Knowledge of the UV index within Western Australia

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Knowledge of the UV Index within Western Australia

This thesis is presented in partial fulfillment of the award of an honours degree.

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Abstract

Australia has the highest rate of skin cancer in the world and despite the dedicated efforts of preventative campaigns since 1981; this number has increased over the past ten years (Carter & Donovan, 2007). With most skin cancer being attributed to Ultra violet radiation there is a pressing need for proper education, health promotion and preventative means. Previous Western Australian skin UV Index research has yielded findings of moderate awareness. However, there is the association between skin cancer prevalence and the UV Index but a lack of knowledge and application of the UV Index as a means of preventative measures against sun exposure. The Index itself has been broadcasted in Australia across a variety of mediums since 1996. This research project investigated UV Index base knowledge and salience compared to other weather reports and subsequently, how the UV Index can be used as an educational tool to identify risks to prolonged sun exposure.

This research project used a mixed methods approach applying both the use of focus groups, and questionnaires within the focus groups, to give a broad pallet of data to collate results and expand discussion from. Research methods utilised, included both unprompted memory recall and prompted recognition. Twenty-six participants made up the sample, separated into four focus groups based on gender and socio-economic status. The results indicated that participants had a low awareness of the UV index compared to other weather measures.

Various misconceptions about the UV Index were made including links to ‘burn-time’, fire warnings and a lack of knowledge of its direct application. However as a positive contribution of the study initial lack of awareness and applicable knowledge, the focus groups allowed participants to improve base understanding. Pre and post knowledge survey results showed an average increase from a score of 30% to 68%. These figures highlighted self-improvement in participant’s application of fundamental UV Index concepts. This was also supported by positive feedback about the use of the bell-curve as a tool to display the UV Index. Overall, the findings suggest that with the correct tool, message and application, the UV Index can still be an effective medium. However, its use must be part of a larger effort to improve knowledge and application of preventative behaviours in combating the effects of harmful UV radiation.
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Cancer Council Influence

The Cancer Council of Western Australia was a major part in the completion of this research project. This report aims to provide insight into questions of the UV Index’s usability, awareness and knowledge within public and practical applications of its message. This report will make recommendations for the Cancer Council in order for them to have informed research on the UV Index. The research conducted for this thesis was just a small part of a larger Cancer Council investigation and marketing strategy to see if the UV Index can be the next focal point in the skin cancer fight.
1. Introduction

Chapter One will outline the background behind this research project. The broad aim of this research project is to determine if the UV index is a possible concept in which to educate Australians about the dangers of prolonged sun exposure. This project will contribute to new knowledge by utilising research methods based on unprompted memory recall as well as prompted recognition. This will help to both test the salience of the UV Index whilst also establishing whether participants can be educated further about the Index through prompted yet self guided education. Chapter One will specifically outline the background of the research area, identify the research problem and subsequent research questions, define key definitions used in this thesis, and will conclude with an outline of the structure of the thesis.

1.1 Background

Australian is often referred to as a sun-blessed country that is best emanated by the public’s rich relation and lifestyle with the outdoors (Cancer Council Australia, 2008). Despite this sun rich culture, Australia has the highest rate of skin cancer in the world, with over 270,000 cases each year and with over 8,000 of these cases being potentially fatal melanoma’s (Carter & Donovan, 2007). Carter (2007) stated that dedicated sun smart campaigns have been prevalent in Australia since 1981 aimed at educating Australians about the dangers of the sun and the importance of preventative measures. With most skin cancer in Australia being attributed to the sun’s ultra violet radiation the need for public health promotion on this issue is paramount it also has prevalent since 1996 when the Australian Bureau of Meteorology adopted the internationally standardized UV Index (UVI) and began forecasting it for all major Australian centres (Carter & Donovan, 2007).
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The UV index is a tool used to visualize the amount of radiation reaching the Earth’s surface. The UVI values range from 0-20 with the higher the value the higher the risk of UV damage (Italia & Rehfuss, 2011). The UV index is seen as an educational tool used to “increase the sun protective behaviors in the public, leading to a decrease in the incidence of skin cancer” (Blunden, Lower, & Slevin, 2004). Since 2008, the average number of people diagnosed with skin cancer in Australia is well over 450,000 (Lemus-Deschamps & Makin, 2011). With cases of skin cancer increasing, the examination of the UV index and its value as an educational tool is needed (Italia & Rehfuss, 2011). In doing so, questions of whether in its current form it is effective and if not, what changes to such things as the promotion and display of the index can lead to increasing awareness & significant knowledge of the UV Index, drive this research.

1.2 Research Problem

Australia has the highest rate of skin cancer in the world, therefore research into the sociologic reasons behind this fact should not be understated (Cancer Council Australia, 2008). By engaging in qualitative research in the form of focus groups, the research will provide valuable insight into what Australians know about the UV Index, misconceptions and whether understanding can be improved.

From a long-term perspective, this research can help provide a roadmap for understanding individual’s knowledge of the UV Index, if it can be used as an educational tool and whether it can be changed to improve its message reception. All of these potential outcomes are aimed at helping to increase education and thus increase the adoption of sun smart behaviours in the wider community. Previous research from Carter and Donovan (2007) had suggested that despite moderate to high levels of awareness, the tool was not used and lay dormant in the creases of a weather report in an old newspaper. The rationale behind this study was to see if the UV Index can be reinvigorated. In this study, questions of its application or its inherited merit and value are raised given the low knowledge and application by Australians. This study aims to determine if the UV Index remains a viable concept in which to educate Australians about the dangers of prolonged sun exposure.
1.3 Research Questions

**Research Question 1:** What is the salience of the UV Index relative to other weather reports?

**Research Question 2:** What is the level of pre-existing knowledge that participants have of the UV Index?

**Research Question 3:** How can the UV Index be used as an educational tool to identify risks to prolonged sun exposure in Australia?

1.4 Definitions of Key Terms

**The UV Index** is a standardised measure of the level of harmful UV radiation that is targeted at the planet (Bureau of Meteorology, 2012).

**Stimulus material** is whereby UV Index relevant material is given or shown to participants in order to generate responses, views and opinions based on what is being presented.

**Quantitative** designed to measure how many people hold a specific point of view or measured value (Donovan & Henley, 2010).

**SPSS** is a quantitative based data entry system that analyses trends of data in order to find significant results. It allows for in depth data preparation, analytical reporting in order to create unique modeling of quantitative data (Skuza, 2012).

Prolonged **Sun exposure** when an individual is exposed to the sun for an extended amount of time.

The **UV Index bell curve** is a tool used to display the fundamentals of the UV Index including its core message. It appears as a colourful bell shape curve to highlight to the public the unique dangers to UV at specific times of the day (Cancer Council NSW, 2012).
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**Qualitative research** designed primarily for exploratory purposes. Typical research includes using focus groups and interviews (Aaker, Kumar, & Day, 2001).

A **Mixed Methods** approach combines both aspects of quantitative and qualitative research. It intentionally integrates various methods to draw on the strengths of each research type in order to create a broader perspective in data collection and analysis (Office of Behavioural and Social Sciences Research, 2012).

**Cancer Council** is a national department body that is involved in research, education and marketing of issues fighting cancer.

**Solar Noon** is a daily occurrence when the sun reaches its peak in the sky. At this point (between 12/12:20) the UV Index is at its highest and most dangerous level.

A **focus group** is a group discussion focused on a series of topics introduced by a discussion leader; the group members are encouraged to express their own views on each topic and elaborated on or react to views of other participants (Aaker, Kumar, & Day, 2001).

**1.5 Structure of the Thesis**
The overall structure of the thesis includes a review of the current literature providing rationale for this project in Chapter Two. Chapter Three will detail the methodology that helped develop a structured format for the research phase. Chapter Four highlights the results found through in the data collection phase. Chapter Five provides discussion and elaboration of the themes and main findings. Finally, Chapter Seven details the references cited in this thesis, while Chapter Eight provides appendices featuring further details from the research project. Throughout this thesis figure 2 is referred to which is the Research Methodology Road Map. The figure illustrates the conceptual framework of the research project including the broad aim, research questions and the methodology of the focus groups derived directly using a top down aspect. The road map allows for an easy point of reference and broad interpretation of the approach taken in this project.
2. Literature Summary

The purpose of this Literature Review is to explore and analyse primary sources of data and cite additional secondary sources in order to evaluate the usefulness of the UV Index. The evaluation of literature is based around understanding whether in Australia the UV index is currently and could in the future an effective educational tool to help increase sun protective behaviors (Blunden, Lower, & Slevin, 2004). Chapter two provides a review of the current literature regarding skin cancer in Australia, the history of skin cancer campaigns and the UV Index in terms of knowledge, awareness and behaviour change. Various academic sources both internationally and nationally have been drawn upon to give a holistic view drawn upon again in the analysis of the data collected for this study to answer the research questions.

