentiate interventions on their effectiveness. This requires the development of a validated and accepted standardised measure of sun protective behaviour, but also the identification of new methods to incorporate ‘context’ into the reporting of sun protection interventions.

All sun protection interventions would benefit from tailoring to account for differences in individual needs and barriers to sun protection; however, the sun protection guidelines developed through this project contain adolescent- and young adult-specific recommendations which, if followed, should improve the potential for
effective social marketing interventions for this demographic. The guidelines also fit
within public health practice, recommending a holistic approach incorporating policy
and environmental approaches. The key outcome from this project is, therefore, the
sun protection guidelines developed through the Delphi consensus project.
REFERENCES


Centre for Behavioural Research in Cancer (2005a). Sun protection and sunburn incidence of Australian adolescents: Summer 2003-04, A report prepared for:


Thomas, J., A. Harden, A. Oakley, s. Oliver, K. Sutcliffe, R. Rees, g. Brunton and J. Kavanagh (2004). "Integrating qualitative research with trials in systematic reviews." British Medical Journal 328: 1010-1012.


Weinstock, M. A., J. S. Rossi, C. A. Redding and J. E. Maddock (2002). "Randomized Controlled Community Trial of the Efficacy of a


Appendix 1
Data Extraction Form Information Sheet

This data extraction form is the instrument used to systematically collect data from studies to be used in a systematic review of sun protection campaigns. There are 5 sections to the form: part A includes classification and eligibility data; part B includes study and intervention descriptions; part C contains study quality data; part D contains study results. All sections will be filled out separately by 2 reviewers with disagreements between reviewers decided by consensus and referral to the project supervisor.

The following sections provide further explanation of key concepts and aids to decision-making in order to assist reviewers in making consistent and valid judgements on data extraction.

Part A

1. Study population

More than one item may be ticked. General populations would take in any interventions in the general community or interventions that are seen in multiple settings to cover a certain target population. Children 0-12 years; adolescents 12 to 18 years; young adults 18 to 24 years; adults over 18 years. Segments may overlap 2 years either side, but choose group most wholly represented and delineated in outcome measures i.e. 16 to 24 years would come under young adult populations unless outcome measures were reported for 16 to 18, or 16 to 20 years. If outcomes are given for newborns sun protection, such as wearing hats, sunburns then these come under children’s populations even though parents are the ones doing the actions for their children. If outcomes are given for parents sun protection these come also under adult populations.

2. Inclusion criteria

Does the intervention have a main focus of trying to improve sun protection? This can be seen in outcome measures which may look at knowledge, attitudes, intentions or behaviours.

Is the intervention given to improve the sun protection of groups rather one on one individual counselling by a health professional? Some interventions may utilise a one on
one component within a group intervention i.e. screening for skin cancers, but still be focused on group change.

Would the intervention be able to be generalised to other similar populations i.e. children, adults, other beach-goers etc?

If any of the noted behavioural outcomes is measured tick the box. Note that intention to do a behaviour is not a behavioural outcome, check the results to see what was actually measured.

Is there some quantitative measure which can be taken from the behavioural outcomes? If a behavioural outcome is measured but not recorded due to no significant differences being found, this is still taken as a quantitative measure = zero.

3. Exclusion criteria

Not individual counselling by a health professional, i.e. not one on one for more than 50% of intervention.

Not culturally or medically distinct so that the intervention could not be generalised to a wider community i.e. distinct groups could be certain ethnic groups, armed forces, health professionals, people who have had skin cancers removed, people with immune disorders etc.

4. Design of study Definitions adapted from Hawe et al. (2002).

Random-controlled trial- pre and post test with individuals or groups randomised to receive the intervention. Need to have a control group which is equivalent to the intervention group. All other study designs are quasi-experimental. If authors state random allocation through any manner, accept as written and do not interpret the true nature or quality of the randomisation.

Pre and post-test design with control group- participants not randomised into groups. Measurements taken before and after the intervention for both groups.

Single group pre and post-test, no control group. One measurement taken before and one after the intervention.

Post test with comparison group. One measurement taken after intervention in intervention group and compared to a similar group that has not received any intervention.

Single group, post test only- measurement taken after the intervention only.
Time series with single group or with comparison group- lots of measurements taken over a period of time particularly before any intervention occurs, in order to follow size and direction of changes when an intervention occurs.

**Part B**

11. **Theory**

The article should explicitly record what theory or theories were used to guide the intervention, or strongly suggest use of particular theory through the use of names, terms or combinations of terms specific to theories such as:

- Transtheoretical model- ‘stages of change’; ‘Prochaska and DiClemente’
- Health belief model- ‘perceived susceptibility/perceived severity/self-efficacy’;
- Theory of Planned Behaviour or Theory of Reasoned Action- ‘attitudes towards behaviour/subjective norms/behavioural control/behavioural intentions’; ‘Azjen and Fishbein’;
- Social cognitive theory- ‘reciprocal determinism/self-efficacy/outcome expectations/outcome expectancies’; ‘Bandura’
- Diffusion of innovations- ‘innovation/development/dissemination/adoptions/implementation/maintenance’, ‘Rogers’

12. **Formative research**

Formative research is defined as research conducted to assist in analysing the marketing environment, selecting target markets, and developing preliminary strategies (Kotler, Roberto et al. 2002).

The study should explicitly state the use of formative research, focus groups, interviews, with the target audience (or secondary audience, i.e parents) used to develop the intervention.

13. **Segmentation**

State whether segmentation is done on demographic, geographical, psychometric or behavioural divisions. Secondary segmentation is shown when a target group such as children 8 to 10 are segmented into smaller subgroups based on some other factor.

14. **Targeted environmental/social barriers**
Strategies to target environmental barriers could be shade provision, sunscreen provision, policy initiatives, restructuring times to avoid peak UV levels etc. May be implicitly implied through the use of these strategies.

Strategies to target social barriers would be advocacy to magazines re tanned models, interactive learning sessions looking at social norms etc. Should be **explicitly** stated within study.

**15. Targeted audiences**

Has the intervention been directed only at the target audience or caregivers, teachers, role models, authority figures etc?

**16. Settings**

Has the intervention used a ‘settings’ approach i.e. looked at a combination of strategies within that setting, not just one component within a particular area? Just because an intervention is in a defined area, such as a school environment, it is not a settings approach if it just gives an educational component and doesn’t look to a broader context of sun protection within that environment. Use of many channels of dissemination for the same strategy i.e. information giving, is not a settings approach

**17. Tailored message**

Were messages formulated to appeal to individuals within the specific group targeted, after some form of secondary segmentation?

**18. Secondary detection messages**

Should state messages given re detection of skin cancers (by any medium), or participants given examinations to detect skin cancers. If not stated then put ‘no’.

**19. Type of message framing**

A negatively framed message states that something bad will happen if you do or don’t do a certain action, therefore might say ‘if you do this (or don’t do this) you will get skin cancer’. A positively framed message states good things will happen if you do or don’t do certain actions, therefore might say ‘if you do this (or don’t do this you will have good skin, or be healthier’.

**20. Length of intervention**

If intervention has environmental strategies in place for length of intervention, program is considered as ongoing. If ‘one-off’ but unsure of length, approximate i.e < 1 day, < 1
week. State season for pre and post test outcomes in order to judge on recall, or information bias.

**21. Measurement tool for outcomes**

State all tools i.e. self report questionnaire, self report interview, observation by trained observers etc, used to measure changes in the target group’s sun protection behaviours or parent’s behaviours on behalf of their children.

**22. Tools validated?**

Should state measurement tool pilot tested, validated or previously used tool from previous study.

**23. Outcome measures**

Only those measures of behaviour to do with the target groups’ sun protection. Follow-up duration is from end of program to post-test. If environmental strategies in place then put as < 12 weeks follow-up as intervention is ongoing for length of program.
Part C

1. **Were study participants well described?**
   The study population should be described by: how recruited and selected; what were the ages; gender; ethnic composition/or skin type. (Look to Table 1 in most studies, or results section).

2. **Was the intervention well described?**
   The intervention should be described in terms of what was done, how it was delivered, when the population received the intervention; where it was done.

3. **Was the study group appropriate for the research question?**
   Was the study group indicative of the population that the intervention would be generalised to in age, gender, ethnic composition and educational/ socio-economic status.

4. **Were groups or individuals randomly assigned?**
   Were the groups randomly allocated treatment.

5. **Were control and intervention groups comparable?**
   Were there any significant differences between the groups in terms of age, gender, ethnic composition or skin sensitivity?

6. **Were other sources of selection bias unaccounted for?**
   Such as a very low participation /high refusal rate; an all volunteer sample; or extremely restrictive sampling.

7. **Were measurement tools validated?**
   Should report one of the following: consistency checks for self-reports; use of corroborating respondents (i.e. comparing parents with children self-report); reliability checks on observers; use after previous pilot testing; evidence from other studies; discussion on other methods of validating measurement tools.

8. **Were measures taken to control other sources of bias?**
   Blinding of observers, timing of self-report questionnaires for recall bias or social desirability bias, other measures reported by authors.

9. **Was attrition adequately dealt with?**
   Did at least 80% of enrolled participants complete the study? This may be reported as a ‘loss to follow-up’, or ‘drop out’ rate. If the authors do not report greater or equal to 80%
follow-up but conduct an alternative analysis that concluded the high attrition did not affect results then tick ‘Yes’. May not be applicable on some studies reported at community level.

10. Were the chosen outcome measures appropriate?

Do the outcome measures reflect the outcome of interest i.e. do they give direct evidence of a change in sun protective behaviour.

11. Were the statistical tests appropriate?

The authors should report what statistical testing was done, (see tables for statistical tests appropriate for specific data.) A subjective appraisal of study quality is then made on the information recorded on the data form- circle the appropriate level of study quality.

Note: Multiple outcome measures may increase the risk of Type 1 error, measures to guard against this should be stated (Ajetunmobi 2002).

Table A 1: Taken from Ajetunmobi (2002).

<table>
<thead>
<tr>
<th>Testing for difference</th>
<th>Normal continuous data</th>
<th>Skewed continuous data/discrete numerical data/ranked categorical data</th>
<th>Binary categorical data</th>
</tr>
</thead>
<tbody>
<tr>
<td>With one sample</td>
<td>One-sample <em>t</em>-test</td>
<td>Wilcoxon signed rank test</td>
<td>Chi sq test (or Fisher’s exact test)</td>
</tr>
<tr>
<td>Between 2 independent samples</td>
<td><em>t</em>-test</td>
<td>Mann-Whitney U test</td>
<td>Chi sq test (or Fisher’s exact test)</td>
</tr>
<tr>
<td>Between 2 paired samples</td>
<td>Paired <em>t</em>-test</td>
<td>Wilcoxon matched pairs test</td>
<td>McNemar’s test</td>
</tr>
<tr>
<td>Between 3 or more independent samples</td>
<td>ANOVA</td>
<td>Kruskal-Wallis test</td>
<td>Chi sq test</td>
</tr>
<tr>
<td>Between 3 or more paired samples</td>
<td>ANOVA</td>
<td>Friedman test</td>
<td>McNemar’s test</td>
</tr>
</tbody>
</table>
Table A 2: Common analysis options for group-randomised trials and conditions for appropriate application Taken from Varnell et al. (2004)

<table>
<thead>
<tr>
<th>Method</th>
<th>Appropriate application in group-randomised trials</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mixed model methods</td>
<td></td>
</tr>
<tr>
<td>Repeated measures ANOVA/ANCOVA</td>
<td>1 or 2 time points</td>
</tr>
<tr>
<td>Random-coefficients approach</td>
<td>&gt; 2 time points</td>
</tr>
<tr>
<td>Generalised estimating equations</td>
<td></td>
</tr>
<tr>
<td>With small sample correction</td>
<td>&lt; 40 groups in analysis</td>
</tr>
<tr>
<td>With no correction</td>
<td>≥ 40 groups in analysis</td>
</tr>
<tr>
<td>2-stage methods (analysis on group means or other summary statistic)</td>
<td>Applied at level of unit of assignment</td>
</tr>
<tr>
<td>Post-hoc correction based on external estimates of ICC</td>
<td>Validity depends on validity of external estimates</td>
</tr>
<tr>
<td>Analysis at subgroup level, ignoring group-level ICC</td>
<td>Not appropriate for GRTs</td>
</tr>
<tr>
<td>Analysis at individual level, ignoring group-level ICC</td>
<td>Not appropriate for GRTs</td>
</tr>
</tbody>
</table>

Note: GRT= group randomised design; ANOVA= analysis of variance; ANCOVA= analysis of covariance; ICC= intraclass correlation
Part D

Results- enter the primary outcome measures that best describe the designated behavioural outcomes stated on the data form: overall sun protection; incidence of sunburn; outdoor tanning behaviour; use of sunscreen; use of hats; use of protective clothing; use of shade/staying out of the sun. If there are multiple measures a decision needs to be made on the most appropriate measure to use with an explanation on your choice (write on back of form). Use figures as stated in the article with standard deviations, p-values etc, and numbers of observations/participants.

References:


Data extraction form for an effectiveness review
Data extraction for health promotion interventions to increase sun protective behaviours

Part A: General information
Identification features of the study

Author ...........................................................................................................................

Article Title ...................................................................................................................

.................................................................................................................................

Source / Year / Volume / Pages / Country of Origin ....................................................

.................................................................................................................................

.................................................................................................................................

Institutional Affiliation (first author) and/or contact address
.................................................................................................................................

.................................................................................................................................

Identification of the reviewer
.................................................................................................................................

Notes
.................................................................................................................................

.................................................................................................................................

.................................................................................................................................

.................................................................................................................................

Verification of study eligibility □ Yes □ No

Why excluded?................................................................................................................

.................................................................................................................................

.................................................................................................................................

.................................................................................................................................
Part A: Study Eligibility

Population characteristics and care setting

1 Study population

- Programs targeting children – general population settings; pre-school and school settings; sports and recreational settings, newborns in health care settings.
- Programs targeting adolescents - general population settings; school settings; sports and recreational settings.
- Programs targeting adults – general population settings; colleges; health service settings; occupational settings; sports and recreational settings.

(Describe).................................................................................................................................

2 Inclusion criteria

- Group or community level
- Primary prevention focus
- Able to generalise to the wider community

(Describe).................................................................................................................................

Behavioural outcomes (any of below)

- Overall sun protective behaviour
  - Incidence of sunburn
  - Outdoor tanning behaviour
  - Use of sunscreens
  - Use of hats/use of sun protective clothing
  - Use of shade/staying out of the sun/time spent outdoors

- Knowledge
- Attitudes
- Intentions
- Quantitative measure of the behavioural outcome effect size

3 Exclusion criteria  □ No

- Individual counseling/health education  □ Single component research
- Culturally distinct  □ Medically distinct

(Describe).................................................................................................................................

4 Design of the study (see information sheet)

- Randomised controlled trial, group or individual
- Quasi-experimental, pre and post test with control/minimal intervention group
- Quasi-experimental, pre and post test with no control/minimal intervention group
☐ Quasi-experimental, post test with control/minimal intervention group
☐ Time series, single group or with comparison group

☐ Non-comparative, post test, no control/minimal intervention group

Part B
Study Description

1. Name of program

2. Target group

3. Recruitment procedures used (participation rates if available)

4. Characteristics of control participants at intervention commencement
   Age
   Sex
   Geographic region
   Other information

5. Characteristics of intervention participants at intervention commencement
   Age
   Sex
   Geographic region
   Other information

6. Were intervention and control groups comparable?
   ☐ Yes ☐ No ☐ No information ☐ N/A

7. Intervention description: Number of intervention arms
   Description of differences between arms

8. Numbers of participants per arm
   Control........... Interv.1........Interv.2...........

9. Was the intervention pilot tested?
10. Other known articles about this intervention?

………………………………………………………………………………………………
………………………………………………………………………………………………
………………………………………………………………………………………………
………………………………………………………………………………………………

11. Theory

☐ Yes ☐ No

(Describe) ……………………………………………………………………………
………………………………………………………………………………………………

12. Formative research

☐ Yes ☐ No

(Describe) ……………………………………………………………………………
………………………………………………………………………………………………

13. Segmentation

☐ Yes ☐ No

(State) ………………………………………………………………………………………

14. Targeted environmental/social barriers ☐ Environmental ☐ Social ☐ No

(Describe) ……………………………………………………………………………
………………………………………………………………………………………………

15. Targeted audiences ☐ Primary ☐ Secondary ☐ Primary and secondary

(Describe) ……………………………………………………………………………
………………………………………………………………………………………………

16. Settings approach ☐ Yes ☐ No

(Describe) ……………………………………………………………………………
………………………………………………………………………………………………

17. Tailored message ☐ Yes ☐ No

(Describe) ……………………………………………………………………………
………………………………………………………………………………………………

18. Secondary detection messages ☐ Yes ☐ No

(Describe) ……………………………………………………………………………
………………………………………………………………………………………………

19. Type of message framing

☐ Negative persuasion ☐ Positive persuasion ☐ No information

20. Dissemination channels (tick all that apply)

☐ Mass media (including television, radio, newspaper and magazines)
☐ Other advertising (web advertising, direct mail, outdoor, point of sale)
☐ Public relations (news coverage, media advocacy, special events)
☐ Print material (brochures, newsletters, posters)
☐ Promotional activities (merchandise, product placement, mascots)
☐ Popular media/edutainment/interactive materials (sons, movies, documentaries, comic strips, CD-ROM)
☐ Education (curricular, lectures)
☐ Other (any strategy not falling within the other groupings) ………………………….

20. Length of intervention
   Pre-test ………………………………………………………………………………………………
   Duration ………………………………………………………………………………………………P
   Post-test ………………………………………………………………………………………………
   Season ………………………………………………………………………………………………

21. Measurement tool/methods for outcomes

………………………………………………………………………………………………………………
………………………………………………………………………………………………………………
………………………………………………………………………………………………………………
………………………………………………………………………………………………………………

22. Measurement tools validated?
(Describe all)
………………………………………………………………………………………………………………
………………………………………………………………………………………………………………
………………………………………………………………………………………………………………
………………………………………………………………………………………………………………

23. Outcomes measured
   Tick boxes

<table>
<thead>
<tr>
<th></th>
<th>Pre-test</th>
<th>Post-test less than 12 weeks</th>
<th>Post-test greater than 12 weeks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Overall sun protection behaviour</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Incidence of sunburn</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Outdoor tanning behaviour</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Use of sunscreen</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Use of hats</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Use of sun protective clothing</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Use of shade/staying out of sun</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
## Part C: Study Quality

<table>
<thead>
<tr>
<th>Descriptions</th>
<th>Yes</th>
<th>Partial</th>
<th>No</th>
<th>Don’t know</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Were study participants well described?</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Describe</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. Was the intervention well described?</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Describe</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Sampling

<table>
<thead>
<tr>
<th>Descriptions</th>
<th>Yes</th>
<th>Partial</th>
<th>No</th>
<th>Don’t know</th>
</tr>
</thead>
<tbody>
<tr>
<td>3. Was study group appropriate for the research question?</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Describe</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4. Were groups or individuals randomly assigned?</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Describe</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5. Were control and intervention groups comparable?</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Describe</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6. Were other sources of selection bias unaccounted for?</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Describe</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Measurement
7. Were measurement tools validated? □ □ □ □ Describe

8. Were measures taken to control other sources of bias? □ □ □ □ Describe

Outcomes

9. Was attrition adequately dealt with? □ □ □ Describe

10. Were the chosen outcome measures appropriate? □ □ □ Describe

11. Were the statistical tests appropriate? □ □ □ Describe

<table>
<thead>
<tr>
<th>Risk of bias (circle)</th>
<th>Interpretation of results</th>
</tr>
</thead>
<tbody>
<tr>
<td>A. Low risk of bias</td>
<td>Plausible bias unlikely to seriously alter the results</td>
</tr>
<tr>
<td>B. Moderate risk of bias</td>
<td>Plausible bias that raises some doubt about results</td>
</tr>
<tr>
<td>C. High risk of bias</td>
<td>Plausible bias that seriously weakens confidence in results</td>
</tr>
</tbody>
</table>

Comments:

........................................................................................................................................
........................................................................................................................................
........................................................................................................................................
## Part D: Results

(Use whatever units are recorded in the study)

<table>
<thead>
<tr>
<th>Pre</th>
<th>Post</th>
<th>Control</th>
<th>Intervention</th>
<th>Other info</th>
</tr>
</thead>
<tbody>
<tr>
<td>diff</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Pre</th>
<th>Post</th>
<th>Control</th>
<th>Intervention</th>
<th>Other info</th>
</tr>
</thead>
<tbody>
<tr>
<td>diff</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Pre</th>
<th>Post</th>
<th>Control</th>
<th>Intervention</th>
<th>Other info</th>
</tr>
</thead>
<tbody>
<tr>
<td>diff</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Appendix 2

Included papers


**Excluded papers**


This thesis reports on a pre and post educational intervention with control group with 30 university students. The evaluation showed increases in knowledge but no changes in skin colour or differences in sunscreen use measured by weighing sunscreen bottles among the intervention participants. This study did not meet inclusion criteria as it did not measure the specified behavioural outcomes.


This study evaluated a national skin cancer prevention campaign in England for women aged 16 to 34. The campaign consisted of magazine advertising, leaflets and public relations activities. The campaign found increases in awareness about skin cancer risk factors and sun protection measures, but no significant changes in sun protection when sunbathing except for an increase in the use of moisturisers and suncreams with UVA and UVB filters. The study did not meet inclusion criteria as it did not give a breakdown of behaviours for the specified demographic group.

This paper reports on a randomised controlled trial of an informational leaflet for young women age 16 to 19 years of age in Britain. Evaluation one week post intervention found increases in knowledge but no changes in beliefs about sunbathing, and a significant downward shift in the intervention group from action to non-action. Self-reported tanning was associated with greater perceived benefits minus the cost of sunbathing. This study did not meet inclusion criteria as no behavioural outcomes were measured post-test.


This study evaluated the effects of either an informational video, emotionally involving video, or a control video on the knowledge, intentions to sun protect, and health beliefs of Australian university students (n = 312). Skin protection intentions increased for both intervention videos, however maintenance of intentions was higher with the emotional video. This study did not meet inclusion criteria as it only measured behavioural intentions.


This paper reports on an educational intervention to increase sun awareness and behaviours among young adolescents. The intervention comprised of teacher led classroom activities and researcher led outdoor activities as part of a field day. Significant changes were seen in knowledge, attitudes and intentions to practice sun protective behaviours. Appearance played a major role in hat preferences for the group. This study does not meet inclusion criteria as no behavioural outcomes were measured.


This paper reports on an appearance-based skin cancer prevention in college-aged women. Intervention individuals recieved a short workbook describing the appearance damaging effects of indoor tanning. Treatment respondents received a short workbook describing the appearance damaging effects of indoor tanning. At two week follow-up respondents had significantly more negative attitudes to indoor tanning and reported fewer intentions to tan. At two month follow-up intervention individuals tanned half as much as control individuals. As this study is concerned with indoor tanning rather than sun protection, in college-aged women, it does not meet inclusion criteria.

A paper from Jackson's 1997 dissertation research which was included in the systematic review.


This report shows the evaluation of a mass media campaign "Me No Fry" aimed at promoting and reinforcing sun protective behaviours among West Australians aged 12 to 17 years. Amongst respondents who were aware of the ad, 38% reported they were more likely to use sun protection and 30% reported they were more likely to check their skin regularly. As the report does not present baseline results it does not meet the criteria for review.


As Jalleh and Donovan 2001, presenting the second years findings of the "Me No Fry" campaign.


This paper reports on a program to increase secondary schools student’s awareness of the need for sun safety behaviours in pre-school children. The students were part of a vocational study program. Two lessons on sun protection were given by a specialist in cancer prevention. Testing immediately post intervention found positive changes in attitudes to tanning for the secondary students and improved attitudes towards the sun protection of pre-school children. This study did not meet inclusion criteria due to the lack of measured behavioural outcomes.


This paper reports on an experiment to compare the effectiveness of health-based versus appearance-based messages (essays) on university students' intentions to protect the skin from the sun. One essay described the health risks of excessive sun exposure, one discussed the deleterious effects of tanning on physical appearance, and a control essay described the process by which tanning occurs. The study found that the appearance-based essay was most effective in promoting intentions to practice sun-safe behaviours, primarily among those low in appearance motivation. This study did not meet inclusion criteria as it only measured intentions.


This paper reports on process evaluation of the "Choose Your Cover" sun protection program aimed at adolescents and young adults. The invention was based on Social
Cognitive Theory and the Theory of Planned Behaviour and consisted of public service announcements on television and radio, print ads and brochures as well as employing news and entertainment media to promote the program. As this paper only reports process evaluation it did not meet inclusion criteria.

This paper reports on "Project SAFETY" a skin cancer prevention program for incorporation into high school biology. The intervention includes a video which gives examples of skin cancer and melanoma as well as examples of poor sun behaviours, student handouts, hands-on activities and curricular content. Using constructs from the Transtheoretical Model post intervention testing found 64% of students contemplating a change in sun behaviour (contemplation) and 18% ready to change (action). As the study did not measure specified behavioural outcomes, this study did not meet inclusion criteria.

This paper reports on an education program for college and high school students to improve knowledge on skin cancer and sun protection. It consisted of a 30 minute presentation with slides, and question and answer period. Results showed significant increases in knowledge two weeks post intervention. This study did not meet inclusion criteria due to the lack of measured behavioural outcomes.

This paper reports the development, media buy, and evaluation of a South Australian Cancer Council advertising campaign aimed at 17 to 25 year olds- featuring the advertisement "Time Bomb". Evaluation found a high level of recall for the advertisement in the target audience, and reports that 41.7% of those who saw the ad claimed it influenced them to increase their sun protection. The report did not meet study design criteria as it was post test only without a comparison group.

This paper reports an evaluation of a secondary school-based intervention targeted to grade 7 and 8 students. The intervention was developed using the Health Belief Model as a theoretical framework, and was given in one 45 minute session and included a teacher manual, comic figure transparencies, a video and instructions on sun protection for the children to take home. Pre and post-test found increased knowledge but no significant changes in attitudes to sunbathing or tanning. The effect of the intervention on stages of change was primarily a progression from precontemplation to contemplation. This study
did not meet inclusion criteria as there were no designated behavioural outcomes reported, rather outcomes were reported as a progression through the stages of change model.


This paper describes a skin cancer prevention program targeting young beachgoers using young research assistants as peer educators. The peer educators collected survey information while modelling sun protective clothing. This study does not meet inclusion criteria due to a post-test only design, and lack of reported behavioural outcomes.


This paper describes development of the Hunter Region Health Promoting Schools Project in New South Wales. The authors present barriers to, and difficulties in implementing the project in the secondary school setting. As it does not present the evaluation of the project in terms of behavioural outcomes, it does not meet inclusion criteria.


This paper reports on an initiative to encourage the inclusion of sun protection information in primary school curriculum within a Sydney health district. The initiative increased the proportion of schools with written sun protection policies from 61% to 84%. This study did not meet inclusion criteria due to its lack of behavioural outcomes.


This paper reports on a 2 X 2 appearance-based intervention where participants were randomly assigned to receive information on 1. photoaging and view a UV photo, 2. photoaging information, 3. UV photo, or 4. a control group. It found immediate positive effects on sun protection intentions for all interventions and positive changes in sun protection for the UV information. This paper did not meet inclusion criteria although it included 18 to 25 year olds as the mean age of participants was 35.76.


This paper reports on two appearance-based interventions where college students received a photoaging information intervention, or a UV photo intervention that makes the negative appearance consequences of UV more salient. The experiments found that the UV photo intervention significantly increased intentions to use sunscreen in the future, and the combination of the UV photo and photoaging information resulted in substantially lower reported sunbathing. This study did not meet inclusion criteria as
experiment 1 only measured intentions, and experiment 2 participants had a mean age of 35.28 years.


This RCT trialled an intervention based on Protection Motivation Theory, with lectures, an essay, video clips about a young man who died of melanoma, and discussions for an intervention group, against a wait-listed control group. The intervention group showed increases on PMT variables and intentions at post-test. Did not meet inclusion criteria as it did not measure behavioural outcomes, only intentions.


This paper reports on a study examining the relation between appearance concern and responses to an intervention targeting sunscreen use and suntanning among young adults. It found appearance concern was correlated at post test with perceived vulnerability to the damaging effects of the sun, perceived severity of the damaging effects and perceived rewards of a tan. At one month post test only the association with perceived rewards was still apparent. Appearance concern was not significantly correlated with intentions or change in skin tone. This study did not meet inclusion criteria as it did not report specified behavioural outcomes.


This paper reports on a brief secondary school intervention designed to increase student’s knowledge and preventive attitudes about skin cancer in Chicago suburban schools. The intervention was a 45 minute session with a 12 minute video, worksheet and discussion. It found the intervention significantly increased knowledge and perceived susceptibility to skin cancer but not behavioural intentions. As the study does not report behavioural outcomes, it does not meet inclusion criteria.


This article describes the social, political, economic, and organizational context within which the Slip! Slop! Slap! campaign was developed in Victoria during 1980 to 2000, and it's evolution to it's current form. It sees the success of the two programs as having been built on two key foundations: the vital integration of research and evaluation, on one hand, and a strong basis of consistency and continuity, on the other. As it is not an evaluative study it does not meet inclusion criteria.

This paper describes a 2 year randomized controlled trial featuring an office-based assessment of sun protection behaviours followed by stage-based counselling from a primary care provider. The intervention found more adolescents in the intervention group moved into action or maintenance stages than control group participants (odds ratio 1.74, C.I. 1.13-2.68). This paper was not included as the intervention was individual counselling.


This paper discusses the use of the internet to communicate sun-safety messages to teenagers. Focus groups in the UK and Australia, and in-depth interviews with UK teenagers were used to explore their experience of the internet and their opinions on its potential as a channel for promoting sun safety. As this study did not evaluate any intervention, it did not meet inclusion criteria.


This paper reports on an experiment based on Protection Motivation Theory, comparing the effectiveness of appearance-based messages focusing on the benefits of tanning and the efficacy of preventive measures on students intentions to protect themselves against sun-induced skin damage. It found subjects low in appearance concern expressed greater intentions to take precautionary measures than those high in appearance concern. Also low benefits of tanning message produced greater intentions to take precautions than did the high benefits message. The study did not meet inclusion criteria as it did not report behavioural outcomes.


This paper reports on computer-based interventions using the Transtheoretical Model that allow individualised programs. This has been trialled on a variety of problems in adolescents such as smoking cessation and sun protection behaviours. The paper did not evaluate these interventions and did not therefore meet inclusion criteria.


This paper reports on a randomised trial comparing two dissemination strategies in promoting the adoption of comprehensive ‘SunSmart’ skin protection policies and practices in primary and secondary schools in New South Wales. It found a strong intervention effect in both the mail only group (21%) and the mail and staff support group (44%) in primary schools, but not in high schools (6% and 11% respectively). Little relationship was seen between adoption of sun protection policies and actual sun
protection practices in primary and secondary schools. As the study does not report on actual sun protection behaviours of the children it did not meet inclusion criteria.

 This thesis reports on an intervention providing risk communication to 181 individuals from the Junior Lifeguard Program in Los Angeles in a pre and post test controlled evaluation. As it only measured attitudes and perceptions it did not meet inclusion criteria.

 This paper reports on an evaluation of an education program aimed at secondary school children. The intervention consisted of a sun protection leaflet, a workbook containing information about the sun and skin cancer, and a video with a celebrity discussing attitudes to sunbathing and skin cancer with a school class. The pre and post test with control found positive knowledge and attitude changes. This study did not meet inclusion criteria as it did not measure behavioural outcomes.
### Secondary school interventions