2.1 Australia and the Journey of Skin Cancer

Skin Cancer rates of diagnoses and mortality are continuing to have an increased malice in today’s society. It is predicted two out of three Australians will be diagnosed with skin cancer by the age of seventy (Cancer Council Australia, 2008). The Cancer Council has been utilizing a range of health campaigns to advocate the need for sun protection behaviors in combating the effects of the suns UV rays in an attempt to present a preemptive approach in fighting skin cancer. In 2010, melanoma, the deadliest skin cancer disease killed 1452 Australians, and these numbers are increasing (Cancer Council Australia, 2008). Carter and Donovan state that there has been an increase in both sexes at about 5% per year in relation to melanomas (2007, p. 41). They also point out a proven scientific fact that “Ultraviolet UV radiation from sunlight exposure is directly associated with melanoma of the skin” (2007, p. 41). Despite the increases there are major factors that contribute to a person’s susceptibility to melanomas. These include: early childhood exposure, skin sensitivity with fairer people having increased susceptibility and external factors such as Australia’s decreasing ozone layer (Carter & Donovan, 2007). With most skin cancer attributed to Ultraviolet radiation (UVR) the need to communicate its affect has been in place since 1996 when it became a worldwide standardized tool; the UV
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The UV Index tool provides information on the strength of UV rays in relation to time of the day (Blunden, Lower, & Slevin, 2004).

The Cancer Council of Australia was founded in 1961 with six state councils. Recognising the devastating effects that cancer can have on society, skin cancer was targeted in sun conscious advertisements and social campaigns were marketed whereby using the slogan slip, slop, slap in the Sun Smart Campaign (Cancer Council Australia, 2008). In 1988 the Cancer Council of Victoria launched an integrated marketing campaign involving multiple strategies including multimedia, policy development, sponsorship and education (Department of Health and Ageing, 2006). The Sun Smart campaign was founded on the principles of improving protection behaviors among the wider community (Cancer Council Australia, 2008). In 1995 the Cancer Council of Victoria created the “you can leave your hat on” campaign, which was, aimed at influencing younger people’s sun protection behaviors. There was also a greater attempt to counter the idea within younger demographics that the idea of sun protection being unfashionable (Department of Health and Ageing, 2006). Sun protection strategies continued to evolve reflecting the attempt to break down the cultural norms and problems that have led to increase sun exposure and skin cancer rates. Between 1990 and 2002 the “me no fry” campaign was utilised in NSW and Western Australia aimed at replacing the sun adoring culture of Australian with a culture of sun protection (Department of Health and Ageing, 2006).

Between 1999 and 2005 skin cancer campaigns moved more towards the effects of sun exposure rather than preventative measures. Campaigns such as “time bomb” and the tattoo campaign with the slogan “skin cancer, it’s a killer body art” aimed to dispel misconceptions about the risk of tanning (Department of Health and Ageing, 2006). Tanning based advertisements have continued with recent campaigns such as the skin cells in trauma campaign which graphically represented the effects of tanning and the links to melanoma (Cancer Council Australia, 2008).

In 2007 the slip, slop, slap slogan was updated to include slip, slop, slap, slide and seek (Cancer Council Australia, 2008). These updated five ways to be sun smart can be seen in figure 1.
It was hoped that by illustrating the dangers of exposure on any day would lead to increased sun protective behaviors and thereby to a decrease in skin cancer numbers. This however appears to be unsuccessful with increasing incidences of skin cancer every year in Australia (Blunden, Lower, & Slevin, 2004). Skin cancer campaigns have evolved over the past 30 years but what remains constant are the themes of increasing protection behaviors and increasing knowledge of the risks of prolonged sun exposure.

2.2 The UV Index
The UV Index is a tool that advocates for sun protection behaviours based on providing knowledge of the most dangerous periods of the day for sun exposure. Despite its premise it has not been used in either a state or nationwide campaign. The UV Index itself however has been presented solely to the public since 1996 through such mediums as print and television. Despite its prolonged presence in the eyes of the public several studies have reported moderate levels of awareness in Australia however the UV Index does not influence knowledge, attitudes and sun protection behavior or sun exposure (Italia & Rehfuess, 2011). Blunden, Lower and Slevin (2004) conducted a telephone survey in 2003 with 452 West Australian participants and found that 90% had heard about the UV Index. Despite the study reporting a high level of awareness knowledge and application showed diminished results. Carter and Donovan (2007) highlight this theme in that they found several misconceptions of the Index and a lack of correct knowledge of its use. Such examples of a lack of correct
knowledge include: the lack of appreciation of solar noon, which is the peak UV high (55% incorrect), UVI being independent of temperature (61.2% incorrect) and with 23.3% participants in the demographic 22-44 year olds misinterpreting UV Index for a “burn-time” measure (Blunden, Lower, & Slevin, 2004).

Themes of The UV Index’s relevance to other weather reports, base a lack of base knowledge and how to improve knowledge appear to be prevalent questions that need to be answered the UV Index can be used properly to fulfill its original goal of helping to shape preventive behavior and lead to a decrease in skin cancer rates.

Overall in Western Australia, there seems to be a high level of awareness but a diminished level of knowledge and without correct knowledge application of sun protection behaviors becomes an increasingly difficult task. It is largely considered that awareness of a health issue does not always lead to behavior change (Blunden, Lower, & Slevin, 2004). This study argues that an increased in knowledge of the correct use of the UV Index is important. However, accurate knowledge about the UV tool is necessary to encourage increasing knowledge can remain a long-term goal for reduced cancer rates. From there, behavior change to be a long-term goal with the immediate task being to increase knowledge.

2.3 Communicating Preventative Behaviour in the Sun

In the fight against skin cancer the use of educational means to communicate preventative behaviors to the public is essential. One interesting way of communicating sun protection behavior noted by Hurst, Janda, Mair, Marshall, Soyer, & Youl (2012). The basis of the online study was an Online to investigate whether young adults would like to be alerted to the UV index either by electronic means such as emails, text, mobile apps (Hurst, et al., 2012). The online survey consisted of 141 participants with a median age of 34 years. Multivariate logistic regression and bivariate logistic regression were used to help analyse the collected data (Hurst, et al., 2012). Overall it was found that 80% of participants stated they would be open to receiving electronic messages about the UV Index. The major vehicles in which to communicate these messages were SMS and email: 20% preferred to receive via SMS
and 42% via email. These figures highlight a specific theme in that young adults are open to receiving updates on the UV index and preventative advice in relation to its information.

Another form of distributing sun safe and UV messages can be done within a multimedia environment. Avery, Coupland, Garrud, Glazebrook & Williams (2006) conducted a study that aimed to evaluating the impact of an interactive multimedia program called skinsafe. Research was used in a cluster-randomised, controlled trial in the UK at 5 family practices in which doctors prescribed patients with higher risk skin characteristics (Avery, et al., 2006). Results of the 259 participants showed that patients were more likely to report mole checking and adopt protective skin behaviors after completing the 15-minute interactive program. A key theme in the previous two studies is that interactive, visual and targeted messages have a greater effect on education aimed at creating behavioral change in an individual rather than through news reporting. This study compared results before the trial and after, helping to show changes in base knowledge and changes that had been made to individual’s preventative behaviors. However, gaps in the search were the lack of further qualitative analysis that could have further explained the benefits of the trial and what participants learnt from the experience. If this practice was going to be adopted in Australia in relation to the UV index careful planning would need to be made to ensure correct education and information can act as a driving force for behavioral change.

2.4 Awareness and Salience
Since 1996, The UV index has been widely used in weather forecasts ever since 1996 when the Australian Bureau of Meteorology adopted the internationally standardised UV Index (UVI) and began forecasting it for all major Australian cities (Carter & Donovan, 2007).

Alberink, Green, Russell and Vallery (2000) conducted a research project in which a “self-administered questionnaire was used on two occasions in 1997 to ask about knowledge of UV indexes shown in the media and about possible influence on outdoor behavior”. Participants were randomly selected from the electoral role of
Western Australia and invited to participate in the survey. Of the 1341 participants surveyed there were 977 responses, 423 were male and 554 were female. The survey was administered once in the summer and once in the winter to see if responses differed between winter and summer.

The results showed that 92% of men and 86% of women were aware and had seen the UV indexes during summer. Of that number however only 28% men and 46% of women said that their outdoor behavior was influenced by the index.

Some positives of this study were the large sample size of 922, the administration of the survey on a bilateral basis to thereby identifying behavioral changes as a result of weather changes. Some of the limitations of the study were that there were not enough psychographic and demographic breakdowns of respondents; therefore a lack of further in depth analysis could be gathered from the responses. For example, questions such as why males were significantly lower in adoption of behavior were not properly explored. A good forum to analyse these findings would be in a focus group where questions of why and relevance of the UV indexes messages could be asked directly to individuals, giving a more detailed response. The report highlights two consistent themes that of a high rate of awareness of the index but a low rate of behavioral influence caused by the index’s information. Accordingly, research question one for this study aims to:

- Identify the salience of the UV Index compared to other weather report measure.

2.5 Public Knowledge and Understanding of UV Index
Thompson (2005) details a study undertaken by the UK’s Sun Smart campaign into the public awareness of the index itself. Results showed that 70% of people in a random intercept survey in northeast London had no idea what the UV index was (Thompson, 2005). The results of the survey commissioned by Boots were released to demonstrate the importance of knowing skin type and when to protect oneself from over exposure to the sun (Science Letter, 2005). Even though the survey results are appear in numerous newspaper articles there is little detail into research methodology.
and the framework for which the study was undertaken. These limitations greatly hamper the validity and use of the information despite the alarming results. Such key information as sample size, demographic breakdown and follow up questions leave the statistics presented nothing more than an interesting finding. It can also be said that England has a considerable lower rate of skin cancer cases than Australia 70,000 v Australia’s 450,000 cases and growing. This can be attributed to the geographical location of each country and Australia’s reduction in stratospheric ozone which increases Australia’s UV dangers compared to that of a less sun ridden country of England.