<table>
<thead>
<tr>
<th>Study</th>
<th>Study design</th>
<th>n=</th>
<th>Intervention</th>
<th>Theory</th>
<th>Formative research</th>
<th>Segmentation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Buller 2006 Sunny Days, Healthy Ways</td>
<td>RCT</td>
<td>2038/1788</td>
<td>6 curricular X 50 minute lessons to increase perceived personal risk for skin damage and skin cancer, positive outcome expectations, and self-efficacy expectations. Taught key prevention skills, goal setting, monitoring progress, overcoming barriers.</td>
<td>Social Cognitive Theory</td>
<td>Not noted</td>
<td>Age 11 to 15</td>
</tr>
<tr>
<td>Lowe (1999) Skin Cancer and Teenagers (SCAT)</td>
<td>RCT</td>
<td>3, 400</td>
<td>4 to 6, 50 minute classroom lessons utilised participatory learning principles, role playing, student directed activities</td>
<td>Social cognitive theory</td>
<td>Yes- see Lowe (1993)</td>
<td>Age- 13 to 16</td>
</tr>
<tr>
<td>Geller (2002) SunWise School Program</td>
<td>Pre and post</td>
<td>214/188</td>
<td>Curricular sun safety lessons 1 to 2 hours, supplementary activities optional</td>
<td>None stated</td>
<td>None stated</td>
<td>Ages 5 to 12, 13 to 15.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>49 schools</td>
<td>*using 2003a results</td>
<td></td>
<td></td>
<td>No secondary segmentation</td>
</tr>
<tr>
<td>Geller (2005) <em>SunSmart America</em></td>
<td>Pre and post</td>
<td>344/184</td>
<td>Theory and practice orientated curriculum of 7 units</td>
<td>None noted</td>
<td>None noted</td>
<td>15 to 18 year olds</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>No secondary segmentation</td>
</tr>
<tr>
<td>Environmental/social barriers</td>
<td>Targeted audiences</td>
<td>Settings</td>
<td>Tailored message</td>
<td>Secondary detection messages</td>
<td>Type of message frame</td>
<td>Dissemination channels</td>
</tr>
<tr>
<td>-------------------------------</td>
<td>-------------------</td>
<td>---------</td>
<td>------------------</td>
<td>-----------------------------</td>
<td>----------------------</td>
<td>-----------------------</td>
</tr>
<tr>
<td>No</td>
<td>Primary - teachers involved to teach curriculum</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>No info</td>
<td>Education</td>
</tr>
<tr>
<td>Yes, looked at societal images, peer influence</td>
<td>Primary and secondary Parents completed school activities with children</td>
<td>Yes-looked at policy outcomes</td>
<td>Age appropriate but not tailored message</td>
<td>No</td>
<td>Not stated</td>
<td>Education (7) Other (8)</td>
</tr>
<tr>
<td>No- guidelines provided but no school utilised</td>
<td>Primary</td>
<td>Yes- to varying degrees</td>
<td>Age appropriate but not tailored message</td>
<td>No</td>
<td>Not stated</td>
<td>Popular media (6) Education (7)</td>
</tr>
<tr>
<td>No</td>
<td>Primary</td>
<td>No</td>
<td>No</td>
<td>Yes- how to detect skin cancer</td>
<td>Not stated</td>
<td>Education (7)</td>
</tr>
<tr>
<td>Behavioural outcomes</td>
<td>Quality rating</td>
<td>Study participants well described?</td>
<td>Intervention well described?</td>
<td>Study group appropriate?</td>
<td>Random allocation?</td>
<td>Groups comparable?</td>
</tr>
<tr>
<td>----------------------</td>
<td>----------------</td>
<td>------------------------------------</td>
<td>-----------------------------</td>
<td>-------------------------</td>
<td>-------------------</td>
<td>-------------------</td>
</tr>
<tr>
<td>Sun protection diary</td>
<td>High</td>
<td>Yes</td>
<td>Partial</td>
<td>Yes</td>
<td>Yes</td>
<td>Stratified, matched, no significant differences at baseline</td>
</tr>
<tr>
<td>Colorimeter</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Self-report-diary</td>
<td>High</td>
<td>No demographic information</td>
<td>No season</td>
<td>Yes</td>
<td>Yes</td>
<td>No information</td>
</tr>
<tr>
<td>Sun protection behaviour index</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Student self-report</td>
<td>Moderate</td>
<td>Yes</td>
<td>No</td>
<td>Yes</td>
<td>No</td>
<td>No-convenience sample to allocate intervention vs control groups</td>
</tr>
<tr>
<td>Use of sunscreen</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Use of hats</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Use of long-sleeved shirts</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Student self-report</td>
<td>Moderate</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>Use of sunscreen</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Use of hats</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Limitations</td>
<td>Results</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>---------------------------------------------------------------------------</td>
<td>-------------------------------------------------------------------------</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Low parental consent, post test in spring rather than post summer</td>
<td>Estimates for differences, mean ratings, standard errors</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Behaviour composite: Control 3.56 (0.021) Intervention 3.43 (0.020)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Diff -0.13 p value 0.0035 Effect size 0.24 * higher score means worse</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>sun protection</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Lat out in sun to get a tan: Control 1.88 (0.049) Intervention 1.75</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>(0.047) Diff -0.13 p value 0.0974 Effect size 0.14</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Get sunburnt: Control 0.48 (0.047) Intervention 0.42 (0.045) Diff</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>-0.06 p value 0.4222 Effect size 0.06</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Little demographic information or baseline comparisons for study groups,</td>
<td>Mean results out of 100 (SD)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>a composite solar protection score giving no breakdown on behaviours.</td>
<td>&lt; 12 weeks Sun protective behaviour index for Sundays</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Control pre 55.34(22.96), Post (grade 8) 54.62(20.91)p&lt;.001,post(grade</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>10) 54.55(22.26)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Intervention pre 55.29 (23.23), Post (grade 8) 57.63 (21.28), post 54.01</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>(22.82)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>F value 2.45 p value 0.044 N= 3730</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Self-selected sample, little information on schools undertaking</td>
<td>Use sunscreen Pre=12.6%, Post=14.4%, Diff 1.8%</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>supplementary activities, immediate follow-up not indicative of actual</td>
<td>Wear hats: Pre=17.2%, Post=13.2%, Diff=-4.0%</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>behaviour change, no account of ICC</td>
<td>Wear long-sleeved shirt: Pre=10.9%, Post=25.8%, Diff=15.0%</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Control group results reported for grades 4 and 5, therefore not to be</td>
<td>* Significant difference between control and intervention</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>compared with 13 to 15 year olds data</td>
<td>groups for grades 4 and 5 p&lt;0.05</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>No control group, only using one school self selected teachers, high</td>
<td>Use of sunscreen: No change</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>attrition</td>
<td>Use of hats: No change</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Wearing sun protective clothing: Some decrease</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>p=0.03*</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Behaviour composite: Absolute difference</td>
<td>Relative change 3.7%</td>
<td>Small significant changes in sun protective behaviour, small non-significant changes in tanning and sunburn incidence</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tanning: Absolute difference</td>
<td>Relative change 6.9%</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sunburn incidence:</td>
<td>Relative change 12.5%</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sun protective behaviour index</td>
<td>Moderate effects grade 8, no significant effect by Grade 10, follow-up 3 years from baseline</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Absolute change G 8 = 3.06, Absolute change G 10 = -0.49</td>
<td>Relative change G 8 = 44%, Relative change G 10 = -0.9%</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Use of sunscreen:</td>
<td>Use of shirts</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Absolute change = 1.8%</td>
<td>Absolute change = 15.0%</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Relative change = 14%</td>
<td>Relative change = 138%</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Use of hats:</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Absolute change = -4.0%</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Relative change = -23%</td>
<td>Probable significant substantial change in wearing of long sleeved shirts. Small change in use of sunscreen, moderate change in wearing hats, but not significant</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>No information</td>
<td>No effect sunscreen, hats. Decrease in wearing protective clothing.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Study</td>
<td>Study design</td>
<td>n=</td>
<td>Intervention</td>
<td>Theory</td>
<td>Formative research</td>
<td>Segmentation</td>
</tr>
<tr>
<td>-----------------------</td>
<td>-------------------</td>
<td>------------</td>
<td>-------------------------------------------------------------------------------</td>
<td>-----------------</td>
<td>-----------------------------------------------</td>
<td>-----------------------------------</td>
</tr>
<tr>
<td>Ramstack (1986)</td>
<td>Pre and post</td>
<td>696</td>
<td>School curriculum of 6 units, discussion of primary and secondary prevention</td>
<td>None noted</td>
<td>Not with target group but with teachers and education authority</td>
<td>Grades 4 to 8 upper junior high and elementary versions</td>
</tr>
<tr>
<td>USA</td>
<td></td>
<td>Grades 7 and 8</td>
<td>n=289</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hughes (1993)</td>
<td>Post test with comparison</td>
<td>543/466</td>
<td>1. Control 2. Workbook and leaflet 3. A/a plus video 4. A/a plus designed posters 5. A/a plus discussion</td>
<td>None noted</td>
<td>None noted</td>
<td>Age 12 to 16 years No secondary segmentation</td>
</tr>
<tr>
<td>“Sun Cool” UK</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>University research</td>
<td>RCT</td>
<td>133/84</td>
<td>Photoaging information given via 11 minute videotape; UV facial photographs shown with natural light photo 2X2 design- photo/no photo X photoaging information</td>
<td>HBM; PMT; TPB</td>
<td>Not noted</td>
<td>No</td>
</tr>
<tr>
<td>Mahler (2007) USA</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Environmental/ social barriers</td>
<td>Targeted audiences</td>
<td>Settings</td>
<td>Tailored message</td>
<td>Secondary detection messages</td>
<td>Type of message frame</td>
<td>Dissemination channels</td>
</tr>
<tr>
<td>-------------------------------</td>
<td>--------------------</td>
<td>----------</td>
<td>------------------</td>
<td>-----------------------------</td>
<td>----------------------</td>
<td>-----------------------</td>
</tr>
<tr>
<td>Informational only</td>
<td>Primary teachers involved to teach curriculum</td>
<td>No</td>
<td>No</td>
<td>Yes - recognise types of skin cancer</td>
<td>No info</td>
<td>Education (7)</td>
</tr>
<tr>
<td>No</td>
<td>Primary</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>Not stated</td>
<td>Print material (4)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Education (7)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Other (8) - group discussion</td>
</tr>
<tr>
<td>No</td>
<td>Primary</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>Not noted</td>
<td>Popular media (6)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>UV photographs (8)</td>
</tr>
<tr>
<td>Follow-up Results taken *</td>
<td>Behavioural outcomes</td>
<td>Quality rating</td>
<td>Study participants well described?</td>
<td>Intervention well described?</td>
<td>Study group appropriate?</td>
<td>Random allocation?</td>
</tr>
<tr>
<td>---------------------------</td>
<td>-----------------------------------------------------</td>
<td>----------------</td>
<td>-----------------------------------</td>
<td>------------------------------</td>
<td>-------------------------</td>
<td>-------------------</td>
</tr>
<tr>
<td>*Immediate on completion</td>
<td><strong>Self-report Questionnaire</strong></td>
<td>Low</td>
<td>Part- ages, gender, ethnicity, but not in terms of recruitment and selection</td>
<td>No-lack of info on how many schools, length of intervention, when received</td>
<td>Yes</td>
<td>N/A</td>
</tr>
<tr>
<td>2 months</td>
<td><strong>Student self-report</strong></td>
<td>Moderate</td>
<td>No breakdown on groups</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>4 months</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4-5 months</td>
<td><strong>Self-report and spectrophotometry</strong></td>
<td>High</td>
<td>Partial, no breakdown between groups</td>
<td>Yes</td>
<td>Yes, but female skew and volunteer student population limits generalisability</td>
<td>Yes</td>
</tr>
<tr>
<td>1 year</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Other bias accounted?</td>
<td>Limitations</td>
<td>Results</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>-----------------------</td>
<td>-------------</td>
<td>---------</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>No information</td>
<td>No comparison group, lack of information on recruitment, selection or attrition, high risk of bias on tanning if hadn't been through a summer since intervention</td>
<td>Grade 7 and 8 overall behaviour score change $n=289$, $p&lt;0.001$</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>All grades:</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Wearing a hat always Pre=5%, Post=6%, Diff=1%</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Tanning never Pre=38%, Post=40%, Diff=2%</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Wearing protective clothing always Pre=5%, Post=7%, Diff=2%</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Use sunscreen always Pre=5%, Post=12%, Diff=7%</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Possible contamination due to different interventions within one school</td>
<td>No validation of tools, no pre-testing unsure if groups comparable on many factors</td>
<td>No significant difference in behaviour according to teaching group.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Manipulation checks ; check self-report against skin colour</td>
<td>Low sample sizes for follow-ups, female skew, limited generalisability</td>
<td>Mean scores adjusted for baseline (standard error) 4-5 month follow-up</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Tanning: No info 0.9(0.14); Photoaging -0.13(0.16) no photo -0.10 (0.15); Photo 0.06 (0.15) Not significant Incidental exposure:No info 0.22(0.15); Photoaging -0.17(0.16)p&lt;.02; No photo 0.19(0.15); Photo -0.14 (0.15)p=.15 Sun protection index: No info -0.11(0.09); photoaging 0.14(0.10)p=.045; no photo 0.02(0.09); photo 0.02(0.09) Not significant I year follow-up</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Tanning: No info 0.1(0.14); Photoaging -0.12(0.16) No photo -0.24 (0.15); Photo 0.21(0.15) Not significant Incidental exposure:No info 0.28(0.15); Photoaging -0.23(0.16)p&lt;.02; No photo -0.11 (0.15) Photo 0.15 (0.15)p=.29 Sun protection index: No info -0.07(0.09); photoaging -0.02(0.10) not sig; no photo 0.03(0.09); photo -0.05(0.09) Not significant</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Absolute and relative changes:

- Wear hat always: Absolute change=1%, Relative change=20%
- Tan never: Absolute change=2%, Relative change=5.3%
- Protective clothing always: Absolute change=2%, Relative change=40%
- Sunscreen always: Absolute change=7%, Relative change=140%

Small changes in tanning and hat wearing, moderate in wearing protective clothing, substantial change in always using sunscreen. Unsure of individual items significance. Overall significance p<0.001

No changes

No effect on behaviour

4-5 month follow-up * negative change

- Tanning: Absolute change photoaging info =-0.21 Relative change= 23%
- Absolute change photo =0.16; Relative change= 160%*
- Incidental exposure: Absolute change photoaging=-0.39, Relative=-177%
- Absolute change photo =-0.33; Relative change= -173%
- Sun protection index: Absolute change photoaging=0.25; Relative=227%

No change photo.

1 year

- Tanning: Absolute change photoaging info =-0.22 Relative change= 220%
- Absolute change photo =0.45; Relative change= 188%*
- Incidental exposure: Absolute change photoaging=-0.51, Relative=182%
- Absolute change photo =0.26; Relative change= 236%*
- Sun protection index: Absolute change photoaging=0.05; Relative=71%

No change photo.

Substantial significant decreases in incidental sun in those receiving the photoaging information at 4-5 months and 1 year follow-up, significant substantial increases in sun protection at 4-5 months but non-significant at 1 year. *Note non-significant increases in sunbathing and incidental exposure at 1 year follow-up for those viewing a UV photo
<table>
<thead>
<tr>
<th>Study</th>
<th>Study design</th>
<th>n=</th>
<th>Intervention</th>
<th>Theory</th>
<th>Formative research</th>
<th>Segmentation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mahler (2005)</td>
<td>RCT</td>
<td>146</td>
<td>Standard: 12 minute video on photoaging and how to reduce effects of UV exposure, then UV photograph taken to show current skin damage. Enhanced: as above plus given sunless tanner</td>
<td>Theory of Alternative Behaviours</td>
<td>None noted</td>
<td>No</td>
</tr>
<tr>
<td>USA</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bernhardt (2001)</td>
<td>RCT</td>
<td>83</td>
<td>Generic sun protection web page for control group, tailored web page based on perceived involvement, self-efficacy, current behaviour, skin type, and message design preferences.</td>
<td>Social Cognitive Theory Elaboration Likelihood Model, other unspecified communication theories</td>
<td>Focus groups</td>
<td>Based on perceived involvement, self-efficacy, and skin type, and reported behaviours</td>
</tr>
<tr>
<td>USA</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Jackson (1997)</td>
<td>RCT</td>
<td>211</td>
<td>Control- stress reduction intervention Intervention- 35 minute- slides, video, testimonial by melanoma survivor, self-efficacy tasks, pamphlets, videos to tackle social norms- emphasis on skin cancer and photoaging, visualisation task</td>
<td>Theory of Reasoned action, Health Belief Model, Protection Motivation theory, Triandis theory of attitude-behaviour relations</td>
<td>Not noted</td>
<td>Females 18 to 25</td>
</tr>
<tr>
<td>Dissertation</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>USA</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mahler (1997)</td>
<td>Posttest with comparison</td>
<td>110</td>
<td>Control-nothing Intervention 1- 10 minute slide show emphasising sunscreen use to prevent wrinkles and age spots. Intervention 2- 10 minute slide show emphasising sunscreen use to prevent skin cancer</td>
<td>Not explicit, but looking at appearance concern. Measures items from HBM</td>
<td>None noted</td>
<td>No- age only</td>
</tr>
<tr>
<td>USA</td>
<td></td>
<td>62</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Environmental/social barriers</td>
<td>Targeted audiences</td>
<td>Settings</td>
<td>Tailored message</td>
<td>Secondary detection messages</td>
<td>Type of message frame</td>
<td>Dissemination channels</td>
</tr>
<tr>
<td>-------------------------------</td>
<td>-------------------</td>
<td>----------</td>
<td>-----------------</td>
<td>-------------------------------</td>
<td>----------------------</td>
<td>-----------------------</td>
</tr>
<tr>
<td>Yes, sunless tanner as strategy for, enhanced intervention, sunscreen as gift</td>
<td>Primary</td>
<td>No</td>
<td>Yes, tailored message through UV photo</td>
<td>No-not explicit</td>
<td>No info</td>
<td>Video (6) Other (8)-sunless tanner photographs</td>
</tr>
<tr>
<td>Informational only</td>
<td>Primary</td>
<td>No</td>
<td>Yes, web pages tailored on a number of variables from SCT and skin cancer risk</td>
<td>No info</td>
<td>No info</td>
<td>Web page-popular media (6)</td>
</tr>
<tr>
<td>Targeted social norms</td>
<td>Primary</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>Not noted</td>
<td>Print material (4) Popular media (6) Other (8)-visualisation task</td>
</tr>
<tr>
<td>No-sunscreen as gift</td>
<td>Primary</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>No info</td>
<td>Slide show (6)</td>
</tr>
<tr>
<td>Follow-up Results taken</td>
<td>Behavioural outcomes</td>
<td>Quality rating</td>
<td>Study participants well described?</td>
<td>Intervention well described?</td>
<td>Study group appropriate?</td>
<td>Random allocation?</td>
</tr>
<tr>
<td>-------------------------</td>
<td>----------------------</td>
<td>----------------</td>
<td>-------------------------------------</td>
<td>-----------------------------</td>
<td>--------------------------</td>
<td>-------------------</td>
</tr>
<tr>
<td>1 month*</td>
<td><strong>Self-report</strong></td>
<td>High</td>
<td>Partial-age, sex, ethnicity, skin type, no breakdown b/n groups</td>
<td>Partly -no season for Intervention</td>
<td>Skewed to female population 75 to 79% University students</td>
<td>Block randomised</td>
</tr>
<tr>
<td></td>
<td>Hours sunbathing</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Incidental sun protection index</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Use of sunscreen</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4 weeks*</td>
<td><strong>Self-report-web survey</strong></td>
<td>High</td>
<td>Partial-age, sex, race, skin tone but no breakdown b/n groups</td>
<td>20 tailored messages focused on outcomes and self-efficacy of sunscreen use</td>
<td>SI skew to female population 59%, use of university students</td>
<td>Yes</td>
</tr>
<tr>
<td></td>
<td>Use of sunscreen</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Immediate and 2 weeks*</td>
<td><strong>Self-report</strong></td>
<td>High</td>
<td>No breakdown between groups</td>
<td>Partly- no season</td>
<td>Yes- though selected sample- white, female</td>
<td>Yes</td>
</tr>
<tr>
<td></td>
<td>Use of sunscreen, hats, shade for face</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Use of sunscreen, clothing, shade for body over past week</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3 weeks* for hours sunbathed</td>
<td><strong>Self-report</strong></td>
<td>Moderate</td>
<td>Partial-age, gender, ethnicity, but no breakdown b/n groups</td>
<td>No season noted, delivery in groups or individual</td>
<td>Limited generalisability due to female skew and volunteer sample psychology students</td>
<td>Yes</td>
</tr>
<tr>
<td></td>
<td>Hours sunbathed</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td><strong>Spectrometer</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Melanin content</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
### Limitations

<table>
<thead>
<tr>
<th>Limitations</th>
<th>Results as mean (standard deviation) adjusted for covariates</th>
</tr>
</thead>
<tbody>
<tr>
<td>Small sample sizes, lacks power. Limited generalisability due to volunteer</td>
<td>Incidental sun protection: Control n=47, Post=−0.10 (0.84)</td>
</tr>
<tr>
<td>sample. Interviewers blinded, unexpected follow-up.</td>
<td>Intervention 1: n=42, Post= 0.06 (0.87)</td>
</tr>
<tr>
<td>Controlled for baseline differences</td>
<td>Intervention 2: n=14, Post= 0.45 (0.68) p&lt; 0.05</td>
</tr>
<tr>
<td>Small sample, little discussion re validation of survey instrument,</td>
<td>Sunbathing hours: Control n=47, Post= 1.42 (3.73)</td>
</tr>
<tr>
<td>volunteer sample, and slight female skew. Does not report actual figures</td>
<td>Intervention 1: n=42, post= 2.05 (4.32)</td>
</tr>
<tr>
<td>for behavioural outcomes</td>
<td>Intervention 2: n=14, Post= 0.88 (2.98) NS</td>
</tr>
<tr>
<td>Limited generalisability due to using white, female undergraduate population</td>
<td>No significant differences between groups on sunscreen use</td>
</tr>
<tr>
<td>but useful for research question.</td>
<td></td>
</tr>
<tr>
<td>No standard deviations given for mean score. 44.1% attrition but analysed.</td>
<td></td>
</tr>
<tr>
<td>Small sample, no pre-testing so unsure of levels although random assignment</td>
<td></td>
</tr>
<tr>
<td>should ensure groups the same. Small sample sizes for the intervention</td>
<td></td>
</tr>
<tr>
<td>arms plus age grouping. Spectrometer showed decreased melanin readings but</td>
<td></td>
</tr>
<tr>
<td>not seen as decrease in hours sunbathed, may be due to use of sunscreen</td>
<td></td>
</tr>
<tr>
<td>(not necessarily the gift).</td>
<td></td>
</tr>
</tbody>
</table>

### Results for sun protection previous week, given as mean score

<table>
<thead>
<tr>
<th>Results for sun protection previous week, given as mean score</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Control n=65, Intervention n=73</td>
<td>Hours sunbathed: Control Post = 1.94, Intervention Post = 1.68, NS</td>
</tr>
<tr>
<td>Sunscreen on face: Control Post = 3.42, Intervention Post = 3.41, NS</td>
<td>Sun protection body: Control Post = 2.88, Intervention Post = 3.60, p&lt; 0.05</td>
</tr>
<tr>
<td>Hat use: Control Post = 1.57, Intervention post = 1.55, NS</td>
<td>Protective clothing: Control Post = 1.69, Intervention Post = 1.82, NS</td>
</tr>
<tr>
<td>Use of shade: Control Post = 2.75, Intervention post = 3.33, NS</td>
<td>Sunbathing: n=62 Mean hours bathed (SD)</td>
</tr>
<tr>
<td></td>
<td>Control Post = 1.43 (4.42)</td>
</tr>
<tr>
<td></td>
<td>Photaging intervention Post = 1.67 (3.00)</td>
</tr>
<tr>
<td></td>
<td>Skin cancer intervention Post= 2.97 (4.51)</td>
</tr>
<tr>
<td></td>
<td>No significant differences</td>
</tr>
</tbody>
</table>
Negative effects on hours sunbathed.

Not significant.