This study highlights a theme of lack of knowledge, which differs from the Australian results, which conclude there is substantial knowledge but little behavioral change. Blunden, Lower and Slevin (2010, p. 208) state, “within the behavioral sciences discipline it is recognized that awareness and/or knowledge of a health issue does not always lead to behavior change”. This statement reignites through UV research in which behavior change is considerably low in spite of awareness.

From a local perspective the journal article Knowledge, Awareness, and Use of the UV Index Amongst the West Australian Public (Blunden, Lower, & Slevin, 2004) analyses the west Australian public in their relation to UV index knowledge and behavior change related to that knowledge. A research questionnaire was developed, pilot tested and peer reviewed by five public health and cancer control experts in order to have an accurate and well developed methodology and survey format. The 20-question survey was administered via telephone and done through a random sample of Perth metropolitan numbers (Blunden, Lower, & Slevin, 2004). A total of 1,139 were contacted and 519 individuals’ results were used (251 male, 250 female). A positive of the survey was the high volume of respondents a limitation was a lack of further qualitative based discussion which could have provided reasoning behind respondent’s answers.
The results for this survey reported that 90% of respondents indicated they had heard of the term UV index which was considerably higher than other states and comparative studies in Canada (Blunden, Lower, & Slevin, 2004). On further follow up questions about what the UV index is (UV strength, how strong sun is) over 70% provided one or more correct answers. These figures highlight a strong awareness and basic understanding of the UV index and its purpose.

In terms of the UV Index’s affect on behavioral sun protection behavior 83% of respondents said that knowing the UV forecast did not influence their behaviour. These figures from this survey highlight a consistent theme in Australia as also seen in Alberink, et al., (2000) report of a high basic knowledge and practical understanding of the UV index but a lack of sun protection action/behavior based on that knowledge. From a comparative perspective the Australian studies highlight difference in that there is a far greater knowledge of the index even if that information is not enacted upon.

Continuing analysis from Australia, Carter and Donovan (2007) detailed public misunderstandings found in the interpretation, knowledge and application of the UV Index This report highlights a series of focus groups conducted to further examine whether Australians had a sufficient understanding of the UV Index and familiarity.

Participants for the focus group were recruited in 2004 via a random telephone selection from the White page listings in Perth (Carter & Donovan, 2007). A total of 44 participants were recruited for 6 focus groups stratified by age groupings (separated and then analysed within these groups).

The survey highlighted though the majority of people were aware of the UB index and had seen in it on television there were often misconceptions by individuals. Misconceptions of the index included misinterpreting the level of the UV index to explain how long it took to burn in the sun (Carter & Donovan, 2007). Participants also appeared to consistently associate incorrect UV levels directly with temperature levels assuming a linear relationship between the two (the higher UV, the higher temperature).
Carter and Donovan (2007) provide a value qualitative base in which to compare and contrast with more quantitative studies previously highlighted. The research used based focus groups that allowed the administrators to ask more in depth questions regarding UV knowledge and application. The results highlighted key areas of misconceptions and lack of proper understanding. This is significant in that previous studies highlighted a purely quantitative understanding of the UV index being high and as well as 90% of specific respondents being aware of the index (Blunden, Lower, & Slevin, 2004). From the focus groups it can be said very generically that most Australians are aware of the index but are not substantially aware of its primary function and truths. Utilising this survey on a comparative basis, a conclusion and hypotheses can be generated about an average Australian and their true understanding of the UV index. Accordingly, research question two aims to identify:

- What is the level of pre-existing knowledge that participants have of the UV Index?

2.6 Improvement in Knowledge and Understanding

A key research gap identified in the analysis of numerous primary and secondary data sources in relation to the UV index was the lack of any educational campaign about the Index itself. Studies have shown that despite many Australians having a basic recollection and understanding of the index with up to 90% aware of index (Blunden, Lower, & Slevin, 2004) there is a lack of further in depth understanding of the Index with many misconceptions about its purpose (Carter & Donovan, 2007). Such insubstantial knowledge and active engagement with the model negates how effective it could potentially be as an educational too.

If The UV Index tool is to be used for its original purpose of helping to actively increase skin protection behaviors their needs to be active educational campaigns and information available to Australians (Blunden, Lower, & Slevin, 2004). Education based specifically on the UV index and how to utilise that knowledge for increased skin protection behaviors is needed. With young Australians typically the most at risk the educational means of distribution must be delivered appropriately for their
Knowledge of the UV Index within Western Australia
David Mercovich 10143243

lifestyle (Cancer Council Australia, 2008). The use of digital and interactive means of education has been shown as a worthwhile means for education distribution with this group here in Australia. Through various digital mediums UV Index information and call to action statements could be communicated to help tackle the previously mentioned theme of high awareness with low adoption. However to do this the benefits of the call to action need to outweigh the perceived cost by individuals (Avery, et al., 2006).

Based on a review of the current literature, there is some evidence to support that Australians are aware of the UV Index and to a certain extent its purpose. However studies have emulated the fact that this base awareness is followed by a lack of in depth knowledge and various misconceptions. If the UV Index is to be properly understood and acted upon individuals must first have a considerable level of understanding of its purpose, limitations and practical uses. Questions of its relevance to an individual compared to other weather reports and how to improve individual knowledge are constant themes derived from previous literature academic studies. Without a pragmatic understanding by individuals the UV Index as an educational tool will continue to be a flawed in the unrelenting battle against harmful UV rays and the often-deadly consequences that it entails. Subsequently, research question three asks that:

- How can the UV Index be used as an educational tool to identify risks to prolonged sun exposure?
2.7 Research Gaps

In summary, a review of the recent literature highlights that Australians are aware of the UV Index and to a certain extent, its purpose. However, studies have emulated the fact that this base awareness is followed by a lack of in depth knowledge and various misconceptions. Being aware of something does not always equate to capable understanding. If the UV Index is to be properly understood and acted upon individuals must first have a considerable level of understanding of its purpose, limitations and practical uses. Without this an educational tool such as the UV Index will continue to be a flawed in the unrelenting battle against harmful UV rays and the often-deadly consequences that it entails. Based on a review of the existing literature and theory of behavior change this study aims to determine if the UV index is a useful tool in which to educate Australians about the dangers of prolonged sun exposure. The following research questions were devised for this study based on gaps in the literature that showed a need for education development on the UV Index:

- **Research Question 1:** What is the salience of the UV Index relative to other weather reports?

- **Research Question 2:** What is the level of pre-existing knowledge that participants have of the UV Index?

- **Research Question 3:** How can the UV Index be used as an educational tool to identify risks to prolonged sun exposure?
3. Method

Chapter three outlines the methodology of this research project. This project used a mixed methods approach utilising the quantitative techniques as surveys and questionnaires in a qualitative environment consisting of a focus group. Focus groups are often used during an exploratory phase in the market research process in helping to define a problem or future action precisely (Aaker, Kumar, & Day, 2001). The methodology structure of this research project undertook the notion of exploring the broad aim of determining if the UV index is a useful tool in which to educate Australians about the dangers of prolonged sun exposure. Three research questions were developed in order to give the research a framework in gathering information and processing its outcomes and meanings. This was done through the means of thematic analysis and frequency analysis given the mixed methods approach.

3.1 Research Design

Focus groups are a “qualitative research technique in which people are interviewed in a group setting” (Neuman, 2006, p. 412). Focus groups were chosen based on the benefits of allowing the moderator to “facilitate free, open discussion by all group members” (Neuman, 2006, p. 412). This allows for the expansion of ideas and further in depth discussion of ideas, however its depth is limited by its size in comparison to an interview setting. Using focus groups also aids in the interpretation of quantitative data such as surveys. The use of a mixed methods approach in this study allows the focus group to facilitate in depth discussion of ideas about the UV index whilst also providing quantitative data to support and enlighten those themes discussed (Neuman, 2006). Precedent for the use of such techniques in social marketing research can be found as recent as Carter and Donovan (2007), who utilised two samples consisting of focus groups and interviews. The techniques allowed for the expansion and further discussion of the topic of the UV Index in Western Australia. Their research can be seen as a complimentary follow on from previous quantitative based study on the awareness of the Index in Western Australia seen from Blunder, Lower & Slevin (2004).
3.2 Pilot Study

In order to test the methodology and the investigation of the research question 3 test focus groups were used as part of a pilot study. A pilot study can help improve reliability and validity while also acting as a testing ground for preliminary versions of a hypothesis (Neuman, 2006). The three focus groups were conducted at Edith Cowan University on the Joondalup campus and consisted of students both male and female aged between 18 and 25. During these focus group several issues, problems and challenges arose that helped act as a testing ground for the premise of focus groups and how they needed to be improved for the final study. Table 1 highlights issues that arose during the pilot study and how these helped to shape the final proposed research procedure and methodology.

<table>
<thead>
<tr>
<th>Issue</th>
<th>Resolution</th>
</tr>
</thead>
<tbody>
<tr>
<td>Participants did not believe the fact sheet information was true when asked to tick what answers they found most surprising</td>
<td>The fact sheet was changed to have a title that stated “Facts”. The moderator also emphasized this point to participants in the real focus groups</td>
</tr>
<tr>
<td>The pilot study had mixed genders with a combination of both men and women being in focus groups. This raised issues with the validity of data, as there were often philandering behavior that retracted from the aim of the research.</td>
<td>The real focus groups were separated by gender, age and socio-economic status to help segment answers and also eliminate downtime caused by mixed gender focus groups.</td>
</tr>
<tr>
<td>Participants raised confusion in the wording of some of the questions in the pre-post test questionnaires</td>
<td>The questionnaire was re-worded in order to be more easily read and answered in the real focus groups</td>
</tr>
<tr>
<td>Visual Cues were seen as too small and not easily defined coming from a computer or plain paper also were delays in set up.</td>
<td>The six visual cues were printed on A1 canvas backed cardboard which made them easier to see and interpret.</td>
</tr>
</tbody>
</table>

The test focus groups started as largely unscripted but by the end of the pilot study the test runs allowed for the scripting of the focus groups that helped align with methodology and made the collection of data quicker, with less downtime. Figure 2 (Research Methodology Road Map) highlights the structure of the research project and the focus groups, which were finalised and helped in their design by the trials and discoveries made in the pilot study.
3.3 Participants

People between the ages of 18 and 45 are the most susceptible and at risk to skin cancer with 18-29 fair skinned people reported as having the highest sunburn prevalence at 66% (Centres for Disease Control and Prevention, 2012). Even though this percentage is based on an American study similar results and trends are found across Australia having which has highest rates of skin cancer in the world (Department of Health and Ageing, 2006). Accordingly, participants for the focus groups ranged from ages of 18 to 45. This research project consisted of four focus groups that were conducted over a two-week period. The participants were recruited via an external agency West Coast Field Services (WCFS) in Applecross who also provided the venue for the focus groups. The recruitment process was done through telephone calls based on socio economic status (SES), which was broadly determined based on postcodes. By doing this, it allowed the focus groups to be specifically separated by both gender and SES status. This was done in order to provide unique pillars in order to test UV Index concepts to a broader audience, which helps to expand the potential for differing responses.

Fourty participants were recruited with the idea that the focus groups would consist of 10 participants each. However, as is the case in qualitative research, finding consistency in participant numbers can be difficult (Vicsek, 2010). Subsequently, 26 participants out of a confirmed 40 attended on the days of their focus group. Table 2 highlights the gender breakdown on the y-axis, whilst on the x-axis participants are divided between their age and also SES demographic. There was a fairly even age distribution amongst the focus groups with each age bracket with 12 participants being in the 30-45 brackets and 14 being from the 18-29-age bracket. In terms of SES of the participants, determined by WCFS, the two male focus groups had a total of 11 participants with four being from the low SES demographic whilst seven were from the upper SES demographic. This was determined by associating levels of SES status to participant’s postcodes which is seen a useful way to determine social class (US National Library of Medicine National Institutes of Health, 1999). The two female focus groups had a total of 15 participants with seven being from the upper SES and 8 from the lower SES demographic.
Table 2- Socio Economic and Gender Breakdown of Participants

<table>
<thead>
<tr>
<th></th>
<th>Lower SES</th>
<th>Upper SES</th>
<th>TOTAL</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>18-29 years</td>
<td>30-45 years</td>
<td>18-29 years</td>
</tr>
<tr>
<td>Males</td>
<td>2</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>Females</td>
<td>5</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>TOTAL</td>
<td>7</td>
<td>5</td>
<td>7</td>
</tr>
</tbody>
</table>

3.4 Procedure

Research methods are seen as a set of techniques used in measuring and observing aspects of social life, refining data and data analysis data into the discussion and reporting of results (Neuman, 2006). The focus group approach allows for the open discussion of ideas and collaboration in emerging new ideas and consensus between group members (Patton, 2002). It is very important that the moderators conduct the focus group in order to not prompt or give personal input in order for the data not to be influenced (Aaker, Kumar, & Day, 2001). The four focus groups conducted for this research project was done through the method of an “exploratory focus group [which] are commonly used …in market research process” in order to help gain insight and knowledge into baseline levels of knowledge of the UV Index and how its interpretation is viewed and its practical use to participants when educated about its purpose. Each group of participants was involved in a voluntary focus group that took between 70-90 minutes.

Figure 2 highlights the structure of this research project; from a viewpoint of the broad aim the three emergent research questions (Neuman, 2006), phases and the focus group detailed structure. The purpose of the Research Methodology Road Map is to allow the broad aim to have a sequential path in which the focus group should be conducted in order to directly follow the research questions and their phases. This provides a two-way highway of information flow up and downstream allowing the
procedure to be both complex in data collection but streamlined in the process of doing so. Figure 2 (Research Methodology Road Map) highlights the procedural approach taken in the focus groups and how this relates to the methods, aims and research questions posed. The diagram highlights the two broad streams that made up the focus group. The first stream was the pre-stimulus material which was about testing the recall knowledge of participants about the UV Index without being prompted thus determining the salience of the UV Index term against other weather measures (this can be seen in Appendix 7.1) Post stimulus material was the second stream which highlighted the introduction of the UV Index term and educational material. Within these two broad streams the three research questions of the project fall under with research question one situated in the pre stimulus stream and research question 2 and 3 falling under the post stimulus stream. These two broad streams and research questions helped to provide an informed and structured backbone in which the procedure of the focus groups was developed and followed. This procedure was broken down into six distinct phases that highlight the main touch points that occurred throughout each focus group.
Figure 2- Research Methodology Road Map
3.4.1 Phase One: Unprompted awareness (salience) of UV Index

The focus groups consisted of two broad aspects being pre stimulus material and post stimulus material. The pre stimulus material consisted of the salience questionnaire, which was about gathering unprompted recall of the UV index in comparison to other weather report measures. The use of unprompted awareness is common within the field with the Department of Health and Ageing using the method in the study “Evaluation of National Skin Cancer Awareness Campaign 2008-09” (Department of Health and Ageing, 2009). The post stimulus aspect meant the introduction of UV index related content such as a specific questionnaire see Appendix 7.2 and the introduction of visual material such as that seen in Appendix 7.5-7.10. This then becomes a recognition memory aspect rather than recall as the focus group participants are now aware that the premise and focus of the session is about the UV Index where as the pre stimulus section was about finding how salient the UV Index was in a non prompted phase in order to test the notions of recall v recognition memory. After the salience questionnaire participants were asked to openly discuss their results. Table 3 represents the questions participants were asked in the salience questionnaire.

Table 3- Salience Questions

<table>
<thead>
<tr>
<th>Survey</th>
</tr>
</thead>
<tbody>
<tr>
<td>Question 1</td>
</tr>
<tr>
<td>Question 2</td>
</tr>
</tbody>
</table>
3.4.2 Phase Two: Baseline knowledge of the UV Index

In this phase participants were tested on their pre-existing knowledge of the UV Index and were asked to complete a questionnaire. After the baseline knowledge questionnaire participants handed back their responses and were asked not to discuss their results in order for participants to gain further knowledge because there would be a posttest follow-up questionnaire that was exactly the same. This meant participants would not know whether they answered questions correctly, as the actual focus group discussions were used as self-directed learning to help improve knowledge rather than the knowledge questionnaires themselves.

Table 4- Pre & Post Knowledge Questionnaire

<table>
<thead>
<tr>
<th>Questionnaire</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Q.1</strong></td>
<td>What is the average UV Index rating in Perth during summer?</td>
</tr>
<tr>
<td><strong>Q.2</strong></td>
<td>What is the average UV Index rating in Perth during winter?</td>
</tr>
<tr>
<td><strong>Q.3</strong></td>
<td>The sun’s UV intensity remains fairly constant throughout the day (Agree/Disagree)</td>
</tr>
<tr>
<td><strong>Q.4</strong></td>
<td>Does cloud cover increase or decrease the intensity of the sun’s UV rays (Y/N)</td>
</tr>
<tr>
<td><strong>Q.5</strong></td>
<td>At what time of the day are you most likely to get sunburnt (to nearest hour)</td>
</tr>
<tr>
<td><strong>Q.6</strong></td>
<td>Where have you seen the UV Index reported?</td>
</tr>
<tr>
<td><strong>Q.7</strong></td>
<td>From what UV Index value upwards is it possible to get sunburnt?</td>
</tr>
<tr>
<td><strong>Q.8</strong></td>
<td>What is the earliest time in the morning you can get sunburnt in Perth in December?</td>
</tr>
<tr>
<td><strong>Q.9</strong></td>
<td>Can you get sunburnt in Perth summer after 5pm (Y/N)</td>
</tr>
<tr>
<td><strong>Q.10</strong></td>
<td>Is it difficult to get sunburnt in Perth from May to September (Agree/Disagree)</td>
</tr>
<tr>
<td><strong>Q.11</strong></td>
<td>In Perth the sun’s UV Intensity is highest at around 2pm (Agree/Disagree)</td>
</tr>
</tbody>
</table>
3.4.3 Phase Three: Prompted awareness

The next step in the focus group was where the moderator displayed and discussed with the participants a range of visual cues related to the UV Index and asked participants to give their feedback on each of them in terms of understanding, knowledge and applications of the information. An example of a visual cue can be seen in Figure 3. At no stage did the moderator give information feedback in order to give a correct or incorrect notion to the respondent’s thoughts. This also meant the moderator acted as a wall to bounce ideas off but did not intervene in responses and the facilitation allowed for participants to develop their own line of thinking and interpretation free of subjective influence from the moderator (Neuman, 2006). Figure 3 highlights the six visual cues used during the focus group, the numbers highlight the order in which they were showed to participants.