People in photoaging component more likely to tell friends they used in message, p<0.05.

Skin cancer intervention: absolute change = 1.54 Relative change = 108%

Small to moderate changes overall sun protection, non-significant small decreases in sunbathing.

Incidental sun protection (sunscreen use when not sunbathing):

Absolute change I1 = 0.16 Relative change=160%
Absolute change I2 = 0.55 relative change=550%

Substantial, significant change in use of sunscreen when not sunbathing for intervention against control groups. Increased sunbathing in I1, decreased in I2 but not significant. Low power to detect changes.

Hours spent sunbathing:

Absolute change I1 = 0.63 Relative change= 44%*
Absolute change I2 = -0.54 Relative change=-38%

No changes

No behavioural outcomes, useful for message design as higher percentage read web page in intervention group.

Hours sunbathed: Absolute change= -0.26 Relative change= -13%
Sun protection face: Absolute change= 0.43 , Relative change=11%
Hat use: Absolute change= -0.02 Relative change= -1%*
Sun protection body: Absolute change=0.72 ,Relative change=25%
Protective clothing use: Absolute change=0.13 Relative change= 8%
Use of shade: Absolute change= 0.58 Relative change=21%

Photoaging intervention: Absolute change=0.24 Relative change=17%*
Skin cancer intervention: absolute change = 1.54 Relative change = 108%*

* negative change
<table>
<thead>
<tr>
<th>Study</th>
<th>Study design</th>
<th>n=</th>
<th>Intervention</th>
<th>Theory</th>
<th>Formative research</th>
<th>Segmentation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dukeshire (1996)</td>
<td>Post test with control</td>
<td>120/100</td>
<td>3.5 minute audio-visual presentation 1. High fear appeal</td>
<td>Theory of Reasoned Action, revised</td>
<td>None noted</td>
<td>No- undergraduates</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>2. Low fear appeal.</td>
<td>Protection Motivation Theory</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Control-no appeal</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Pre and post with control</td>
<td>3.5 minute slide or overhead</td>
<td>As above</td>
<td>No</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>presentation with high fear and enhancer, enhancer only, information only or control.</td>
<td></td>
<td>Not noted</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>131/</td>
<td>Pre and post with control</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>36 High fear appeal/ Low fear appeal</td>
<td>Theory of Reasoned Action, revised</td>
<td>Not noted</td>
<td>Segmented on sunbathing behaviour</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Enhancer/No enhancer</td>
<td>Protection Motivation Theory</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Control</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>in 2 X 2 design and control</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Environmental/social barriers</td>
<td>Targeted audiences</td>
<td>Settings</td>
<td>Tailored message</td>
<td>Secondary detection messages</td>
<td>Type of message frame</td>
<td>Dissemination channels</td>
</tr>
<tr>
<td>-------------------------------</td>
<td>-------------------</td>
<td>----------</td>
<td>-----------------</td>
<td>-----------------------------</td>
<td>-----------------------</td>
<td>-----------------------</td>
</tr>
<tr>
<td>No</td>
<td>Primary</td>
<td>No</td>
<td>No</td>
<td>Yes- advice to be vigilant in looking for warning signs</td>
<td>Not noted</td>
<td>Print material (4)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Audio-visual materials (6)</td>
</tr>
<tr>
<td>No</td>
<td>Primary</td>
<td>No</td>
<td>No</td>
<td>As above</td>
<td>Not noted</td>
<td>As above</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>No</td>
<td>Primary</td>
<td>No</td>
<td>No</td>
<td>Yes</td>
<td>No info</td>
<td>Print material (4)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Audio-visual materials (6)</td>
</tr>
<tr>
<td>Follow-up Results taken</td>
<td>Behavioural outcomes</td>
<td>Quality rating</td>
<td>Study participants well described?</td>
<td>Intervention well described?</td>
<td>Study group appropriate?</td>
<td>Random allocation?</td>
</tr>
<tr>
<td>-------------------------</td>
<td>----------------------</td>
<td>----------------</td>
<td>-----------------------------------</td>
<td>-----------------------------</td>
<td>-------------------------</td>
<td>-------------------</td>
</tr>
<tr>
<td>6 to 8 weeks</td>
<td>Sunbathing behaviours Use of sunscreen, hats clothing- put into overall index of sun protection</td>
<td>Moderate</td>
<td>No-no age</td>
<td>Yes</td>
<td>For preliminary research but decreased generalisability</td>
<td>Not noted</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6 to 8 weeks</td>
<td>As above</td>
<td>Moderate</td>
<td>No-no age</td>
<td>Yes</td>
<td>Skewed to female 78%</td>
<td>States booklets given out randomly</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1 month* 10 months*</td>
<td><strong>Self-report</strong> Use of hats, sunscreen, clothing, combined for overall index</td>
<td>Moderate</td>
<td>No age</td>
<td>Yes</td>
<td>Skewed to female</td>
<td>Not noted</td>
</tr>
</tbody>
</table>
Limitations | Results
--- | ---
No pre-testing of sample, uncertain comparability of groups, lack of information on selection, or sample numbers for different interventions. Low power to detect significant change. | No changes noted in behaviour, result figures not reported

High attrition (43-61%) allows some bias, skewed to female population decreases generalisability, questions regards randomness of allocation. Small sample sizes means lack of power to detect significant changes.

| High fear n=22, Pre= 2.89, Post= 2.95 | Enhancer n=14, Pre= 2.34, Post=2.38 | Information only n=9, Pre=3.31, Post=3.67 |
| Control n=9, Pre= 2.96, Post= 2.78 | | |

Wearing hats

| Control n=9, Pre= 1.88, Post= 1.33 | Enhancer n=14, Pre=1.84, Post=2.38 | Information only n=9, Pre=2.21, Post=2.56 |
| High fear n=22, Pre= 1.98, Post= 2.24 | | |

Volunteer sample, no blinding of post survey interviewers, no comment on selection and high attrition at 58%. Skewed to female population. Low power to detect significant change.

| Low fear n=26 Pre=2.48, Post1=2.74, Post2= 2.29 | Low fear n=26 Pre=2.38,Post1=2.60, Post2=2.46 |

Mean scores (unadjusted)

| Sunscreen use during outside activities: |
| Control n=9, | Pre= 2.41, Post1=3.23,Post2= 3.11 |
| High fear n=22, Pre= 2.59, Post1=3.40,Post2= 2.59 |
| Low fear=26, Pre= 2.91, Post1=3.62, Post=3.15 |

Overall sun protection

| Control n=9, Pre= 2.56, Post= 1.56 |
| High fear n=22, Pre= 2.24, Post= 2.43 |
| Enhancer n=14, Pre=2.06, Post=2.08 |
| Information only n=9, Pre=2.31, Post=2.11 |

Wearing protective clothing

* All non-significant
Absolute change $\Delta I - \Delta C$; Relative change $\Delta I/I_{pre} - \Delta C/C_{pre}$

<table>
<thead>
<tr>
<th>No Change</th>
<th>Small effect $&gt;1%$ to $20%$; Mod effect $20%$ to $100%$; Sub $&gt;100%$</th>
<th>No effect on behaviour</th>
</tr>
</thead>
</table>

Sunscreen use: High fear
- Absolute change$=0.24$ Relative change$=8\%$
- Enhancer Absolute change$=0.22$ Relative change$=8\%$
- Information Absolute change$=0.54$ Relative change$=17\%$

Hats use: High fear
- Absolute change$=0.81$ Relative change$=42\%$
- Enhancer Absolute change$=1.09$ Relative change$=59\%$
- Information Absolute change$=0.9$ Relative change$=45\%$

Clothing: High fear
- Absolute change$=1.19$ Relative change$=48\%$
- Enhancer Absolute change$=1.02$ Relative change$=40\%$
- Information Absolute change$=0.8$ Relative change$=38\%$

Overall SP: High fear
- Absolute change$=2.24$ Relative change$=31\%$
- Enhancer Absolute change$=2.33$ Relative change$=33\%$
- Information Absolute change$=2.21$ Relative change$=29\%$

I month

Use of sunscreen: High fear
- Absolute change$=-1.01$ Relative change$=-44\%$
- Low fear Absolute change$=-1.11$ Relative change$=-51\%$

Use of hats: High fear
- Absolute change$=0.06$ Relative change$=1.3\%$
- Low fear Absolute change$=0.02$ Relative change$=0.1\%$

Use of clothing: High fear
- Absolute change$=-0.06$ Relative change$=7\%$
- Low fear Absolute change$=-0.42$ Relative change$=-29\%$

Overall sun protection: High fear
- Absolute change$=1.17$ Relative change$=1.2\%$
- Low fear Absolute change$=-0.27$ Relative change$=-6\%$

10 months

Use of sunscreen: High fear
- Absolute change$=-0.7$ Relative change$=-29\%$
- Low fear Absolute change$=-0.46$ Relative change$=-21\%$

Use of hats: High fear
- Absolute change$=-0.57$ Relative change$=-25\%$
- Low fear Absolute change$=-0.3$ Relative change$=-25\%$

Use of clothing: High fear
- Absolute change$=-0.16$ Relative change$=-9\%$
- Low fear Absolute change$=-0.12$ Relative change$=-6\%$

Overall sun protection: High fear
- Absolute change$=1.22$ Relative change$=-19\%$
- Low fear Absolute change$=-0.62$ Relative change$=-10\%$

Moderate changes in hat and clothing use, and overall sun protection, small change in sunscreen use for all intervention groups compared to control. No changes are significant.

Negative changes sunscreen, use of clothing, overall sun protection (low fear condition), but not significant

Small to moderate negative changes with high fear slightly more negative but not significant
### Tourist/recreational setting

<table>
<thead>
<tr>
<th>Study</th>
<th>Study design</th>
<th>n=</th>
<th>Intervention</th>
<th>Theory</th>
<th>Formative research</th>
<th>Segmentation</th>
<th>Environmental/social barriers</th>
</tr>
</thead>
<tbody>
<tr>
<td>USA</td>
<td>16 to 24 yrs</td>
<td>n=821</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Novick (1997)</td>
<td>Time series</td>
<td>30</td>
<td>Day camp participants-photographs taken of all girls Controls left untouched, Intervention 1 photos aged 25 years, Intervention 2 photos aged and lesions added</td>
<td>No theory but strategies aimed at appearance concern and optimistic bias</td>
<td>None noted</td>
<td>Age and gender females 13 to 18 years</td>
<td>Sunscreen given</td>
</tr>
<tr>
<td>USA</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lombard (1991)</td>
<td>Time series</td>
<td>2 pools</td>
<td>Each pool received 5 components-posters on sun protection, information fliers for adults and children, feedback via posters on percent of patrons performing behaviours, modelling of protective behaviours by lifeguards, commitment raffle</td>
<td>Social Cognitive Theory</td>
<td>Yes, interviews patrons, staff, management</td>
<td>Age 1-17 years, 18 and older</td>
<td>Sunscreen provision</td>
</tr>
<tr>
<td>USA</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Targeted audiences</td>
<td>Settings</td>
<td>Tailored message</td>
<td>Secondary detection messages</td>
<td>Type of message frame</td>
<td>Dissemination channels</td>
<td>Length of intervention</td>
<td>Follow-up Results taken *</td>
</tr>
<tr>
<td>---------------------------------</td>
<td>---------------</td>
<td>------------------</td>
<td>-----------------------------</td>
<td>-----------------------</td>
<td>-------------------------------------------------------------</td>
<td>------------------------</td>
<td>-------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Primary</td>
<td>No</td>
<td>Feedback and photos</td>
<td>No</td>
<td>No info</td>
<td>Print material (4) Other (8)- written and verbal feedback</td>
<td>12 months</td>
<td>12 months (24 months from baseline)</td>
</tr>
<tr>
<td>Primary</td>
<td>No</td>
<td>Tailored photos</td>
<td>No</td>
<td>Not noted</td>
<td>Other (8)- photos</td>
<td>One-off</td>
<td>3 follow-up over next 3 weeks Take final result*</td>
</tr>
<tr>
<td>Primary and secondary via</td>
<td>Yes- a number of strategies within one setting</td>
<td>No, although general feedback</td>
<td>No</td>
<td>Positive persuasion</td>
<td>Print material (4) Other(8)- role modelling, feedback posters, commitment cards/raffle</td>
<td>21 to 42 days</td>
<td>Continual testing through program</td>
</tr>
<tr>
<td>Behavioural outcomes</td>
<td>Quality rating</td>
<td>Study participants well described?</td>
<td>Intervention well described?</td>
<td>Study group appropriate?</td>
<td>Random allocation?</td>
<td>Groups comparable?</td>
<td>Other bias accounted?</td>
</tr>
<tr>
<td>----------------------</td>
<td>----------------</td>
<td>----------------------------------</td>
<td>----------------------------</td>
<td>-------------------------</td>
<td>-------------------</td>
<td>------------------</td>
<td>---------------------</td>
</tr>
<tr>
<td><strong>Self-report</strong></td>
<td>Moderate</td>
<td>Partial - previous reports but no breakdown b/n groups</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>No significant differences stated by authors</td>
<td>Partial, good initial participation rates, trained interviewers, but no checks self-report data</td>
</tr>
<tr>
<td>Sun protection behaviour scale, stage of change</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Self-report weekly logs</strong></td>
<td>Moderate</td>
<td>Female, white, 13 to 18 No breakdown b/n groups</td>
<td>Yes</td>
<td>Partial - small, sample size</td>
<td>Yes</td>
<td>No significant differences in sunscreen use</td>
<td>Use of daily log to lessen recall bias, use of peer collectors so didn't change behaviour due to monitoring, but no info refusal rates</td>
</tr>
<tr>
<td>sunscreen use time in sun</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Observer report</strong></td>
<td>Moderate</td>
<td>No. Pools taken as entities, but similar on demographics, location, and amount of shade</td>
<td>Yes</td>
<td>Yes, but dividing children and adolescents would be more appropriate</td>
<td>N/A</td>
<td>N/A</td>
<td>Yes, checks on weather and temp.</td>
</tr>
<tr>
<td>Behavioural mapping observing use of shade, shirts, hats, any one behaviour, any two behaviours</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
### Limitations

38% attrition with non-completers having lower baseline sun protective behaviours, may lead to inflated effect size

Unvalidated measurement tools, Poor reporting of results, limited generalisability due to mid-high SES, white, female sample. Small sample. Time in sun not useful as no control over job requirements

### Results

Overall sun protection behaviour score: for ages 16 to 24

- **Control** Pre=2.46(0.78), Post=2.71(0.79), Diff=0.25
- **Intervention** Pre=2.47(0.81), Post=2.95(0.84), Diff=0.48 p=0.004

Use of sunscreen over experimental period

- Control= 24%, Intervention1= 50%, Intervention2=87%
  
  p=0.000

Use of shade questions equivalence of groups or environment.

- Pool 1 baseline observations=15, intervention observations=41
  - Children use of shade Baseline=10.0%, Intervention=45.3%
  - Children use of shirts Baseline=21.0%, Intervention=31.6%
  - Pool 2 Baseline observations=32, intervention observations=21
  - Children use of hats Baseline=3.0%, Intervention=4.8%; Any 2 behaviours Base=6.3%, Interv.=24.7%
  - Children use of shade Baseline=15.6%, Intervention=41.2%
  - Children use of shirts baseline=22.6%, intervention=36.3%
  - Children use of hats Baseline=3.7%, Intervention=7.1%; Any 2 behaviours Base=6.6%, Interv.=29.1%
Absolute change $\Delta I - \Delta C$ ; Relative change $\Delta I/I_{pre} - \Delta C/C_{pre}$

<table>
<thead>
<tr>
<th></th>
<th>Small effect &gt; 1% to 20%; Mod effect 20% to 100%; Sub&gt;100%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Absolute change =$0.23$ ; Relative change$= 9.3%$</td>
<td>Small significant effect on overall sun protective behaviour at long term follow-up. Note greater effect on 16 to 24 years than older groups.</td>
</tr>
</tbody>
</table>

- **Intervention1** Absolute change=$26\%$, Relative change=$108\%$
- **Intervention2** Absolute change=$63\%$, relative change=$262.5\%$

Substantial changes in sunscreen use during 2.5 weeks following intervention. Biggest increases in first week post intervention.