Figure 3- UV Index Visual Cues (Bureau of Meteorology, 2012)
3.4.4 Phase Four: Assessment of groups understanding of the UV Index fundamental concepts

After the visual cues participants were handed fact sheets by the moderator which contained facts about the UV Index which were consistent with the main learning concepts of the focus group, that being; Solar Noon, above UV of 3 you can get sunburnt, the varying nature of the UV Index throughout the day and the seasonality of the UV Index rating throughout the year. The fact sheet combines in two both phase four and five with it revealing the groups understanding of UV Index fundamental concepts and also illuminating the things the group found most surprising. This was analysed both in terms of frequency and thematic analysis.
3.4.5 Phase Five: Cut-through phase

Once given these fact sheets participants were asked to tick facts they found surprising and cross facts they did not find surprising. After this they were asked to list their top 3 surprising facts with 1 being the most surprising. These answers were then discussed in the open focus group forum. This fact sheet helped in understanding participants thinking and helped give an insight into cut-through facts that resonated as new or the most surprising (Table 5 illustrates the facts in the fact sheet).

Table 5- UV Index Facts Sheet

<table>
<thead>
<tr>
<th>Facts</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1. You get sun burnt fastest when the sun is highest in the sky</td>
<td>2. You get sunburnt fastest when your shadow is the shortest</td>
<td>3. The sun is closet to you at its highest point in the sky</td>
</tr>
<tr>
<td>4. UV levels change throughout the day</td>
<td>5. In October UV levels are just as intense at 9am as they are at 3PM in Perth</td>
<td>6. Early morning and late afternoon are the safest times to avoid sun burn</td>
</tr>
<tr>
<td>7. You are safe from sunburn after 4:30pm in Perth even during the height of summer</td>
<td>8. In December you can et sunburnt from 8:10 am onwards in Perth</td>
<td>9. In Perth there are only 35 days per year in midwinter that you cant get sunburnt</td>
</tr>
<tr>
<td>10. UV Levels peak during summer</td>
<td>11. It is easy to get sunburnt in Autumn and Spring</td>
<td>12. In December you can get sunburnt from 8:10 to 4:30pm</td>
</tr>
<tr>
<td>13. In mid-September you can get sunburnt in Perth between 9:30am and 2:40pm</td>
<td>14. In June in Perth you can get sunburnt from 11:40 am to 12:50pm</td>
<td>15. There are no days in the year in Carnarvon when sun protection is not required</td>
</tr>
<tr>
<td>16. Sun protection is required all year round in the northwest</td>
<td>17. In Western Australia UV levels increase the further north you travel</td>
<td>18. UV levels are not dependent on temperature</td>
</tr>
<tr>
<td>19. UV Levels peak at midday even tough temperatures continue to increase in the afternoon</td>
<td>20. UV radiation is invisible and cant be seen or felt</td>
<td>21. Sun protection is required when the UV Index is 3 or more</td>
</tr>
<tr>
<td>22. In Perth in the middle of summer the UV Index reaches 12 (extreme) on most days</td>
<td>23. Perth remains at ‘very high’ and ‘extreme’ UV Index levels for 6 months of the year</td>
<td></td>
</tr>
</tbody>
</table>
3.4.6 Phase Six: Post knowledge of UV Index

Participants were then given the post-knowledge questionnaire, which was exactly the same as the pre knowledge survey; however participants were not told that this would happen in order to ensure the answers were not influenced or skewed. By testing salience of the UV Index, pre and post knowledge the data collection was not limited to qualitative thematic analysis, and the nature of many of these themes could be compared to that of the individual quantitative responses. The individual participant’s questionnaires themselves were joined together so that one participant’s answers did not mix with others. This meant the individual focus groups could be compared to each other and that pre and post knowledge improvement could be analysed on an individual basis as well as on a holistic level. In order to remain consistent with anonymous and confidential nature of the research project, questionnaires were coded to ensure pre and post responses could be compared.

**Questionnaire**

| Q.1 | What is the average UV Index rating in Perth during summer? |
| Q.2 | What is the average UV Index rating in Perth during winter? |
| Q.3 | The sun’s UV intensity remains fairly constant throughout the day (Agree/Disagree) |
| Q.4 | Does cloud cover increase or decrease the intensity of the sun's UV rays (Y/N) |
| Q.5 | At what time of the day are you most likely to get sunburnt (to nearest hour) |
| Q.6 | Where have you seen the UV Index reported? |
| Q.7 | From what UV Index value upwards is it possible to get sunburnt? |
| Q.8 | What is the earliest time in the morning you can get sunburnt in Perth in December? |
| Q.9 | Can you get sunburnt in Perth summer after 5pm (Y/N) |
| Q.10 | Is it difficult to get sunburnt in Perth from May to September (Agree/Disagree) |
| Q.11 | In Perth the sun's UV Intensity is heisted at around 2pm (Agree/Disagree) |
3.5 Data Analysis

The recording of these events are analysed and coded in that participant’s responses are not linked directly to them but rather linked to a decoded pseudonym name (FGP#1). Their names were only used a point of politeness in conducting the focus group and will be not be used to identify their responses. Rather their unique name was given to help ensure anonymity and validity of the data. Coding of the data in this way made it easier for further breakdown of the responses and helped establish key themes across the four focus groups.

During the focus group respondents were asked to fill in three questionnaires. These questionnaires helped to give supplementary data to assess the respondent’s base knowledge of the UV Index. These questionnaires were coded and again linked to the specific respondent to help provide further data to answer the research questions. The questionnaire responses were used to form part of the supportive material in analysing themes in the qualitative data. The use of thematic and frequency analysis was used to help to give a multi dimensional aspect to the data analysis for this study.

3.5.1 Thematic Analysis

Thematic analysis is “used to refer to any qualitative data reduction and sense-making effort that takes a volume of qualitative material and attempts to identify core consistencies and meanings…the meanings are often called patterns or themes” (Patton, 2002, p. 453). The use of thematic analysis was used in order to find consistent themes across the four focus groups in order to identify clusters of recurring comments in terms of attitudes, beliefs and misconceptions of the UV index. The nature of the focus group format allowed for emergent design flexibility, meaning that inquiry into certain aspects of situations could change and different areas could have a deeper conversation or thought level than others (Patton, 2002). This emergent nature is apparent due to the four differing focus groups and individual participants who have unique beliefs and personalities. Analysing themes or trends in the focus groups becomes a more apparent method of analysis rather than trying to equate numerical value to participant responses. Thematic analysis consists of utilizing quotes, observations and body language to help decipher a vast amount of information into reoccurring themes that may arise (Patton, 2002).
3.5.2 Frequency Analysis
Due to the nature of the mixed methods approach, the use of frequency analysis was also be used in order to identify results and meanings derived from the questionnaires and fact sheets given to the participants during the focus group procedure. Frequency analysis consists of gathering quantitative data whether that is numerical or formulated in order to appear in the nature of a percentage or a quantifiable estimate (Patton, 2002). The utilisation of questionnaires and mini tests means numerical values can easily be assigned to responses in order to easily quantify results, which can help elude to trends or themes. The salience questionnaire, the pre and post knowledge tests and the fact sheets were analysed predominately in a quantitative measure (see section 5).

3.6 Ethical considerations
Ethical issues are the “concerns, dilemmas, and conflicts that arise over the proper way to conduct research” (Neuman, 2006, p. 129). There can never be absolute measures of ethics however there is often a balance between the pursuit of scientific knowledge and the potential benefits (Neuman, 2006). In order to take into the account the ethical considerations of this research project, the moderator and primary researcher had to undergo an ethics application of industry standard through ECU. This outlined considerations such as avoiding deception or harm to participants, providing informed consent, data collection methods, and anonymity of the participants and security of the data. In line with these ethical considerations, participants were provided with a Participant Information Letter, which outlined ethical aspects as well as the broad nature of the study (see Appendix 7.4). Before each focus group, participants were briefed and asked if they agreed to being audio recorded and were also encouraged to be as honest as possible given the anonymity steps taking in decoding participant’s responses. The participants who agreed to participate signed a consent form (see Appendix 7.4). Participants were ensured their results would remain confidential and anonymous in all reporting of the data, that their involvement was voluntary with the option to remove themselves at any given time.
An ethical consideration, which is in line with trying to seek scientific knowledge advancement over researcher subjectivity, is to ensure that the focus group was conducted with as little moderator influence as possible. This meant the moderator was a wall to bounce ideas off rather than a source of validation. This was done in order to remain objective and on the sideline. This meant the moderator’s views were not expressed and at no time did the moderator seek to validate answers during the focus group as this would provide unnecessary stimulus to the participants and possibly skew results (Posavac, 2011). In conducting research, it is important to consider ethical considerations from a multi dimensional outlook including scientific validity and the participants partaking in the research itself. Through a rigorous ethics application and solid methodology framework, this research project aimed to minimize subjective data influences and results whilst also taking into account the ethical considerations of participants and the complex nature of running a focus group. After each focus group participants were debriefed were the moderator expressed the full nature of the focus group and its purpose and rationale.
4. Results

This chapter was formulated by having focus group summaries prior to being broken into three broad sections based on this project's research questions. The Focus group summaries are listed prior to the Research question results to give a contextual background. Results are presented in relation to each research question helping to provide both qualitative and quantitative data to answer the research questions. Within each research question the main results from each phase are discussed. Quantitative results are collated and represented through the use of frequency analysis and in terms of qualitative data thematic analysis. The thematic analysis presents the major themes of discussion that arose during the focus group supported by participant quotes.