**Pool 1: Overall sun protect.**
- Absolute$=18.3\%$, Relative$=290\%$
- Shade use: Absolute$=35.3\%$, Relative$=355.0\%$
- Shirt use: Absolute$=10.6\%$, Relative$=50.5\%$
- Hat use: Absolute$=1.8\%$, Relative$=60.0\%$

**Pool 2: Overall sun protect.**
- Absolute$=22.5\%$, Relative$=340.9\%$
- Shade use: Absolute$=25.6\%$, Relative$=164.1\%$
- Shirt use: Absolute$=13.7\%$, Relative$=60.6\%$
- Hat use: Absolute$=3.4\%$, Relative$=91.9\%$

Substantial increases in overall sun protection (use of 2 behaviours), and shade use at both pools, moderate increases in shirt and hat use at both pools.
<table>
<thead>
<tr>
<th>Study</th>
<th>Study design</th>
<th>n=</th>
<th>Intervention</th>
<th>Theory</th>
<th>Formative research</th>
</tr>
</thead>
<tbody>
<tr>
<td>McGee (1992)</td>
<td>Pre and post</td>
<td>286/345</td>
<td>Media advertising to increase awareness of melanoma and promote the use of sun protection</td>
<td>None noted</td>
<td>None noted</td>
</tr>
<tr>
<td>New Zealand</td>
<td>X-sectional surveys</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hill (2002) &quot;SunSmart&quot; Australia</td>
<td>X-sectional surveys 1988 weekly surveys taken as baseline so could be seen as time series, however results given as pre and post</td>
<td>1655/1376</td>
<td>Mass media, outdoor advertising, teaching resources for schools, looking at school policy, advocacy for shade at recreation areas, working with unions for sun protection guidelines for workers, pressure to decrease sunscreen price, pressure on magazines and fashion houses to promote hats and sun protect, clothing, sponsorships for 1988-1990</td>
<td>Stages of change and other social-cognitive theories</td>
<td>Focus groups-see SunSmart Evaluation Series No. 1.</td>
</tr>
<tr>
<td>Dobbinson (2004) &quot;SunSmart&quot; Australia</td>
<td>X-sectional surveys * baseline survey 1999 with weekly summer tracking surveys, last survey results taken</td>
<td>1406/1426</td>
<td>Continuation of SunSmart campaign as above plus new advertisement &quot;Time Bomb&quot; for years 1999-2001</td>
<td>Stages of change and other social-cognitive theories</td>
<td>Youth advisory committee-see SunSmart No.6</td>
</tr>
<tr>
<td>Jalleh (1999) &quot;Sun Smart West Aussies&quot; Australia</td>
<td>*Pre and post X-sectional surveys * baseline survey, then 6 fortnightly surveys, taken last survey results</td>
<td>200/100</td>
<td>Summer media campaign with &quot;How to remove a skin cancer&quot; ad, plus local media competition &quot;Spot the Sun Smart West Aussie&quot;</td>
<td>Not noted</td>
<td>None noted</td>
</tr>
<tr>
<td>Segmentation</td>
<td>Environmental/social barriers</td>
<td>Targeted audiences</td>
<td>Settings</td>
<td>Tailored message</td>
<td>Secondary detection messages</td>
</tr>
<tr>
<td>--------------</td>
<td>-------------------------------</td>
<td>--------------------</td>
<td>---------</td>
<td>----------------</td>
<td>-----------------------------</td>
</tr>
<tr>
<td>Age 13 to 15 years</td>
<td>No</td>
<td>Primary</td>
<td>No</td>
<td>No</td>
<td>Melanoma awareness</td>
</tr>
</tbody>
</table>

- All ages though results given for age groups 14-29, 30-49, 50-69, no secondary segmentation discussed but multi-strategy to target different groups

<table>
<thead>
<tr>
<th>Segmentation</th>
<th>Environmental/social barriers</th>
<th>Targeted audiences</th>
<th>Settings</th>
<th>Tailored message</th>
<th>Secondary detection messages</th>
<th>Type of message frame</th>
<th>Dissemination channels</th>
</tr>
</thead>
<tbody>
<tr>
<td>All ages though results given for age groups 14-29, 30-49, 50-69, no secondary segmentation discussed</td>
<td>Yes</td>
<td>Primary and secondary</td>
<td>Yes-state wide</td>
<td>No</td>
<td>No</td>
<td>Not noted</td>
<td>Mass media(1) Education(7) Other (8)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Segmentation</th>
<th>Environmental/social barriers</th>
<th>Targeted audiences</th>
<th>Settings</th>
<th>Tailored message</th>
<th>Secondary detection messages</th>
<th>Type of message frame</th>
<th>Dissemination channels</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ages 18 to 35 years</td>
<td>No</td>
<td>Primary</td>
<td>No- not multi-strategy</td>
<td>No</td>
<td>Yes-evaluated on skin examination</td>
<td>Not noted</td>
<td>Mass media (1)</td>
</tr>
</tbody>
</table>

- Public relations (3) Other (8)
<table>
<thead>
<tr>
<th>Length of intervention</th>
<th>Follow-up</th>
<th>Behavioural outcomes</th>
<th>Quality rating</th>
<th>Study participants well described?</th>
<th>Intervention well described?</th>
<th>Study group appropriate?</th>
<th>Random allocation?</th>
<th>Groups comparable?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Approx 3 months</td>
<td>Immediate*</td>
<td>Self-report</td>
<td>Moderate</td>
<td>No</td>
<td>No</td>
<td>Yes</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Overall sun protection</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Tanning behaviour</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2 X summer approx 3 months</td>
<td>Immediate*</td>
<td>Self-report via phone interview</td>
<td>Moderate</td>
<td>Limited but stratified sample</td>
<td>Yes</td>
<td>Yes</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>Take as ongoing for 2 years as environmental strategies</td>
<td></td>
<td>Sunburn on previous weekend</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Use of sunscreen, hats, percent of body clothed</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Summer ad campaign but ongoing intervention</td>
<td>During summer intervention</td>
<td>Self-report via phone interview</td>
<td>Moderate</td>
<td>Yes-stratified sample</td>
<td>See SunSmart Evaluation Series</td>
<td>Yes</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Sunburn previous weekend</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Use of hats, sunscreen, shirts, staying out of sun</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Summer campaign approx 3 months</td>
<td>During campaign results from last survey used*</td>
<td>Self-report via phone interview</td>
<td>Moderate</td>
<td>Yes</td>
<td>No</td>
<td>Yes</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Sunburn previous weekend</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Use of hats, sunscreen Staying of of sun previous weekend</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Other bias accounted?</td>
<td>Limitations</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>-----------------------</td>
<td>-------------</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Nov pre-test may allow recall bias</td>
<td>No apparent validation of surveys, and timing of pre-survey may allow some bias</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Wording of questionnaire to decrease social desirability and acquiesence, controls for weather</td>
<td>No control group therefore unsure regards influence of secular trends, however this type of community wide intervention has reciprocal influence on secular trends, difficult and maybe inappropriate to try to separate. Further division of 14 to 29 would be useful.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Decreased recall bias with interviews after each weekend</td>
<td>No control group as above. Does not report significance levels for specific age group differences at 1999 compared to 2001.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>? Training of interviewers No information on refusal or participation rates.</td>
<td>No control group therefore cannot be sure of relationship of changes to campaign. Incidence of sunburn and staying out of sun on preceding day strongly influenced by UV index, therefore not useful for trend data unless controlled for UV.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
### Results

<table>
<thead>
<tr>
<th>Sunbathing behaviour: average score, unknown scale</th>
<th>Absolute change ΔI -ΔC ; Relative change ΔI/I pre - ΔC/C pre</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pre=1.8, Post=1.4, Diff=0.4</td>
<td>Tanning: Absolute change=0.4 Relative change=22.2%</td>
</tr>
<tr>
<td>Sun protection scores: average score, unknown scale</td>
<td>Overall sun protection: Absolute=0.4 Relative= 5.9%</td>
</tr>
<tr>
<td>Pre=6.8, Post=7.2, Diff=0.4</td>
<td></td>
</tr>
</tbody>
</table>

Results for 14 to 29 years: Women 1988 n=586 , 1990 n=374; Men 1988 n=676, 1990 n=497

- **Women**
  - Use of hats: 1988=9%, 1990=24% \( p<0.01 \)
  - Use of sunscreen: 1988=16%, 1990=24% NS
  - % body clothed: 1988=0.64, 1990=0.67 \( p<0.01 \)
  - Incidence of sunburn: 1988=9%, 1990=6% NS

- **Men**
  - Use of hats: 1988=19%, 1990= 26% NS
  - Use of sunscreen: 1988= 12% 1990=16% NS
  - % body clothed: 1988=0.66, 1990=0.71 \( p<0.01 \)
  - Incidence of sunburn: 1988=15% 1990=11% NS

Results for years 14 to 29 years 1999 n=1406, 2001 n=1426

- Attempted to get suntan 1999= 24%, 2001=30% \( p<0.01 \) for all ages
- Wore hat in sun 1999= 33%, 2001= 36% (NS for all ages)
- Wore shirt in sun 1999= 15%, 2001=13%* (probable NS)
- Used sunscreen 1999= 34%, 2001= 38%* NS

* taken from total sample as no significant difference for age

Baseline n=200, Survey 6 n=100

* "Always" or "usually" wear hat: Pre=32.0% Post=28.0%
* "Always" or "usually" wear sunscreen: Pre=70.9% Post=62.0%
* "Always" or "usually" wear protective clothing:Pre=62.5% Post=56.0%
* "Always" or "usually" seek shade: Pre=70.5 Post=60.0%

Significance not noted

* not using sunburn or staying out of sun preceding day as more related to UV levels

Absolute change ΔI -ΔC ; Relative change ΔI/I pre - ΔC/C pre

Women:
- Use of hats Absolute =15% Relative= 166.7%
- Use of sunscreen Absolute=8% Relative=50.0%
- Use of clothing Absolute =0.03 Relative=4.7%
- Sunburn Absolute =3% Relative=33%

Men:
- Use of hats Absolute=7% Relative=36.8%
- Use of sunscreen Absolute=4% Relative=33.3%
- Use of clothing Absolute=0.05 Relative=7.6%
- Sunburn Absolute=4% Relative=26.7%

Attempted to get suntan Absolute =6%, Relative =25%

Wore hat in sun Absolute=3%, Relative=9.1%

Wore shirt in sun Absolute= -2%, Relative= -13.3%

Used sunscreen Absolute= 4%, Relative=11.8%

* negative results
Small effect > 1% to 20%; Mod effect 20% to 100%; Sub>100%

Moderate change in tanning, small change in overall sun protection, unknown level of significance

Substantial and significant change in women's wearing of hats, moderate non significant change in sunburn incidence, small and significant change in use of clothing for sun protection, sunscreen positive change but statistically insignificant

Small and significant change in men's use of clothing for sun protection, other positive changes but statistically insignificant

Moderate, significant increase in attempting to get tans. Small, positive changes for wearing hats and sunscreen, and small, negative changes for wearing shirts but not significant

Small, (probably) non significant decreases in use of hats, sunscreen, clothing and shade use.
Karnatz (1993) RCT

- Intervention: pamphlets each week for 3 weeks on dangers of sun exposure, personal risk, feedback
- Setting: secondary
- Audience: Ages 13 to 17
- Segmentation: HBM, TRA
- Feedback: personalized
- Intervention 2: as above plus personalized feedback based on stage of change

Olson et al. (2007) RCT

- Intervention: 10 communication sessions with students to develop Sunscreen Stewardship initiation, SCT, PMT
- Setting: secondary
- Audience: Age: grade 6 to 8
- Segmentation: not mentioned
- Feedback: Dermascan slides, Dermscan viewing
- Intervention 2: as above plus personalized feedback based on stage of change
<table>
<thead>
<tr>
<th>Type of message frame</th>
<th>Dissemination channels</th>
<th>Length of intervention</th>
<th>Follow-up Results taken</th>
<th>Behavioural outcomes</th>
<th>Quality rating</th>
<th>Study participants well described?</th>
<th>Intervention well described?</th>
<th>Study group appropriate?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Not noted</td>
<td>Print material (4)</td>
<td>3 weeks</td>
<td>“follow-up for next 2 weeks”</td>
<td>Self-report weekly logs</td>
<td>High</td>
<td>Partial, no breakdown in groups</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Use of sunscreen</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Use of protective clothing</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Use of shade</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Not stated</td>
<td>Print, promotional activities, popular media, education, Dermascan, role modeling, contests</td>
<td>3 years</td>
<td>1 and 2 years from the start of the intervention, taken as short term</td>
<td>Observation, interview</td>
<td>High</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
</tbody>
</table>
### Limitations and Results

<table>
<thead>
<tr>
<th>Randomised by site</th>
<th>Groups comparable?</th>
<th>Other bias accounted?</th>
<th>Limitations</th>
<th>Results</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
<td>Matched communities</td>
<td>Less than 1% refusal rate, slot work, inter-rater reliability assessed</td>
<td>Low numbers of participants in control groups at follow-up.</td>
<td>Adjusted percentage of BSA covered: Control N=433 BSA 73.7 (1.4), Intervention N=343 BSA 71.8 (1.6) p value &lt;0.01</td>
</tr>
<tr>
<td>No</td>
<td></td>
<td></td>
<td>Low baseline levels for intervention groups.</td>
<td>Mean percent time in shade (SD) Control: Males Pre=0.32 (0.17), Post=0.35 (0.11) Females Pre=0.25 (0.23), Post=0.44 (0.16) Intervention1 Males Pre=0.19 (0.14), Post=0.24 (0.21) Females Pre=0.42 (0.11), Post=0.26 (0.15) Intervention2 Males Pre=0.53 (0.13), Post=0.42 (0.23) Females Pre=0.38 (0.22), Post=0.42 (0.19) Significant gender X condition X time p&lt;0.02</td>
</tr>
<tr>
<td>Randomised by site</td>
<td>No significant differences on sunscreen, unknown for other variables Female clothing low baseline levels for intervention groups.</td>
<td>May be some selection bias of people interested in sun protection although low results don’t indicate this Weekly logs to decrease recall bias Volunteer group, female skew</td>
<td>Volunteer sample with female bias. Low baseline levels for protective clothing in female intervention groups, but does not report on significance of this.</td>
<td>Mean use of protective clothing (SD) Control: Males Pre=0.28 (0.30), Post=0.55 (0.33) Females Pre=0.16 (0.28), Post=0.36 (0.33) Intervention1: Males Pre=0.38 (0.48), Post=0.62 (0.30) Females Pre=0.02 (0.09), Post=0.26 (0.30) Intervention1: Males Pre=0.45 (0.44), Post=0.29 Intervention 2: Pre=56%, Post = 50%; Females Pre=0.04 (0.12), Post=0.28 (0.30) p&lt;0.02 Control vs intervention Significant gender X condition X time p&lt;0.03</td>
</tr>
</tbody>
</table>
Mean use of protective clothing:

<table>
<thead>
<tr>
<th>Intervention</th>
<th>Males Absolute change</th>
<th>Males Relative change</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>-0.01</td>
<td>-33%</td>
</tr>
<tr>
<td>2</td>
<td>-0.43</td>
<td>-132%</td>
</tr>
</tbody>
</table>

Females Absolute change:

<table>
<thead>
<tr>
<th>Intervention</th>
<th>Females Absolute change</th>
<th>Females Relative change</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>0.04</td>
<td>1075%</td>
</tr>
<tr>
<td>2</td>
<td>0.43</td>
<td>475%</td>
</tr>
</tbody>
</table>

Intervention 1 had no significant changes in sunscreen use for males or females.

Intervention 2 saw males decrease sunscreen use by 132% relative change, while females increased by 475%.

Changes in BSA protected:

<table>
<thead>
<tr>
<th>Absolute change</th>
<th>Relative change</th>
</tr>
</thead>
<tbody>
<tr>
<td>11.2</td>
<td>15%</td>
</tr>
</tbody>
</table>

Small significant changes in overall sun protection.
Appendix 4

Proposal for guideline development for social marketing of sun protection programs for adolescents and young adults

The following proposal outlines a process to formulate “best practice” guidelines for the social marketing of sun protection programs for adolescents and young adults. This innovative method of guideline development brings the expertise of practitioners to the forefront of guideline development, whilst still utilizing established methods of evidence confirmation. A number of experts in sun protection, social marketing and health behaviour will be approached to participate, leading to a very informed and diverse range of opinion. This should ensure the process is a worthwhile exercise for all participants, and the resulting guidelines will progress current practice in this field.

Keryn Johnson (PhD candidate)
Centre for Health Behaviour and Communication Research,
University of Wollongong,
Wollongong. NSW. 2522.
Ph: 61 2 4221 5311
E-mail: kmj93@uow.edu.au

Assoc-Prof Sandra Jones
Director: Centre for Health Behaviour and Communication Research,
University of Wollongong.
E-mail: sandraj@uow.edu.au

Prof Don Iverson
Dean: Health and Behavioural Sciences,
University of Wollongong.
E-mail: iverson@uow.edu.au
Proposal outline

Background
There is an increasing recognition of the importance of practice guidelines to assist decision-making in health areas. If they are developed through valid and reliable methods, and seen as relevant to the practitioners that will be using them, the use of such guidelines can potentially: improve outcomes; improve efficiency and optimize value for money; highlight gaps in the evidence for practice; and improve the quality of decision-making within practice.

While specific methods may differ, three components are common to these frameworks: multidisciplinary development, systematic review of the literature, and graded recommendations based on the strength of evidence.

Multidisciplinary development is needed to ensure the guidelines are based on a broad range of knowledge and expertise, and also that they are valued by all members of the team in order to be incorporated successfully into practice.

Systematic review of the literature is necessary in order to minimize bias, and ensure recommendations are based on current evidence.
The grading of recommendations based on the strength of evidence is necessary so that users of the guidelines know how much confidence can be placed on the recommendations. This is done by referral to evidence hierarchy tables (example shown overleaf).
Table 1 SIGN Grading System (Scottish Intercollegiate Guideline Network 2001)

**Levels of evidence**

<table>
<thead>
<tr>
<th>Grade</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1++</td>
<td>High quality meta-analysis, systematic reviews of RCTs, or RCTs with a very low risk of bias</td>
</tr>
<tr>
<td>1+</td>
<td>Well conducted meta-analyses, systematic reviews of RCTs, or RCTs with a low risk of bias</td>
</tr>
<tr>
<td>1-</td>
<td>Meta analyses, systematic reviews of RCTs, or RCTs with a high risk of bias</td>
</tr>
<tr>
<td>2++</td>
<td>High quality systematic reviews of case-control, or cohort, or studies High quality case-control or cohort studies with a low risk of confounding bias or chance, and a moderate probability that the relationship is causal</td>
</tr>
<tr>
<td>2+</td>
<td>Well conducted case-control or cohort studies with a low risk of confounding bias or chance and a moderate possibility that the relationship is causal</td>
</tr>
<tr>
<td>2-</td>
<td>Case control or cohort studies with a high risk of confounding bias or chance, and a significant risk that the relationship is not causal</td>
</tr>
<tr>
<td>3</td>
<td>Non-analytic studies, e.g. case reports, case series</td>
</tr>
<tr>
<td>4</td>
<td>Expert opinion</td>
</tr>
</tbody>
</table>

**Grades of recommendation**

<table>
<thead>
<tr>
<th>Grade</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>At least one meta analysis, systematic review, or RCT rated as 1++, and directly applicable to the target population; or A systematic review of RCTs or a body of evidence consisting principally of studies rated as 1+, directly applicable to the target population, and demonstrating overall consistency of results</td>
</tr>
<tr>
<td>B</td>
<td>A body of evidence including studies rated as 2++, directly applicable to the target population, and demonstrating overall consistency of results; or Extrapolated evidence from studies rated as 1++ or 1+</td>
</tr>
<tr>
<td>C</td>
<td>A body of evidence including studies rated as 2+, directly applicable to the target population and demonstrating overall consistency of results; or Extrapolated evidence from series rated as 2++</td>
</tr>
<tr>
<td>D</td>
<td>Evidence level 3 or 4; or Extrapolated evidence from studies rated as 2+</td>
</tr>
</tbody>
</table>
While the development of guidelines has been largely standardized within a clinical context, a number of debates arise when transferring clinically originated methods into a public health arena. One debate centres on the low rating of much of the evidence due to the difficulty in evaluating public health interventions with randomised controlled trials, which are considered the "gold standard" of medical evidence. This has led the National Health and Medical Research Council (1999) to suggest that researchers should not disadvantage this area by the rigid application of a hierarchy of evidence seen in grading tables, and must recognise that much of the evidence in public health will be of a lower level of rating than evidence required for clinical practice guidelines. The NHMRC advises researchers to still utilise the published grading systems, with this understanding.

Another debate involves the use of systematic review in a public health context. While systematic reviews are seen as an essential component within guideline development, many argue as to the appropriateness of this type of “reductionist” approach which removes the context within which public health interventions are developed and implemented (Tilford 2000). As many public health interventions are strongly influenced by their social context, to disallow or ignore contextual evidence may be to miss valuable insights which aid an understanding of why some interventions “work” and other interventions do not, and how interventions and strategies may need to differ for different populations.