4.1 Focus Group One Summary: males 18-29 (low-mid SES)

Prior to presenting the results from the focus groups, a brief outline of each focus group will be discussed here. Overall the group had quite a good understanding of basic concepts of solar noon, and once seeing the bell graphs found it easier to adopt UV Index messages, alert times and period of danger better. There were common misconceptions before the explanation of bell graph that UV Index stayed constant through the day or the peak number represented was in fact merely an average. The bell curve proved quite easy for the group to understand and it was notable how they could quickly identify mistakes or reconfirm correct beliefs. They found it the most useful visual cue.

4.2 Focus Group Two Summary: females 18-29 (High SES)

Overall this group had a moderate understanding of UV Index. However this group had far more misconceptions about tanning. Again the bell curve was seen as useful, however most of the group felt that the UV Index in the moderate stages was unimportant. There were correct assumptions about the axis, distance and solar noon and the varying times between winter and summer. There were misconceptions about times when you can get sun burnt – again this was heat related.
**4.3 Focus Group Three Summary: males 30-45 (Mid-high SES)**
This group was very well informed and quickly learned and adapted through the stimulus material. During the salience questions the UV Index was mentioned in the second question. Notions of solar noon and changes in variance levels between summer and winter were also mentioned. This group was fairly well informed however there were misconceptions with the scale with several participants believing that the UV Index was measured on a 10 point scale.

**4.4 Focus Group Four Summary: females 30-45 (low-mid SES)**
This group seemed to have less knowledge about the UV Index but seemingly mentioned UV Index concepts such as angle and tilt of the earth and various in winter/summer and the concept of solar noon. The group seemed to have never seen the bell curve graph before and initially met it with “too hard, too much info” but after discussion they quickly learnt how to interpret the graph and found it quite succinct and useful.

**4.5 Phase One: Unprompted awareness**

**4.5.1 Research Question 1: What is the salience of the UV Index relative to other weather reports?**
Before the official commencement of the focus group participants were asked to fill in a survey and were advised that it pertained to health issues. This was done in order to test recall knowledge or salience of the UV Index compared to other measures. The two questions asked were:

<table>
<thead>
<tr>
<th>Survey</th>
</tr>
</thead>
<tbody>
<tr>
<td>Question 1</td>
</tr>
<tr>
<td>List Three things reported in the weather forecast</td>
</tr>
<tr>
<td>Question 2</td>
</tr>
<tr>
<td>Which things do you pay more attention to in summer weather forecasts?</td>
</tr>
</tbody>
</table>
Q 1. List three things reported in the weather

Table 6 lists the responses of the 26 participants over the four focus groups in response to question one. The top four results were temperature, wind, rainfall and swell. Table 6 also shows that out of a possible 78 opportunities to be listed in question one the UV Index was only mentioned once. The total percentage of question one is listed as 300% as there were 3 responses required from participants and each line represents a total value of 100%.

Table 6- Salience question one results

<table>
<thead>
<tr>
<th>Survey</th>
<th>Question 1</th>
<th>List three things reported in the weather forecast</th>
<th>N</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Measure</td>
<td>Measure</td>
<td></td>
<td>N</td>
<td>%</td>
</tr>
<tr>
<td>Temperature</td>
<td>Temperature</td>
<td></td>
<td>20</td>
<td>77</td>
</tr>
<tr>
<td>Wind</td>
<td>Wind</td>
<td></td>
<td>15</td>
<td>58</td>
</tr>
<tr>
<td>Rainfall</td>
<td>Rainfall</td>
<td></td>
<td>14</td>
<td>54</td>
</tr>
<tr>
<td>Swell</td>
<td>Swell</td>
<td></td>
<td>6</td>
<td>23</td>
</tr>
<tr>
<td>Weekly Forecast</td>
<td>Weekly Forecast</td>
<td></td>
<td>4</td>
<td>15</td>
</tr>
<tr>
<td>Tide</td>
<td>Tide</td>
<td></td>
<td>4</td>
<td>15</td>
</tr>
<tr>
<td>Air Pressure</td>
<td>Air Pressure</td>
<td></td>
<td>3</td>
<td>12</td>
</tr>
<tr>
<td>Humidity</td>
<td>Humidity</td>
<td></td>
<td>2</td>
<td>8</td>
</tr>
<tr>
<td>Cloud Cover</td>
<td>Cloud Cover</td>
<td></td>
<td>2</td>
<td>8</td>
</tr>
<tr>
<td>Extreme Weather Warning</td>
<td>Extreme Weather Warning</td>
<td></td>
<td>1</td>
<td>4</td>
</tr>
<tr>
<td>UV Index</td>
<td>UV Index</td>
<td></td>
<td>1</td>
<td>4</td>
</tr>
<tr>
<td>Sunrise/Set</td>
<td>Sunrise/Set</td>
<td></td>
<td>1</td>
<td>4</td>
</tr>
<tr>
<td>Other</td>
<td>Other</td>
<td></td>
<td>5</td>
<td>19</td>
</tr>
<tr>
<td>Total</td>
<td>Total</td>
<td></td>
<td>78</td>
<td>300</td>
</tr>
</tbody>
</table>
Knowledge of the UV Index within Western Australia

David Mercovich 10143243

Q 2. List all the measures in the summer weather forecast you can think of

Table 7- Salience Question Two Results

<table>
<thead>
<tr>
<th>Survey</th>
<th>List all the measures reported in the summer weather forecasts that you can</th>
</tr>
</thead>
<tbody>
<tr>
<td>Measure</td>
<td>N</td>
</tr>
<tr>
<td>Temperature</td>
<td>26</td>
</tr>
<tr>
<td>Rainfall</td>
<td>15</td>
</tr>
<tr>
<td>Tide</td>
<td>13</td>
</tr>
<tr>
<td>Swell</td>
<td>13</td>
</tr>
<tr>
<td>Sunrise/set</td>
<td>13</td>
</tr>
<tr>
<td>Humidity</td>
<td>12</td>
</tr>
<tr>
<td>Wind</td>
<td>12</td>
</tr>
<tr>
<td>Barometric Pressure</td>
<td>7</td>
</tr>
<tr>
<td><strong>UV Index</strong></td>
<td><strong>7</strong></td>
</tr>
<tr>
<td>Weekly Forecast</td>
<td>5</td>
</tr>
<tr>
<td>Extreme Weather Warnings</td>
<td>5</td>
</tr>
<tr>
<td>Fire Warnings</td>
<td>3</td>
</tr>
<tr>
<td>Cloud Cover</td>
<td>2</td>
</tr>
<tr>
<td>Other</td>
<td>14</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>148</strong></td>
</tr>
</tbody>
</table>

Table 7 lists the responses of the 26 participants over the four focus groups in response to question two. The top four responses were temperature, rainfall, tide and swell. The mentioning of the UV Index increased in the second question with 7 responses listed out of a possible 148. The second question was an open-ended question that meant there was an increase in responses with the average participant listing 6 measures (5.7). The UV Index was listed as a response 7 times out of a 148 total responses (27%).

After completing the salience survey participants were asked as an open group to discuss and mention some of their responses. Table 7 highlights some of the most common responses to the UV Index. Most people had heard of the UV Index and had some small knowledge of it and its functionality. There were also widespread
misconceptions in its relation to the fire warning, its scale and its appearance. In 3 out of 4 focus groups the UV Index was mentioned at least once. From the group discussions, a number of themes arose to answer Question 2.

The groups that mentioned the UV Index had a base understanding of the UV Index in terms of it being a measure of the strength of the sun or UV radiation levels “strength of sun…like UV Index”. However there was some confusion about its practical use with one participant stating, “UV rating…how sun burnt you’re going to get” about how it is measured and presented. The results of answers to Question two also highlighted consistent associations of the UV Index in being displayed as “…a little bar between 1-10” or being represented on a scale reminiscent of the fire warning messages “ extreme, medium high or low sort of sliding scale”.

List things reported:

**FG2:** “Strength of sun… Like UV Index”

**FG1:** “UV rating…How sun burnt you’re going to get”

What is the UV Index:

**FG1:** “Measured in names kind of like fire warnings”

**FG3:** “Radiation of UV levels”

“It’s a high or low…little bar between 1-10”

“Extreme medium, high or low…sort of a sliding scale”
4.6 Phase Two: Baseline knowledge of UV Index results

4.6.1 Research Question 2: What is the level of pre-existing knowledge that participants have of the UV Index?

In phase two the participants were given a survey that asked questions regarding the UV Index. Table 8 shows the percentage in which each answer was correctly given which was 30%. The lowest correct responses were for question 1 (8%), 7 (8%) and 9 (4%).

Table 8- Pre and Post Knowledge Questionnaire Results

<table>
<thead>
<tr>
<th>Pre-Questionnaire</th>
<th>% Correct</th>
</tr>
</thead>
<tbody>
<tr>
<td>Q.1 What is the average UV Index rating in Perth during summer?</td>
<td>8%</td>
</tr>
<tr>
<td>Q.2 What is the average UV Index rating in Perth during winter?</td>
<td>23%</td>
</tr>
<tr>
<td>Q.3 The sun’s UV intensity remains fairly constant throughout the day (Agree/Disagree)</td>
<td>69%</td>
</tr>
<tr>
<td>Q.4 Does cloud cover increase or decrease the intensity of the suns UV rays (Y/N)</td>
<td>38%</td>
</tr>
<tr>
<td>Q.5 At what time of the day are you most likely to get sunburnt (to nearest hour)</td>
<td>27%</td>
</tr>
<tr>
<td>Q.6 Where have you seen the UV Index reported?</td>
<td>/</td>
</tr>
<tr>
<td>Q.7 From what UV Index value upwards is it possible to get sunburnt?</td>
<td>8%</td>
</tr>
<tr>
<td>Q.8 What is the earliest time in the morning you can get sunburnt in Perth in December?</td>
<td>39%</td>
</tr>
<tr>
<td>Q.9 Can you get sunburnt in Perth summer after 5pm (Y/N)</td>
<td>4%</td>
</tr>
<tr>
<td>Q.10 Is it difficult to get sunburnt in Perth from May to September (Agree/Disagree)</td>
<td>69%</td>
</tr>
<tr>
<td>Q.11 In Perth the sun’s UV Intensity is heisted at around 2pm (Agree/Disagree)</td>
<td>19%</td>
</tr>
<tr>
<td>Average Score</td>
<td>30%</td>
</tr>
</tbody>
</table>
In response to Question 6, where participants were asked to name places where they had seen the UV Index, the following results were given:

<table>
<thead>
<tr>
<th>Medium</th>
<th>N</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Television</td>
<td>26</td>
<td>100</td>
</tr>
<tr>
<td>Internet/Apps</td>
<td>8</td>
<td>31</td>
</tr>
<tr>
<td>Newspaper</td>
<td>4</td>
<td>15</td>
</tr>
<tr>
<td>Radio</td>
<td>2</td>
<td>8</td>
</tr>
</tbody>
</table>

Table 9 highlights the mediums in which people listed they saw the UV Index reported. This question was in the pre-existing knowledge survey that was administered to focus group participants. The table highlights the top four responses listed with television being listed 26 times (100%), and the Internet and mobile applications being 2nd with eight responses (31%).

4.7 Phase three: Prompted awareness

The following section will outline the major themes in the qualitative analysis followed by supporting data in the form of participant quotes.

4.7.1 Research question 3: How can the UV Index be used as an educational tool to identify risks to prolonged sun exposure?

The prompted awareness results were based on individual responses in-group discussion to a range of visual cues. These visual cues displayed several things related to the UV Index. Appendix 7.15 shows a complete breakdown of the major participant responses and quotes that arose during the use of the visual cues. The below section will highlight the main themes from the six visual cues used: lack of understanding about severity of stimulus, confusion around presentation and meaning of numbers and word, and skepticism.
4.7.2 Stimulus 1:

**UV Index: 5 [moderate]**

**Theme 1: Lack of understanding about severity of stimulus**

The groups showed a basic understanding for what the stimulus meant but were confused about the wording and its relation to a number with the word moderate often negating the numerical value, participants stated; “I straight away think 5 is moderate and out of 10” some participants also believed the word moderate mitigated risk of sun burn” not too severe”, one participant was even believed that the 5 was an indication for her to “go and tan”. The importance of the word moderate and its negating factor were consistent across focus groups with many people associating the number 5 in a scale out of 10 and the word moderate meaning “average” and you wouldn’t “get that sunburnt”. These findings highlight a level of confusion about the severity of the word and number meant and whether it negated safety behaviors in the sun or reinforced them.
In response to what UV Index: 5 [moderate] means to the participants

**FG1:**
“I straight away think 5 is moderate and out of 10”
“Chance of getting sunburnt”

**FG2:**
“Go and tan”
“Wouldn’t say safer but yes definitely possible to get tanned without burned”

**FG3:**
“Not too severe”
“Misleading...people burn different”

**FG4:**
“Moderate = average”
“Won’t get that sunburnt”

The ability to tan and burn

**FG2:**
“Tanning and indication getting burnt”
“Totally disagree, tanning is just pigment of your skin changing...tanning is different to burning”
“Highest point is when you get burnt”
4.7.3 Stimulus 2:

UV Index: 12 [extreme]

Theme 2: Confusion around presentation and meaning of numbers and word

The second stimulus showed extreme UV alert message of 12 [extreme] the groups understood that the higher the rating the higher the dangers are. However its effectiveness was mitigated due to lack of clear understanding as the “number itself doesn’t mean anything… needs to be associated to the word” and without the word “extreme” “12 is meaningless”. This lack of understanding between the word and the numerical value is a similar theme found in stimulus one. Some group members did associate the word extreme with a higher risk of getting sunburnt “you’re definitely going to get burnt” or a planned behavioral change based on the stimulus “stay out of the sun”. Opinions on behavior change based on the stimulus were mixed with other members more reluctant to take precautions stating, “doesn’t influence my decision making…temperature and rain do”. There was also a limitation among the groups with what the stimulus actually represented with on participants believing 12 is an average throughout the day” and another believing the UVR “peaks when it’s the hottest”.
What the stimulus material means to the participant

**FG1:**

“The sun is at a dangerous level”

**FG2:**

“The extreme grabs my attention”

“I don’t use the UV Index I use temperature as an indicator when I can get burnt”

**FG3:**

“Number itself doesn’t mean anything...needs to be associated to word”

“Doesn’t influence my decision making...temperature and rain do”

On when the UV Index reaches 12[extreme]

**FG1:**

“Average throughout the day”

“It peaks when it’s the hottest”
4.7.4 Stimulus3:

Theme 3: Skepticism

The Sun Smart 11-1 stimulus material was met with skepticism across all the focus groups about its precision in terms of times and its direct meaning in terms of ‘UV Alert’. Some participants did correctly identify that an underlying message in it shows the “times you have to be more vigilant”. One participant even elaborated on the reasons for the time period stating, “higher…more direct, more likely to get sunburnt at these times”. Participants were often skeptical about the time but this was magnified by not understanding that the times given were when the UVI was above 3 with some people believing it was merely when the UV Index is at its maximum or others believing there is “no indication of threshold for alert”.

Meaning of the stimulus material

FG1: “Times you have to be more vigilant”

FG2: “Higher…more direct, more likely to get sunburnt at these times”

FG4: “I don’t think that’s enough of a time frame”
“That’s incorrect”

What participants dislike about the stimulus material

FG2: “I don’t like the 15’s... I don’t think they are necessary”
“No indication of threshold for alert”

FG 4: “Needs to be much longer”
4.7.5 Stimulus 4:

Theme 3: Skepticism

Unlike the previous stimulus material the groups seemed to have a better understanding of stimulus 4 as they believed it to be more realistic and attributed it to a summer’s day or the times a person must be most vigilant and “put a bit more sunscreen on regularly”. The previous stimulus material seemed to leave participants bemused due to its short time frame for the alert. The expanded time period had a better response with more participants indicating proposed sun protection behaviours of covering up and staying out of the sun. There was also a continuation of skepticism about the time being: “very exact” and “too specific” in relation to the exact times given.

What is the practical meaning and application of stimulus material

FG1: “put a bit more sunscreen on regularly”

“These are the areas to be most worried about”

“Put sunscreen on all day”

FG2: “Cover up between 8:15-4:20”

“Very exact”

“Time is too specific”

FG4: “It’s so specific”
4.7.6 Stimulus 5:

**Theme 4: High reception to graph**

The groups tended to understand the bell curve graphs far more than the other stimulus material “that’s a lot better way of representing than the other two scales”. Despite this application of its message was still missing with participants not being able to recognize that any rating above 3 means a person can get sunburnt. There was also a higher responsiveness to the graph in the male focus groups compared to that of the women. Despite this the female focus groups began to understand and value the use of the bell curve after prolonged group discussion.

**Initial reaction to graph**

*FG1:* “Makes sense”

*FG2:* “Useless I think”

“People wouldn’t pay attention to it”

*FG3:* “Haven’t seen it but that’s how I imagined it”

“That’s a lot better way of representing the other two scales

“It actually gives you a threshold”

**Behavioral application of graph**

*FG2:* “I don’t care about moderate”

“Moderate is relief to me”

“I would condition my son to wear sunscreen no matter what”
4.7.7 Stimulus 6:

Theme 4: High receptiveness to graph

Despite mixed feedback about the bell curve after a short discussion, the groups with the most resistance to the graph (especially female groups) began to understand it more and appreciate its message. Initial thoughts of “whatever” and “too hard” turned into “now I get it” and “if you explain it slowly people will get it…eventually”. Both male focus groups differed in that they appreciated and liked the graph from the outset and required less time to understand its functionality and meaning. Further quotes are indicated below.