The National Health and Medical Research Council’s Health Advisory Committee (HAC) and National Public Health Partnership (NPHP) sponsored two expert workshops in 1999 to consider the difficulties that arise when using established methods from evidence-based medicine, when evaluating research from public health interventions (Rychetnik and Frommer 2002). The workshops concluded that while established methods of evidence appraisal were a useful starting point for evaluating evidence on all types of public health interventions, these methods should be:
“expanded or adapted to take account of the diversity of public health interventions, the different evaluations that are conducted in public health settings, and the importance of contextual factors in public health research and practice”

(Rychetnik and Frommer 2002, pg. 1).

There is, therefore, a growing appreciation that systematic review of public health interventions should encompass the totality of available evidence, whether quantitative or qualitative, and that methods for guideline development should allow the complexities of public health research and practice to be considered.

**Use of opinion in guideline development**

One of the major sources of information that influence program decisions is that of peer and colleague opinion. However as seen in Table 1, “expert committee reports/opinions and/or clinical opinion of respected authorities” are classed as category 4 evidence carrying a lowest strength of recommendation - D. There is, therefore, a need to bring the expertise of practitioners to the forefront of guideline development, whilst still utilizing established methods of evidence confirmation.

One method of guideline development, recently used by Roddy et al. (2005; 2006) for the establishment of guidelines on the role of exercise in the management of osteoarthritis of the hip or knee, utilizes expert opinion to establish the initial framework for guideline recommendations through Delphi consensus methods, with systematic review used to provide supporting evidence in guiding the strength of recommendations. This method can be seen to have some advantages over more traditional methods of guideline development, where guidelines are developed from evidence in systematic reviews and then refined and graded through group consensus methods, as it allows a broad scope for the initial framework – not influenced by the reductionist approach of systematic review – with more directed evidence retrieval after the third round of consensus. The method further utilizes a new process for determining strength of recommendation (SOR), where the SOR for each recommendation is based on the traditional SOR table as seen in Table 1, and, additionally, on a visual analogue scale (VAS) as judged by the expert
participants. Recommendations are then grouped according to their original SOR and the mean VAS and 95% confidence interval calculated for each group. (An example is shown on page six). The authors state the principle strength of this method is the filling of the gap between expert opinion and research evidence, allowing recommendations to be upgraded beyond that supported by the category of research evidence.

**Proposed method for guideline development**

In order to generate consensus on “best practice” in the use of social marketing for adolescent and young adults’ sun protection, a Delphi survey technique will be utilised. This method can be defined as “a group facilitation technique that seeks to obtain consensus on the opinions of “experts” through a series of structured questionnaires” (Hasson et al. 2000, pg. 1009), and will follow the process as outlined below.

**Identify issue and initiate questionnaire**

- Participants will be sent conclusions from a recent review of sun protection interventions for adolescents and young adults as an orientation to the issue of social marketing for this target group.

- In Round 1 participants will be asked to provide up to 10 key points, based on their knowledge and practical opinion, which they feel are most important in developing social marketing interventions for the primary prevention of skin cancer among adolescents and young adults.

Examples:

1. Celebrities and popular spokespersons can be effective to change social norms (Health Canada 2005, in relation to any social marketing program)

2. Programs should **not** highlight that communication came from an authority, present adult viewpoint, or lecture (Health Canada 2005, in relation to youth programs).

3. Programs should highlight short-term consequences related to sunburn and appearance for this target group.
**Data collection and analysis**

- Responses will be collated and grouped according to similar themes via content analysis, but will not be edited, with the researcher attempting to give a universal description of common themes.
- In Round 2, all Round 1’s list of key points will be distributed to participants. Participants will then be asked to select 10 key points taken from this common list.
- In Round 3, the responses from Round 2 will be listed with descriptive statistics so participants can see where their opinion lies in relation to group, then participants will again choose 10 key points from this list.
- Round 4 will be conducted as round 3, however, responses with less than 25% agreement will be rejected, and responses with 75% agreement will be accepted for final recommendations. The 25% to 75% responses will be presented to participants for further consensus in Round 5.
- There will be a limit of five rounds with those responses reaching the highest level of agreement selected.

**Assess evidence for recommendations**

- The researcher will determine the evidence-base to support each recommendation via systematic review, or other extrapolated evidence.

**Grading of evidence**

- The list of recommendations will be sent to participants with available evidence, and traditional SOR grading provided.
- Each participant will be asked to indicate how strongly they rate each recommendation based on all aspects relating to their knowledge and practical opinion, as well as the research evidence. This will be recorded using a 10cm visual analogue scale (VAS) anchored with two descriptors labeled “not recommended” at 0cm and “fully recommended” at 10cm.
• The mean VAS and standard deviation will be calculated for each recommendation, and presented via a table with groupings according to original SOR, mean VAS, and 95% confidence interval. An example of two guidelines for exercise in OA patients is shown below (taken from Roddy et al. 2005, pg. 350). Note that Roddy et al. 2005 use a hierarchy of evidence table taken from Shekelle et al. (1999) whereas this project will utilize the SIGN Grading System shown previously.

<table>
<thead>
<tr>
<th>Recommendation</th>
<th>Category of evidence (1-4)</th>
<th>Strength of recommendation (VAS) – Mean (SD) cms</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Both strengthening and aerobic exercise can reduce pain and improve function and health status in patients with knee and hip OA</td>
<td>Knee 1B Hip 4</td>
<td>A (extrapolated from knee OA) 8.9 (1.1) 6.3 (2.1)</td>
</tr>
<tr>
<td>2. There are few contraindications to the prescription of strengthening or aerobic exercise to patients with hip or knee OA</td>
<td>4</td>
<td>C (extrapolated from adverse event data) 8.0 (1.5)</td>
</tr>
</tbody>
</table>

**Other issues**

- Participant’s responses will be anonymous once they have been received by the researcher and will be held without identifying marks, however the researcher will need to identify and track whether participants have returned survey material.

- Participants will be sent the final list of recommendations although they will be requested not to cite the material until it has been published.

- Participants will be acknowledged on any reports or articles originating from the process unless requesting otherwise.
References:


Dear ...............

Thank you for taking the time to examine my project and your possible participation in it. You were identified as an ideal participant because of your expertise in one or more of the following areas: sun protection behaviours, social marketing and behaviour change. Briefly, the project aims to develop evidence-based and/or experienced-based practical recommendations to guide the development of social marketing initiatives for sun protection interventions. A more complete description of the actual project is attached but I thought it would be helpful if I provided you with a synopsis of the project.

The project involves assembling, in a virtual sense, a group of experts in sun protection, social marketing and behaviour change. The first task involves your developing up to 10 ‘bullet points’ which you feel must be considered when developing social marketing initiatives in sun protection directed at adolescents and young adults. Formulation of the ‘bullet points’ is expected to be based on your knowledge of the literature and your practical experiences. This will be followed by four to five Delphi rounds culminating in the creation of a consensus on the most important factors/principles to be considered when developing social marketing initiatives in sun protection directed at adolescents and young adults. The evidence for each recommendation will then be searched for and rated by myself via a traditional Strength of Evidence approach, and then sent to you to additionally rate the evidence via a visual analogue scale (VAS) – where you consider the strength and depth of the research evidence as well as your knowledge and practical experiences in this area. A flow chart illustrating the process and a provisional timetable is provided at the end of this letter.

I expect the above description has resulted in your generating a few questions related to the project. In anticipation of that I have posed and answered a few questions.

- **How time consuming will my participation in the project be?** I do not expect the process will be too time consuming as your generation of the ‘bullet statements’ should be based on what you feel is most important, based on your knowledge of the literature and your experiences. You are not required to do any research or provide references or data to demonstrate justify your ‘bullet statements’.

- **Will the process be anonymous?** Your input will be anonymous. While I need to track who has sent me their key bullet statements, all the bullet statements will be combined into one document with no identifying marks.

- **What do I get out participation?** First, as expected, all participants will be acknowledged in any publications arising from this project (unless they request not to be acknowledged). You will also receive my unpublished review of the relevant literature on sun protection intervention for adolescents and young adults. You will also receive summaries of the evidence that I generate for each of the ‘key bullet statements’ that are identified during the Delphi process. Finally, upon completion of the project you will receive the final report and a soft copy of my PhD thesis. At the same time, the process will, I hope, prove interesting and
informative for you and the other participants given my intent to create guidelines which highlight practical experience as well as research and theoretical expertise.

I and my supervisors have worked hard to ensure the process minimizes the time and effort required by all participants. I sincerely hope you will consider being involved in this research project which, I hope, will advance our knowledge of how best to target sun protection messages to adolescents and young adults.

Yours sincerely,

Keryn Johnson

Keryn Johnson (PhD candidate)
Centre for Health Behaviour and Communication Research,
University of Wollongong,
Wollongong. NSW. 2522.
Ph: 61 2 4221 5311
E-mail: kmj93@uow.edu.au

Supervisors:
Assoc-Prof Sandra Jones
Director: Centre for Health Behaviour and Communication Research,
University of Wollongong.
E-mail: sandraj@uow.edu.au

Prof Don Iverson
Dean: Health and Behavioural Sciences,
University of Wollongong.
E-mail: iverson@uow.edu.au
Round 1
Participants provide up to 10 propositions, and then return via e-mail.
*Content analysis performed by researcher, grouped by themes.*

Round 2
Participants receive all propositions back and choose 10 from this list, and then return via e-mail.
*Quantitative analysis performed by researcher.*

Round 3
Participants receive all propositions back with descriptive statistics to see where opinion lies within group, choose 10 from list, and then return via e-mail.
*Quantitative analysis performed by researcher.*

Round 4
Participants receive all propositions back with descriptive statistics, choose 10 propositions from list, and then return via e-mail.
*Quantitative analysis performed and, propositions with less than 25% agreement rejected, those with 75% agreement accepted. Propositions with 25% to 75% agreement returned to participants with descriptive statistics.*

Round 5
Participants receive edited list with descriptive statistics, choose 10 propositions from list, and then return via e-mail.
*Quantitative analysis performed, propositions with highest level of agreement chosen.*

Assess evidence
*Researcher gathers evidence from systematic reviews and other research for each proposition, and sends to participants with traditional SOR grading.*

Grade evidence
Participants asked to rate each recommendation on VAS scale.
*Researcher calculates mean VAS and standard deviation for each recommendation, tables with traditional groupings, mean VAS and 95% confidence interval.*
## Provisional timetable

<table>
<thead>
<tr>
<th>Date</th>
<th>Event Description</th>
<th>Return Date</th>
<th>Duration</th>
</tr>
</thead>
<tbody>
<tr>
<td>March 26</td>
<td>Send out Round 1 documents</td>
<td>April 16</td>
<td>3 weeks</td>
</tr>
<tr>
<td>May 2</td>
<td>Send out Round 2 documents</td>
<td>May 28</td>
<td>3 weeks</td>
</tr>
<tr>
<td>June 11</td>
<td>Send out Round 3 documents</td>
<td>June 25</td>
<td>2 weeks</td>
</tr>
<tr>
<td>July 9</td>
<td>Send out Round 4 documents</td>
<td>July 16</td>
<td>1 week</td>
</tr>
<tr>
<td>July 30</td>
<td>Send out Round 5 documents</td>
<td>August 6</td>
<td>1 week</td>
</tr>
<tr>
<td>October 1</td>
<td>Send out SOE table for VAS</td>
<td>October 15</td>
<td>2 weeks</td>
</tr>
</tbody>
</table>
Appendix 5

Qualitative analysis of recommendations

**Overall structure**

1) General

Theme of holistic approach to sun protection for this demographic (one source) which necessitates long term commitment (3 sources), and a multicomponent (3 sources), multi-setting approach (2 sources) inclusive of the wider community (3 sources).

Reference 1 – *Think long term; its seventy years since Channel made the sun tan sexy; changing that will take time*

Reference 2 – *Think upstream as well as down stream*

Reference 3 - *Remember, the end does not justify the means*

Reference 4 – *If feasible, programs should target participants at many levels, including individual or small group-level intervention, school-based programs, and mass media campaigns. Ideally, programs should not be one-shot interventions but should have multiple contacts with participants.*

Reference 5 - *Sun protection campaign effectiveness requires it to be multi-component and reach the target groups in different ways at various points throughout adolescence.*

Reference 6 - *Programs need to utilize a myriad of suitable settings and channels of communications in order for the message to be understood. For example educating students in schools without a broader campaign in the external environment in not going to make much of a difference. Therefore a wide range of strategies need to be adopted.*

Reference 7 - *One off educational sessions with students in schools offer little if any value in terms of changing behaviour and attitudes.*
Reference 8 - Any program targeting young people must be well funded and resourced and able to be sustained over the long term (10 years min).

Reference 9 - There needs to be a holistic approach to sunsafety involving not just parents and young people but all who have an influence such as teachers, sports coaches etc.

Reference 10 - To be effective, a program promoting sun protection to adolescents and young adults must communicate through multiple changes in the community.

Reference 11 - Population behaviour change for behaviours that require repetition and maintenance is generally slow and incremental, so intervention approaches need to focus on long term goals.

2) Relationships

Three sources noted the need for the development of partnerships- two noted the potential for partnerships with commercial interests such as cosmetics/sunscreen and fashion interests. One source noted a danger in allowing message and strategy compromise or distraction from primary objectives with commercial partnerships. One source noted the need for relationships with the consumer and primary stakeholders, and three sources suggested the use of celebrity and sports figures.

Reference 1 - Relationships matter, both with the consumer and with key stakeholders.

Reference 2 - Think imaginatively about potential stakeholders and allies. Initiatives need to make protection as easy and accessible as possible and many people can help with this.

Reference 3 - Do your competitive analysis: what are the fashion, celebrity and lotion industries doing? Is it a threat? Does it offer opportunities? Does it provide helpful insights into your target group?

Reference 4 - Programs that target men should try to model positive sun protective behavior of popular sports figures.
Reference 5 - As social marketers, we rarely have the resources to actually change the environment, so we need to find partners to help us, and these partners need to be shown why it is in their own self interest to work with us. I imagine that a self-interested group of partners on this project would be in the business of selling sun screen or cosmetics.

Reference 6 - There is no point working in isolation, partnerships are necessary to assist with getting the message out. In saying this, only rarely is it worth while pursing partnerships with commercial interests because invariably they compromise your message and strategy and distract you from your primary objectives.

Reference 7 - and of course target the decision makers at these locations to provide shade & appropriate merchandise.

3) Policy

General theme of pursuing policy changes and regulations where possible. This should include policy on solarium usage (2 sources), and may include taxation changes to sunscreen and sunsafe clothing (1 source).

Reference 1 - On any issue the target can be segmented along a continuum where one extreme is prone to behave as we desire, while the other extreme is resistant to behave as we wish. Those who are prone will behave as we wish if we tell them what they should do. At the other extreme, the target won’t comply no matter what we want, so if we really need behavior change, we’ll need to use laws. In the middle are people who have chosen what they see is in their best interests; to get them to change we’ll need to provide a better cost benefit package than what is provided in their current behavior choice.

Reference 2 - All new clients of solaria should be required to complete an approved decision making guide relevant to the decision to use a tanning bed.

Reference 3 - Where there are opportunities for changes in policies and regulations, they should be pursued. For young people, having government implement regulations to restrict youth access to solariums is a worthwhile objective.
4) Timing

A theme of sun protection programs needing to be implemented at various points throughout adolescence, with emphasis on developmental transitions, particularly the move from primary (middle) school to high school (3 sources), but also high school to university (one source) as these are times of decreasing parental influence.

Reference 1 - It is critical to consider developmental transitions (e.g., transition from middle school to high school; transition from high school to university; movement away from parental influence to greater peer influence and influence by the media) and to try to intervene prior to the transition. During these transitions, adolescents increasingly seek acceptance from peers and increase their risk-taking behavior. Programs should address the motivations and drives for undertaking risky behavior.

Reference 2 - Parental self-efficacy and the tools for enhancing it should be promoted especially at transition from primary to secondary schooling.

Reference 3 - Sun protection campaign effectiveness requires it to be multi-component and reach the target groups in different ways at various points throughout adolescence.

Reference 4 - Tackle the 11 year old watershed – at the moment before 11 they are treated as children and supervised/protected by adults and suddenly when they enter High School they are left to their own devices. Needs a more gradual transfer of responsibility.

5) Behavioural theory

Only one source specifically noted the need for the use of established behavioural principles or models to be utilized, although one other source stated that developmental theory should be incorporated.
**Reference 1** - Established behavioural principles/models (eg including incentives, minimizing barriers) should be a part of any program seeking to achieve behaviour change.

**Reference 2** - Segmentation within age groups is important – eg effective strategies for 12-13 year olds may involve parental components, while for 17-18 year olds this is unlikely to be effective. Developmental theory/evidence should be incorporated.

**Segmentation**

General theme of the need for segmentation in order to tailor messages and strategies within the broader demographic, this can occur on age (4 sources), gender (2 sources), behaviour (3 sources) and/or risk (2 sources).

*<Document 3>* - § 1 reference coded

**Reference 1** - On any issue the target can be segmented along a continuum where one extreme is prone to behave as we desire, while the other extreme is resistant to behave as we wish. Those who are prone will behave as we wish if we tell them what they should do. At the other extreme, the target won’t comply no matter what we want, so if we really need behavior change, we’ll need to use laws. In the middle are people who have chosen what they see is in their best interests; to get them to change we’ll need to provide a better cost benefit package than what is provided in their current behavior choice.

*<Document 4>* - § 1 reference coded

**Reference 2** - Sun protection campaign effectiveness requires it to be multi-component and reach the target groups in different ways at various points throughout adolescence.

*<Document 6>* - § 1 reference coded

**Reference 3** - Segment and target different groups based on research e.g. by demographic and/or behavioural criteria e.g. Jocks, Fashion trendsetters.

*<Document 7>* - § 1 reference coded

**Reference 4** - Segmentation within age groups is important – eg effective strategies for 12-13 year olds may involve parental components, while for 17-18 year olds this is unlikely to be effective. Developmental theory/evidence should be incorporated.

*<Document 8>* - § 1 reference coded

**Reference 5** - Define, research and target the high-risk groups within this age group (as defined by skin type, family history etc.).
Reference 6 - The audience should be segmented by gender and age.

Reference 7 - Programs that target men should try to model positive sun protective behavior of popular sports figures.

Reference 8 - Base segmentation on attitudes towards tanning + previous burn incidence.

Formative research

General theme of needing to know the target market through formative research (5 sources) in order to understand the self-interests of the target group, and the barriers and motivators of sun protective behaviour for this demographic, especially in regards to tanned skin. This is done in order to develop strategies and messages from the consumer perspective.

Reference 1 - Acquire a detailed and in-depth understanding of the ethnography of sun tans and related behaviour.

Reference 2 - Do your competitive analysis: what are the fashion, celebrity and lotion industries doing? Is it a threat? Does it offer opportunities? Does it provide helpful insights into your target group?

Reference 3 - Like most people, adolescents/young people are poor judges of what influences them to change behaviour.

Reference 4 - Pre-testing of strategies/messages is critical.

Reference 5 - Almost everybody does almost everything out of self interest, therefore it is important to talk to the target to understand their self interests. For example, is the self interest to get a tan or is it to look good (and to look good a tan is important). It is difficult to develop a set of benefits for a target without first talking to the a target and understanding what it is that they want out of life and how your future benefit package can fit into their lives.
Any consumer research needs to be done early in the development of the campaign so that any change in the environment (change in benefits, barriers) reflects the consumer perspective. If the consumer research is done later and only is used to influence communications, then the probability of failure increases.

Focus testing of resource material is essential for this target group, otherwise the material is more likely to be off the mark.

Need to have DEEP consumer insight through research – what are the barriers and motivators for this target group?

Segment and target different groups based on research e.g. by demographic and/or behavioural criteria e.g. Jocks, Fashion trendsetters.

Define, research and target the high-risk groups within this age group (as defined by skin type, family history etc.).

Common theme of the “tan” as competition to sun protective behaviours- therefore need to understand and tackle this competition- look to influencing social norms (2 sources), perceptions on health and tanning (2 sources), uncoupling health from beauty (1 source). Fashion and commercial interests can also be seen as competition. Two comments on care in promotion of fake tanning lotions- need to emphasise that it does not offer protection from UV, and is seen in the context of individuals making reasoned health choices.

Acquire a detailed and in-depth understanding of the ethnography of sun tans and related behavior.

Do your competitive analysis: what are the fashion, celebrity and lotion industries doing? Is it a threat? Does it offer opportunities? Does it provide helpful insights into your target group?
Reference 3 - Given that the media often portrays beauty and health as inter-related, the program should attempt to un-couple these two.

Reference 4 - Programs should emphasis proximal outcomes such as skin damage (wrinkles, aging) and sunburn, rather than the distal outcomes of skin cancer for this demographic. *Tanning provides immediate benefit with long run cost, while not tanning may be seen as having an immediate cost (peers see you as a wimp) in return for vague future benefits.* It will be important to show immediate benefits for the desired behavior.

Reference 5 - The desired behavior needs to acquire a positive image. *Tanning is cool, but what is not tanning?* The target needs to be involved in developing a position for not tanning that is seen as appealing. Perhaps teen age girls could be offered cool incentives that are only available to girls who are not deeply tanned.

Reference 6 - *Sunless tanner as a tool to reduce sunbathing will only be effective if offered in the context of an individual making reasoned health choices.*

Reference 7 - *It is not effective to try and pretend that your messages are 'cool' and 'hip' for the audience; young people easily interpret this attempt and reject it. As a NGO or govt agency responsible for delivering campaigns, we can’t compete with the fashion and the commercial interests at the time.*

Reference 8 - *Need to create social norms e.g. tan is not desirable or attractive; wearing a hat or sunsafe clothes is cool.*

Reference 9 - *Tackle the mythical concept of a ‘safe tan’.*

Reference 10 - *Changing Australian social norms regarding the desirability of a tanned appearance is essential for achieving whole-of-life sun protection behaviour. Such messages/interventions need to be directed both within and outside the adolescent/young adult target groups.*

Reference 11 - *Emphasise the overall health/beauty benefits of an active, outdoor lifestyle whilst being 'SunSmart'.*
Reference 12 - *Take care when offering 'sunless tanning' as a safe alternative to UV tanning in terms of it offering no protection from UV (a common misconception).*

**Product**
The product of “sun protective behaviour” needs to compete against peer behaviour, social norms for tanning, and needs to increase self-efficacy and to offer a “cooler” image. Need to tip decisional balance through decreasing barriers, offering more salient benefit package - need to fit within adolescent/young adult lifestyle. General consensus on offering short-term appearance related benefits package but still a need for skin cancer message.

1) General

<Document 2> - § 2 references coded

Reference 1 - It is critical to consider developmental transitions (e.g., transition from middle school to high school; transition from high school to university; movement away from parental influence to greater peer influence and influence by the media) and to try to intervene prior to the transition. *During these transitions, adolescents increasingly seek acceptance from peers and increase their risk-taking behavior. Programs should address the motivations and drives for undertaking risky behavior.*

Reference 2 - *Programs should acknowledge the positive benefits of sun exposure (e.g., elevated mood, relaxing, provision of vitamin D).*

<Document 3> - § 8 references coded

Reference 3 - *Programs should emphasis proximal outcomes such as skin damage (wrinkles, aging) and sunburn, rather than the distal outcomes of skin cancer for this demographic.* Tanning provides immediate benefit with long run cost, while not tanning may be seen as having an immediate cost (peers see you as a wimp) in return for vague future benefits. It will be important to show immediate benefits for the desired behavior.

Reference 4 - *Almost everybody does almost everything out of self interest, therefore it is important to talk to the target to understand their self interests. For example, is the self interest to get a tan or is it to look good (and to look good a tan is important). It is difficult to develop a set of benefits for a target without first talking to the a target and understanding what it is that they want out of life and how your future benefit package can fit into their lives.*

Reference 5 - On any issue the target can be segmented along a continuum where one extreme is prone to behave as we desire, while the other extreme is resistant to behave as we wish. *Those who are prone will behave as we wish if we tell them what they should do. At the other extreme, the target won’t comply no matter what we want, so if we really need behavior change, we’ll need to use laws. In the middle are people who have chosen*
what they see is in their best interests; to get them to change we’ll need to provide a better cost benefit package than what is provided in their current behavior choice.

**Reference 6** - Many people know what they should do, but are unable to do so because either the opportunity doesn’t exist or they don’t have the ability to behave. Perhaps the target would use more sun screen if dispensers were easily available at every beach. (It is probably cheaper for the community to give away sun screen than it is to treat skin cancer).

**Reference 7** - People choose what is fun, easy and popular, so this program should show the target why choosing to protect from the sun is more fun, easier and will make them more popular than any alternative behavior choice. Perhaps there should be beauty contests that are biased toward pale skinned people (relative to the ethnicity that they represent).

**Reference 8** - The desired behavior needs to acquire a positive image. Tanning is cool, but what is not tanning? The target needs to be involved in developing a position for not tanning that is seen as appealing. Perhaps teen age girls could be offered cool incentives that are only available to girls who are not deeply tanned.

**Reference 9** - In a free choice society, the target has the power to choose its own desired behavior. The only power held by the change agent is to provide a more appealing choice than anything other choice available to the target.

**Reference 10** - Any consumer research needs to be done early in the development of the campaign so that any change in the environment (change in benefits, barriers) reflects the consumer perspective. If the consumer research is done later and only is used to influence communications, then the probability of failure increases.

**<Document 5> - § 1 reference coded**

**Reference 11** - Graphic, fear inducing advertisements continually come out as the most motivational in terms of influencing behaviour. In this context, showing the consequences of skin cancer rather than skin ageing is more effective.

**<Document 6> - § 1 reference coded**

**Reference 12** - To achieve behavioural change the ‘new behaviour’ being marketed needs to be EASY, FUN and/or FASHIONABLE e.g. easy application of sun cream, hats considered fashionable.

**<Document 7> - § 3 references coded**

**Reference 13** - Established behavioural principles/models (eg including incentives, minimizing barriers) should be a part of any program seeking to achieve behaviour change.
Reference 14 - Strategies/messages which engage emotion as well as providing education are necessary for translating knowledge into behaviour.

Reference 15 - Message content needs to emphasise short term benefits/appearance for these age groups, but must still make reference to more ‘serious’ outcomes given the relative strength of fear as a motivator.

Reference 16 - Offer cheaper, less messy, 'cooler' alternatives to sun protection than sunscreen use.

Reference 17 - Consider the impact of explaining sunburn in terms of being a radiation burn (as opposed to a burn in the classical sense as caused by heat) that causes irreparable damage to skin.

Reference 18 - When highlighting risk, sun protection messages should remind adolescents and young adults that taking precautions is their choice in order to minimize psychological reactance and boomerang effects.

Reference 19 - Much sunburn occurs cos people ‘forget’ to apply or re-apply sunscreen – or to take a hat or umbrella - forget how long been in the sun (time flies when you’re having fun). Much of communication strategy then should be ‘reminder’ --- Friday pm radio, w/e media.

Reference 20- Population behaviour change for behaviours that require repetition and maintenance is generally slow and incremental, so intervention approaches need to focus on long term goals.

Reference 21 - Young people are generally less focused on the long term. Like most people, adolescents/young people are poor judges of what influences them to change behaviour.
Boomerang effects of messages may be more common than we think (i.e. on secondary audiences).

2) Appearance

Reference 1 - Programs should emphasize proximal outcomes such as skin damage (wrinkles, aging) and sunburn, rather than the distal outcomes of skin cancer for this demographic.

Reference 2 - Programs should attempt to undermine the perception that a tan is attractive. This might be done by highlighting the attractiveness of pale media figures (e.g., models, actresses) who set the norms for what is attractive. These programs should emphasize the similarity of the media figure to the target population.

Reference 3 - Given that the media often portrays beauty and health as inter-related, the program should attempt to un-couple these two.

Reference 4 - Programs should not admonish sunbathing/tanning, as it will evoke reactance, especially among those who are high on appearance motivation.

Reference 5 - Programs should emphasize proximal outcomes such as skin damage (wrinkles, aging) and sunburn, rather than the distal outcomes of skin cancer for this demographic. Tanning provides immediate benefit with long run cost, while not tanning may be seen as having an immediate cost (peers see you as a wimp) in return for vague future benefits. It will be important to show immediate benefits for the desired behavior.

Reference 6 - Message content targeting teens should highlight cosmetic consequences esp. tan seeking women.

Reference 7 - Graphic, fear inducing advertisements continually come out as the most motivational in terms of influencing behaviour. In this context, showing the consequences of skin cancer rather than skin ageing is more effective.
Reference 8 - Message content needs to emphasise short term benefits/appearance for these age groups, but must still make reference to more ‘serious’ outcomes given the relative strength of fear as a motivator.

Reference 9 - Emphasise the physically unattractive nature of 'sun spots' and wrinkles.

Reference 10 - "Sell" the avoidance of sunburn - rather than the longer-term possibility of future skin cancer.

Reference 11 - Emphasise the overall health/ beauty benefits of an active, outdoor lifestyle whilst being 'SunSmart'.

Reference 12 - Appearance-based risks of unprotected sun exposure should be promoted to adolescents and young adults.

Reference 13 - When highlighting risk, sun protection messages should promote effective protection behaviors that fit within appearance and norms for the adolescent and young adult cultures to increase their perceived self-efficacy.

Reference 14 - Programs should emphasis proximal outcomes such as skin damage (wrinkles, aging) and sunburn, rather than the distal outcomes of skin cancer for this demographic.

Comment: Not sure of the use of proximal & distal here … your use implies immediate vs long term — or initial physical impact on cells and cancer outcomes (but don’t think that is correct re physiology of cancer) … First might be ok but other uses are that proximal has a direct effect whereas the effect of distal variables is indirect ie variables that influence the variables that predict the behaviour of interest..

3) Self-efficacy

Reference 1 - Think imaginatively about potential stakeholders and allies initiatives need to make protection as easy and any people can help with this.

Reference 2 - Do your competitive analysis: what are the fashion, celebrity and lotion industries doing? Is it as accessible as possible and many people can help with this threat? Does it offer opportunities? Does it provide helpful insights into your target group?
Reference 3 - It is critical to target self-efficacy for sun protective behavior, perhaps by leading a focused discussion of strategies for building sunscreen use into daily life. Programs should emphasize that sun protection should be a daily habit.

Reference 4 - Almost everybody does almost everything out of self interest, therefore it is important to talk to the target to understand their self interests. For example, is the self interest to get a tan or is it to look good (and to look good a tan is important). It is difficult to develop a set of benefits for a target without first talking to the a target and understanding what it is that they want out of life and how your future benefit package can fit into their lives.

Reference 5 - Many people know what they should do, but are unable to do so because either the opportunity doesn’t exist or they don’t have the ability to behave. Perhaps the target would use more sun screen if dispensers were easily available at every beach. (It is probably cheaper for the community to give away sun screen than it is to treat skin cancer).

Reference 6 - Whatever choice is offered to the target needs to not add new hassles into the target’s life. It needs to be easy and needs to fit into the existing daily routine of the target. If cosmetic products had built in sun screen, then applying sun screen would become easy and automatic.

Reference 7 - To achieve behavioural change the ‘new behaviour’ being marketed needs to be EASY, FUN and/or FASHIONABLE e.g. easy application of sun cream, hats considered fashionable.

Reference 8 - The fit and feasibility of sun protection within dress, appearance, and grooming norms should be highlighted.

Reference 9 - When highlighting risk, sun protection messages should promote effective protection behaviors that fit within appearance and norms for the adolescent and young adult cultures to increase their perceived self-efficacy.

Reference 10 - When tailoring messages, sun protection communication should be matched to adolescents' and young adults' current sun protection habits and their self-efficacy for sun protection.
Much sunburn occurs because people ‘forget’ to apply or re-apply sunscreen – or to wear a hat or umbrella - forget how long been in the sun (time flies when you’re having fun). Much of communication strategy then should be ‘reminder’ --- Friday pm radio, w/e media.

4) Social norms

Reference 1 - Programs should attempt to undermine the perception that a tan is attractive. This might be done by highlighting the attractiveness of pale media figures (e.g., models, actresses) who set the norms for what is attractive. These programs should emphasize the similarity of the media figure to the target population.

Reference 2 - Successful programs might be ones that target group norms. Given the power of social norms, changing the behavior of a few individuals ultimately might influence the behavior of many. Groups might be defined based on sports teams, clubs, or simply groups of friends.

Reference 3 - People choose what is fun, easy and popular, so this program should show the target why choosing to protect from the sun is more fun, easier and will make them more popular than any alternative behavior choice. Perhaps there should be beauty contests that are biased toward pale skinned people (relative to the ethnicity that they represent).

Reference 4 - The desired behavior needs to acquire a positive image. Tanning is cool, but what is not tanning? The target needs to be involved in developing a position for not tanning that is seen as appealing. Perhaps teen age girls could be offered cool incentives that are only available to girls who are not deeply tanned.

Reference 5 - School based programs may be effective in developing collective insight into peer behaviour and modifying group norms towards sun related behaviour.

Reference 6 - Need to create social norms e.g. tan is not desirable or attractive; wearing a hat or sunsafe clothes is cool.
Reference 7 - Changing Australian social norms regarding the desirability of a tanned appearance is essential for achieving whole-of-life sun protection behaviour. Such messages/interventions need to be directed both within and outside the adolescent/young adult target groups.

Reference 8 - Use celebrity role models to shift social norms around tanning.

Reference 9 - Programs should correct descriptive norms by showing that fewer adolescents and young adults sun tan and more engage in routine sun protection.

Reference 10 - The fit and feasibility of sun protection within dress, appearance, and grooming norms should be highlighted.

Reference 11 - When highlighting risk, sun protection messages should promote effective protection behaviors that fit within appearance and norms for the adolescent and young adult cultures to increase their perceived self-efficacy.

Reference 12 – Adult behaviour is an important influence on setting normative behaviour for adolescents/young adults.

5) Role modeling

Reference 1 - Programs should attempt to undermine the perception that a tan is attractive. This might be done by highlighting the attractiveness of pale media figures (e.g., models, actresses) who set the norms for what is attractive. These programs should emphasize the similarity of the media figure to the target population.

Reference 2 - Programs that target men should try to model positive sun protective behavior of popular sports figures.

Reference 3 - The desired behavior needs to acquire a positive image. Tanning is cool, but what is not tanning? The target needs to be involved in developing a position for not tanning that is seen as appealing. Perhaps teen age girls could be offered cool incentives that are only available to girls who are not deeply tanned.
Reference 4 - Adults should act as role models demonstrating sunsafe behavior themselves.

Reference 5 - Use celebrity role models to shift social norms around tanning.

Reference 6 - Near-peer (matched to their age or slightly older) spokespersons should be used to model sun protection to adolescents and young adults.

Reference 7 - Adult behaviour is an important influence on setting normative behaviour for adolescents/young adults.

6) Specific products

Reference 1 - Many people know what they should do, but are unable to do so because either the opportunity doesn’t exist or they don’t have the ability to behave. Perhaps the target would use more sun screen if dispensers were easily available at every beach. (It is probably cheaper for the community to give away sun screen than it is to treat skin cancer).

Reference 2 - Whatever choice is offered to the target needs to not add new hassles into the target’s life. It needs to be easy and needs to fit into the existing daily routine of the target. If cosmetic products had built in sun screen, then applying sun screen would become easy and automatic.

Reference 3 - Widespread availability of products that facilitate self assessment of present (e.g. measurement of elastosis in fashion shops) or future photo-aging (e.g. personalised aged photos in photo booths) will be effective in motivating personal behaviour change.

Reference 4 - The development formal decision making guides for adolescents to help them make personally relevant choices (e.g. fake or real tan; long or short sleeves) and plan setting related behaviour would be useful, subject to an effective distribution strategy (e.g. fashion consultants).
Sunless tanner as a tool to reduce sunbathing will only be effective if offered in the context of an individual making reasoned health choices.

Take care when offering 'sunless tanning' as a safe alternative to UV tanning in terms of it offering no protection from UV (a common misconception).

Focussed, ongoing attention to the products (sunscreen, hats, clothing) necessary for sun protection is essential for sufficiently engaging these age groups in sun protection behaviour.

and of course target the decision makers at these locations to provide shade & approp merchandise.

Have skin damage equipment at POS.

Two main themes- one of needing to engage at a wider community level, the other of targeting risk areas for sunburn whether intentional or unintentional.

Settings with sun exposure risk, frequented by adolescents should be targeted, to promote shade protection and other positive sun protection norms.

School based programs may be effective in developing collective insight into peer behaviour and modifying group norms towards sun related behaviour.

Programs need to utilize a myriad of suitable settings and channels of communications in order for the message to be understood. For example educating students in schools without a broader campaign in the external environment in not going to make much of a difference. Therefore a wide range of strategies need to be adopted.

One off educational sessions with students in schools offer little if any value in terms of changing behaviour and attitudes.
Reference 5 - There needs to be a holistic approach to sun safety involving not just parents and young people but all who have an influence such as teachers, sports coaches etc.

<Documents\propositions 7> - § 1 reference coded

Reference 6 - Wide implementation of passive strategies – eg increasing availability of shade in areas where unprotected sun exposure currently occurs, provision of sunscreen by clubs or parents – is likely to be effective.

<Documents\Propositions 9> - § 1 reference coded

Reference 7 - To be effective, a program promoting sun protection to adolescents and young adults must communicate through multiple changes in the community.

<Documents\Propositions document 10> - § 1 reference coded

Reference 8 - Much sunburn is incidental. Hence include non-beach/pool situations in communications.

Reference 9 - Have skin damage equipment at POS.

Secondary audiences

Five sources commented on parental influences – one looking at parental self-efficacy and another at looking at a more gradual transfer of responsibility, also parents as role models. Also need to look to wider adult community, especially those in care positions and decision-makers (4 sources).

<Documents\Propositions 4> - § 1 reference coded

Reference 1 - Parental self-efficacy and the tools for enhancing it should be promoted especially at transition from primary to secondary schooling.

<Document 6> - § 3 references coded

Reference 2 - There needs to be a holistic approach to sun safety involving not just parents and young people but all who have an influence such as teachers, sports coaches etc.

Reference 3 - Adults should act as role models demonstrating unsafe behavior themselves.

Reference 4 - Tackle the 11 year old watershed – at the moment before 11 they are treated as children and supervised/protected by adults and suddenly when they enter
High School they are left to their own devices. Needs a more gradual transfer of responsibility.

Reference 5 - Segmentation within age groups is important – eg effective strategies for 12-13 year olds may involve parental components, while for 17-18 year olds this is unlikely to be effective. Developmental theory/evidence should be incorporated.

Reference 2 - Changing Australian social norms regarding the desirability of a tanned appearance is essential for achieving whole-of-life sun protection behaviour. Such messages/interventions need to be directed both within and outside the adolescent/young adult target groups.

Reference 6 - Programs should enlist parents to express their expectations to adolescents that they will be safe in the sun and not sun tan.

Reference 7 - and of course target the decision makers at these locations to provide shade & approp merchandise.

Reference 8 - Adult behaviour is an important influence on setting normative behaviour for adolescents/young adults.

Environmental and structural

Theme of passive strategies and structural strategies to decrease the cost of sun protection, however a need to look at amenity and suitability of specific strategies for the demographic.

Reference 1 - Many people know what they should do, but are unable to do so because either the opportunity doesn’t exist or they don’t have the ability to behave. Perhaps the target would use more sun screen if dispensers were easily available at every beach. (It is probably cheaper for the community to give away sun screen than it is to treat skin cancer).
Whatever choice is offered to the target needs to not add new hassles into the target’s life. It needs to be easy and needs to fit into the existing daily routine of the target. If cosmetic products had built in sun screen, then applying sun screen would become easy and automatic.

Any consumer research needs to be done early in the development of the campaign so that any change in the environment (change in benefits, barriers) reflects the consumer perspective. If the consumer research is done later and only is used to influence communications, then the probability of failure increases.

The provision of shade however technically efficacious, will not optimise sun protection without attention to the social amenity within shaded space.

Wide implementation of passive strategies – eg increasing availability of shade in areas where unprotected sun exposure currently occurs, provision of sunscreen by clubs or parents – is likely to be effective.

Offer cheaper, less messy, 'cooler' alternatives to sun protection than sunscreen use.

and of course target the decision makers at these locations to provide shade & approp merchandise.

Have skin damage equipment at POS.

Environmental change approaches (including policy approaches) can be effective in helping the majority to change/ or at least in supporting some level of change (change by stealth).

Message factors

Themes of care for types of language used (4 sources), danger of reactance (4 sources), peer or near peer delivered messages (3 sources), novelty (1 source), exposure (1 source), tailored (2 sources), usefulness of fear or emotion (3 sources), usefulness of negative framing (1 source), reminder-type communication (1 source).
Reference 1 - Programs should not admonish sunbathing/tanning, as it will evoke reactance, especially among those who are high on appearance motivation.

Reference 2 - Graphic, fear inducing advertisements continually come out as the most motivational in terms of influencing behaviour. In this context, showing the consequences of skin cancer rather than skin ageing is more effective.

Reference 3 - Putting a heavy reliance on both paid and unpaid media (electronic, print and radio) is essential in terms getting the message out to a wide audience. The media messages need to be carefully tailored to work best with the prevailing culture and community awareness at the time.

Reference 4 - It is not effective to try and pretend that your messages are ‘cool’ and ‘hip’ for the audience; young people easily interpret this attempt and reject it. As a NGO or govt agency responsible for delivering campaigns, we can’t compete with the fashion and the commercial interests at the time.

Reference 5 - Do not PREACH but provide the facts using the media and channels appropriate to this target e.g. popular websites, TV programmes, text messaging.

Reference 6 - Strategies/messages which engage emotion as well as providing education are necessary for translating knowledge into behaviour.

Reference 7 - Message content needs to emphasise short term benefits/appearance for these age groups, but must still make reference to more ‘serious’ outcomes given the relative strength of fear as a motivator.

Reference 8 - Use peer-delivered messages in language that is acceptable with the target audience.

Reference 9 - Use young and/or credible case studies where-ever fear appeals may have desired impact.
Reference 10 - Near-peer (matched to their age or slightly older) spokespersons should be used to model sun protection to adolescents and young adults.

Reference 11 - When highlighting risk, sun protection messages should remind adolescents and young adults that taking precautions is their choice in order to minimize psychological reactance and boomerang effects.

Reference 12 - When highlighting risk, sun protection messages should promote effective protection behaviors that fit within appearance and norms for the adolescent and young adult cultures to increase their perceived self-efficacy.

Reference 13 - When tailoring messages, sun protection communication should be matched to adolescents’ and young adults’ current sun protection habits and their self-efficacy for sun protection.

Reference 14 - Much sunburn occurs cos people ‘forget’ to apply or re-apply sunscreen – or to take a hat or umbrella - forget how long been in the sun (time flies when you’re having fun). Much of communication strategy then should be ‘reminder’ --- Friday pm radio, w/e media.

Reference 15 - Negative framing messages – whether about skin damage or cancer likelihood/consequences more effective than positive framed messages – at least in our study.

Reference 16 - Adequate exposure to a message or intervention is critical- often the “dose” of the message may be inadequate given the growing amount of clutter.

New news helps to break through clutter- (speaks to type of message)

Reference 17 - Boomerang effects of messages may be more common than we think (i.e. on secondary audiences).

Channel factors

Theme of wide range of communication channels paid and non-paid (3 sources), this demographic as users of new media (3 sources), choosing appropriate media (1 source), television as powerful medium (1 source), importance of exposure (1 source).

Reference 1 - Public relations could be as important as paid for communications.
Despite the many new channels of communication that are now available to young people, television is still the most powerful medium.

Programs need to utilize a myriad of suitable settings and channels of communications in order for the message to be understood. For example educating students in schools without a broader campaign in the external environment is not going to make much of a difference. Therefore a wide range of strategies need to be adopted.

One off educational sessions with students in schools offer little if any value in terms of changing behaviour and attitudes.

Putting a heavy reliance on both paid and unpaid media (electronic, print and radio) is essential in terms getting the message out to a wide audience. The media messages need to be carefully tailored to work best with the prevailing culture and community awareness at the time.

Do not PREACH but provide the facts using the media and channels appropriate to this target e.g. popular websites, TV programmes, text messaging.

Adolescents/young adults are savvy and critical consumers of media, and more frequent users of “new media”.

Adequate exposure to a message or intervention is critical- often the “dose” of the message may be inadequate given the growing amount of clutter.
TITLE: An investigation of sun protective behaviours

PURPOSE OF THE RESEARCH
This is an invitation to participate in a study conducted by researchers at the University of Wollongong. The purpose of the research is to investigate the sun protective behaviours of university students. We also seek to understand how students make decisions about sun protection, and their attitudes towards sun protection.

INVESTIGATORS
Keryn Johnson PhD candidate
Centre for Health Initiatives
02- 4221 5211
kmj93@uow.edu.au
Professor Sandra Jones
Centre for Health Initiatives
02- 4221 4209
sandraj@uow.edu.au
Professor Don Iverson
02-4221 4677
iverson@uow.edu.au

METHOD AND DEMANDS ON PARTICIPANTS
If you choose to take part in this study you will be asked to complete the survey now. This should take about 10-15 minutes. As a thank you, students who complete a survey will be given a small token of appreciation.

POSSIBLE RISKS, INCONVENIENCES AND DISCOMFORTS
Apart from the time to complete the survey, we can foresee no risks for you. Your involvement in the study is voluntary and you may decide to stop completing the survey at any time. However, as the survey is anonymous, you will not be able to withdraw your information once you have returned the survey. Refusal to participate in the study will not affect your relationship with the University of Wollongong.

FUNDING AND BENEFITS OF THE RESEARCH
This study is funded by an Australian Research Council grant. Findings from the study will be published in a journal article and may be presented at a conference. Only group data will be published.

ETHICS REVIEW AND COMPLAINTS
This study has been reviewed by the Human Research Ethics Committee (Social Science, Humanities and Behavioural Science) of the University of Wollongong. If you have any concerns or complaints regarding the way this research has been conducted, you can contact the UoW Ethics Officer on (02) 4221 4457.

Thank you for your interest in this study.
Appendix 6

Sun protection survey 2008

The following questions ask about your sun protection behaviours, attitudes and beliefs. Please follow the instructions for each question or ask the researcher if you are unsure of anything.

Please note: When a question or statement refers to the term ‘sun protection’, it is referring to any number of ways you can protect yourself from the sun, such as using sunscreen, zinc, wearing a rash vest, wearing a sun hat, sitting in the shade, etc.

When a question or statement refers to “adequate” or “full” sun protection it means any combination of sun protective behaviours that would prevent all of you (your face and body) from tanning or burning.

A. Regarding sun protection, please tick ONE of the following 5 categories that best applies to you, and also tick one or more sub-categories if applicable.

☐ I do not need to protect myself from the sun

☐ I know I should protect myself from the sun but I choose not to because:
  ☐ I want to tan
  ☐ The difficulties of doing so outweigh the benefits

☐ I use some sun protection but I choose not to protect myself fully because:
  ☐ I also like to tan
  ☐ It is too difficult to protect myself fully
  ☐ I feel some sun exposure is good for you

☐ I generally protect myself adequately, but there are times when I don’t because:
  ☐ I want a bit of a tan
  ☐ I forget
  ☐ It is too difficult in the circumstances
  ☐ I am unprepared

☐ I protect myself adequately from the sun at all times

B. Please put a mark on EACH scale to indicate your attitudes to the following behaviours. There are no right or wrong answers, we are just interested in your opinion. An example is shown below.

I feel exercising is: Useful ___ ___ ___ ___ ___ ___ ___ Useless

1. I feel protecting myself from the sun is:

   Useful ___ ___ ___ ___ ___ ___ ___ Useless
   Beneficial ___ ___ ___ ___ ___ ___ ___ Harmful
   Wise ___ ___ ___ ___ ___ ___ ___ Foolish
   Enjoyable ___ ___ ___ ___ ___ ___ ___ Unenjoyable
   Pleasant ___ ___ ___ ___ ___ ___ ___ Unpleasant
   Relaxing ___ ___ ___ ___ ___ ___ ___ Stressful
2. I feel tanning is:

   Useful ___________ ___________ ___________ Useless
   Beneficial ___________ ___________ ___________ Harmful
   Wise ___________ ___________ ___________ Foolish
   Enjoyable ___________ ___________ ___________ Unenjoyable
   Pleasant ___________ ___________ ___________ Unpleasant
   Relaxing ___________ ___________ ___________ Stressful

C. This question asks how much you agree or disagree with the following statements. Please circle the number from 1 to 5 that best reflects your feelings.

<table>
<thead>
<tr>
<th>Statement</th>
<th>Strongly Disagree</th>
<th>Somewhat Disagree</th>
<th>Neither Agree Nor Disagree</th>
<th>Somewhat Agree</th>
<th>Strongly Agree</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Most people look healthier with a tan</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>2. Many people look younger with a tan</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>3. I like to take good care of my skin</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>4. Taking care of my health is very important</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>5. Most people look more sexy with a tan</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>6. My skin is worth protecting</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>7. I look better with a tan</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>8. Taking care of my skin is important to me</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>9. Staying healthy is more important than being attractive</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>10. Men look more masculine with a tan</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
</tbody>
</table>

D. Please circle the option that best indicates how often you feel the following statements.

1. When I am at the beach or pool I am tempted to not protect myself from the sun.
   

2. When I am at the beach or pool I am tempted to tan.
   

3. I think about sun protection every time I am out in the sun.
   
E. Please circle the option that best indicates how confident you are in your ability to sun protect in the following situations.

1. I feel confident in my ability to protect myself adequately from sun damage when I am at the beach/pool.  
   1. Strongly disagree  
   2. Disagree  
   3. Neither agree nor disagree  
   4. Agree  
   5. Strongly agree

2. I feel confident in my ability to protect myself adequately from sun damage when playing or watching sport.  
   1. Strongly disagree  
   2. Disagree  
   3. Neither agree nor disagree  
   4. Agree  
   5. Strongly agree

3. I feel confident in my ability to protect myself adequately from sun damage in all situations.  
   1. Strongly disagree  
   2. Disagree  
   3. Neither agree nor disagree  
   4. Agree  
   5. Strongly agree

F. The following questions are about protecting yourself from sun exposure.

1. Do you protect yourself from exposure to the sun consistently, that is, whenever you know you will be out in the sun for more than about 15 minutes? Yes No

2. Have you consistently protected yourself from exposure to the sun for the past 12 months? Yes No

3. Do you intend to consistently protect yourself from exposure to the sun in the next 12 months? Yes No

4. Do you intend to consistently protect yourself from exposure to the sun in the next 30 days? (If it is sunny). Yes No

G. When you are deciding about sun protection, how important is each of the following items?

1. Preventing skin cancer  
   Not at all important A little bit important Somewhat important Quite Important Extremely important
   1 2 3 4 5

2. Preventing skin damage which causes aging and wrinkles  
   1 2 3 4 5

3. Preventing sunburn  
   1 2 3 4 5

4. Presenting a responsible image to others  
   1 2 3 4 5

5. The approval of my parents or people that are important to me  
   1 2 3 4 5

6. The time, preparation and planning needed to protect myself  
   1 2 3 4 5

7. The discomfort and unpleasantness of using and wearing sun protection  
   1 2 3 4 5

8. The "uncool" image of people wearing hats and sun protective clothing  
   1 2 3 4 5

9. The "cool" image of having tanned skin  
   1 2 3 4 5

10. My friends lack of acceptance of the need to sun protect  
    1 2 3 4 5
H. Did you get at all sunburnt last weekend?

1. [ ] Yes 2. [ ] No

I. If yes, which of the following statements best describes the burn?

1. [ ] Red without being tender 2. [ ] Red and tender 3. [ ] Red, tender and blistered

J. How many times have you been sunburnt this summer? ____________

K. Have you made any attempt to get a tan this season through outdoor sun exposure?

1. [ ] Yes 2. [ ] No

L. Have you made any attempt to get a tan this season through a solarium or other indoor UV source?

1. [ ] Yes 2. [ ] No

M. To what extent do you feel you are at risk for skin cancer?

1. [ ] No risk 2. [ ] Low risk 3. [ ] Moderate risk 4. [ ] High risk

N. The following thoughts or experiences can affect the sun protection habits of some people. Think of similar thoughts or experiences you have had during the last month. Then rate how frequently these events have occurred by circling the appropriate number.

<table>
<thead>
<tr>
<th>Event</th>
<th>Never</th>
<th>Rarely</th>
<th>Occasionally</th>
<th>Often</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. I have read articles about skin cancer or skin damage and how to prevent it.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>2. I have looked for information about skin cancer or skin damage and how to prevent it.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>3. I have looked for new sunscreens, hats, clothing or products that can protect me from the sun.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>4. I have been emotionally moved by stories about people with skin cancer.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>5. I have become afraid of the consequences to my health if I do not protect myself from the sun.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>6. I have become afraid of the consequences for people I love if they do not protect themselves from the sun.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>7. I have thought how my sun protective behaviour could be a role model for other people.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>Statement</td>
<td>Never</td>
<td>Rarely</td>
<td>Occasionally</td>
<td>Often</td>
</tr>
<tr>
<td>---------------------------------------------------------------------------------------------</td>
<td>-------</td>
<td>--------</td>
<td>--------------</td>
<td>-------</td>
</tr>
<tr>
<td>8. I have thought how my wearing of sun protective clothing would increase its social acceptance in people I care about.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>9. I have thought how my tanning may encourage others to tan.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>10. I have told myself that protecting myself from the sun will make me a healthier person</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>11. I have felt that taking responsibility for my sun protection is a sign of maturity.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>12. I have told myself that protecting myself from the sun will show that I am a sensible, responsible person</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>13. I have noticed that dark tans are becoming less fashionable.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>14. I have noticed that many people protect themselves from the sun.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>15. I have noticed that many famous people take good care of their skin.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>16. I have told myself it is easy to protect myself from the sun.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>17. I have decided I must plan and prepare to protect myself before I go out into the sun.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>18. I have made commitments with myself to protect myself adequately from the sun.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>19. I have told my friends to remind me to reapply sunscreen.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>20. I have listened to my parents reminders to sun protect.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>21. My friends and I have supported each other in protecting ourselves from the sun and not tanning.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>22. I have kept things I use for sun protection handy so that I can protect myself easily</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>23. I have used reminders or cues to remind me to protect myself from the sun</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>24. I have checked the weather so I could prepare to protect myself from the sun.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>25. I have viewed sunburn as a unhealthy mistake rather than a natural occurrence.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>26. I have noticed that older people with tanned skin have skin that looks aged and leathery.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>27. I have viewed a tan as a sign of skin damage rather than good health.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>28. I have felt good about myself when I have protected myself adequately from the sun.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
</tbody>
</table>
29. I have felt disappointed in myself when I get sunburnt

<table>
<thead>
<tr>
<th>Never</th>
<th>Rarely</th>
<th>Occasionally</th>
<th>Often</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
</tbody>
</table>

30. I have noticed that my family or friends are disappointed in me when I get sunburnt.

<table>
<thead>
<tr>
<th>Never</th>
<th>Rarely</th>
<th>Occasionally</th>
<th>Often</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
</tbody>
</table>

O. If your skin was exposed to strong sunshine at the beginning of summer with no protection at all, and you stayed in the sun for 30 minutes, would your skin:

1. ☐ Just burn and not tan afterwards
2. ☐ Burn first then tan afterwards
3. ☐ Not burn at all, just tan

P. How would you describe your skin when you don’t have any tan?

1. ☐ Very fair
2. ☐ Fair
3. ☐ Medium
4. ☐ Olive
5. ☐ Dark
6. ☐ Very Dark
7. ☐ Black

Q. How old are you? __________ years

R. Are you:

1. ☐ Male
2. ☐ Female

1. ☐ Domestic student
2. ☐ International student

THANK YOU FOR YOUR TIME IN ASSISTING US WITH OUR STUDY

Date of birth ________________________