Initial reactions to graph

**FG1:**

“The graph is very good”

“Seeing the graph makes you aware of the times”

**FG2:**

“Explains what time you need to slip, slop, slap”

“That’s when you’re most at risk”

**FG4:**

“A lot of information I look at it and go whatever”

“It’s quite straight forward...makes sense”

Understanding of graph:

**FG4:**

“I think the graph like that is good, it helps you put the day in perspective...the whole day”

This quote was from the same woman who initially stated that it was too much information “I look at it and go whatever” after discussion with the group she began to understand the curve and appreciate its message.


4.8 Phase Four: Assessment of groups understanding of UV Index fundamental concepts

One of the aims of the focus groups was too determine pre existing knowledge of the UV index including some of the fundamental concepts about it. Table 10 highlights the four main concepts of the UV Index. These concepts were not explicitly taught to the focus groups however through open discussion many of these concepts arose out of the group discussion.

The Table 10 highlights the qualitative results of these concepts in relation to responses from the group whether incorrect or correct:

Table 10- Participant Analysis of UVI Fundamental Concepts

<table>
<thead>
<tr>
<th>Fundamental Concept</th>
<th>Summary of Responses</th>
</tr>
</thead>
<tbody>
<tr>
<td>Solar Noon- Peak UV</td>
<td>Out of every focus groups at least one person described this concept vaguely</td>
</tr>
<tr>
<td>Above 3 UV, a person can get sunburnt</td>
<td>Not one person could accurately tell when a person could get sunburnt in relation to the UV Index level.</td>
</tr>
<tr>
<td>The varying nature of the UV rating throughout the day</td>
<td>Before the visual graphs were introduced there was an almost 50/50 split between people believing the UV level varies and others believing it stayed constant. After the introduction of the bell curve illustrating the varying nature it became a widely accepted fact (this can be seen in the post test results being 100%).</td>
</tr>
<tr>
<td>The seasonality nature of the UV Index throughout the year</td>
<td>This was one of the most widely recognized concepts by the participants with everyone agreed that the UV is stronger in summer and weaker in winter. Fewer numbers could accurately describe why however some did relate this to the closeness to the sun, the tilt of the earth and the angles of the earth’s rotation</td>
</tr>
</tbody>
</table>
4.9 Phase Five: Cut through phase

Fact sheets results
In the second last part of the focus group participants were asked to complete a fact sheet in which they were to tick the most surprising facts and cross the least surprising. They were also asked to number from 1 to 3, their top surprising facts with 1 being the ‘most surprising’.

The participants were then asked to discuss their results in terms of their top 3 results, what they found most surprising and also least surprising. In order to calculate the frequency of the results these fact sheets were assigned value points (see Table 11).

Table 11- Point System for Fact sheet Analysis

<table>
<thead>
<tr>
<th></th>
<th>= 4 points</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>= 3 points</td>
</tr>
<tr>
<td>3</td>
<td>= 2 points</td>
</tr>
<tr>
<td>✓</td>
<td>= 1 point</td>
</tr>
<tr>
<td>X</td>
<td>= 1 point</td>
</tr>
</tbody>
</table>
Table 12 highlights the participant’s results taking into account the value of each response. If the participants did not tick or cross a fact then no value was assigned to that fact. The top three most surprising facts were there are only 35 midwinter Perth days per year you can get sunburnt (42), Sunburn is unlikely after 4:30 pm during the height of Perth summer (28), and Perth UV Index values are ‘very high’ or ‘extreme’ for half of the year (26). The three least surprising facts were it is easy to get sunburnt in Autumn and Spring (-4), UV levels change throughout the day (-5) and early morning and late afternoon are the safest times to avoid sunburn (-6).

Table 12- Most Surprising Facts

<table>
<thead>
<tr>
<th>Most Surprising Information</th>
<th>Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>There are only 35 midwinter Perth days per year you can’t get sunburnt</td>
<td>42</td>
</tr>
<tr>
<td>Sunburn is unlikely after 4:30pm during the height of Perth summer</td>
<td>28</td>
</tr>
<tr>
<td>Perth UV Index values are ‘very high’ or ‘extreme’ for half of the year</td>
<td>26</td>
</tr>
<tr>
<td>Sun protection is required when the UV Index is 3+</td>
<td>20</td>
</tr>
<tr>
<td>UV levels are just as intense at 9am as 3pm</td>
<td>17</td>
</tr>
<tr>
<td>UV levels peak at midday even if the afternoon gets hotter</td>
<td>16</td>
</tr>
<tr>
<td>Sun protection is required all-year-round in the northwest</td>
<td>15</td>
</tr>
<tr>
<td>UV levels are not dependent on temperature</td>
<td>14</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Least Surprising Information</th>
<th>Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>UV Levels peak during summer</td>
<td>-8</td>
</tr>
<tr>
<td>Early morning and late afternoon are the safest times to avoid sunburn</td>
<td>-6</td>
</tr>
<tr>
<td>UV levels change throughout the day</td>
<td>-5</td>
</tr>
<tr>
<td>It is easy to get sunburn in Autumn and Spring</td>
<td>-4</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Major Themes</th>
</tr>
</thead>
<tbody>
<tr>
<td>✓ UV rating in WA is serious</td>
</tr>
<tr>
<td>✓ Time of day in relation to UV Index Strength</td>
</tr>
<tr>
<td>✓ Misconception that temperature= UV rating</td>
</tr>
<tr>
<td>✓ Unfamiliar with the UV Index</td>
</tr>
</tbody>
</table>
4.10 Phase Six: Post knowledge of UV Index results

Before the debriefing of the focus groups participants were asked to fill in the same knowledge survey that the filled in before the focus groups commenced. This was done in order to evaluate post knowledge in comparison to pre knowledge. Table 13 shows significant improvement of results across the board. During the focus group the pre questionnaires were immediately collected and the questions were not explicitly discussed and there was no mention of a follow up survey. This was done in order not to influence the data results. Participant’s average improved from 30% in the pre test to an average of 68% in the posttest.

Table 13 highlights the average participants achieved for the pre test questionnaire before the introduction of UV related stimulus material. It also shows the posttest average which showed great improvement with averages increasing from a total of 30% per participant to 68%. Some of the highest individual question improvements include “what is the average UV Index rating in Perth during summer?” which went from 8% to 69%. Another improved answer was “The sun’s UV intensity remains fairly constant throughout the day (Agree/Disagree)”, which went from 69% to 100%. The lowest improved correct question was “Does cloud cover increase or decrease the intensity of the sun’s UV rays (Y/N)”. This stayed exactly at 38% pre and post. The far right column labeled $p$ value highlights the use of the program SPSS and the T-test tool. The T-Test tool analyses the number of participants, against the pre and posttest answers in order to discern what answers are considered significant. If the number is less than 0.05 it is said to be a significant value.
## Table 13- Post Focus Group Knowledge Improvement

<table>
<thead>
<tr>
<th>Questionnaire</th>
<th>% Correct -Pre</th>
<th>% Correct -Post</th>
<th>P-Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Q.1 What is the average UV Index rating in Perth during summer?</td>
<td>8%</td>
<td>69%</td>
<td>.000*</td>
</tr>
<tr>
<td>Q.2 What is the average UV Index rating in Perth during winter?</td>
<td>23%</td>
<td>42%</td>
<td>.134</td>
</tr>
<tr>
<td>Q.3 The sun’s UV intensity remains fairly constant throughout the day (Agree/Disagree)</td>
<td>69%</td>
<td>100%</td>
<td>.003*</td>
</tr>
<tr>
<td>Q.4 Does cloud cover increase or decrease the intensity of the sun’s UV rays (Y/N)</td>
<td>38%</td>
<td>38%</td>
<td>1.000</td>
</tr>
<tr>
<td>Q.5 At what time of the day are you most likely to get sunburnt (to nearest hour)</td>
<td>27%</td>
<td>54%</td>
<td>0.50</td>
</tr>
<tr>
<td>Q.6 Where have you seen the UV Index reported?</td>
<td>/</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Q.7 From what UV Index value upwards is it possible to get sunburnt?</td>
<td>8%</td>
<td>85%</td>
<td>0.00*</td>
</tr>
<tr>
<td>Q.8 What is the earliest time in the morning you can get sunburnt in Perth in December?</td>
<td>39%</td>
<td>89%</td>
<td>.000*</td>
</tr>
<tr>
<td>Q.9 Can you get sunburnt in Perth summer after 5pm (Y/N)</td>
<td>4%</td>
<td>58%</td>
<td>.000*</td>
</tr>
<tr>
<td>Q.10 Is it difficult to get sunburnt in Perth from May to September (Agree/Disagree)</td>
<td>69%</td>
<td>81%</td>
<td>.327</td>
</tr>
<tr>
<td>Q.11 In Perth the sun’s UV Intensity is heisted at around 2pm (Agree/Disagree)</td>
<td>19%</td>
<td>62%</td>
<td>.001*</td>
</tr>
<tr>
<td>Average Score</td>
<td>30%</td>
<td>68%</td>
<td></td>
</tr>
</tbody>
</table>
Overall, the focus groups showed improvement in the participants understanding of core UV Index concepts. Salience test results showed that initial UV Index was very low with only 1/78 listed answers for question one in the salience questionnaire attributed to the UV Index. This only slightly improved to 7 mentions when participants were asked to list what things in the ‘summer’ weather do you pay attention to. The introduction of the stimulus material showed mixed results with most participants not liking the first two tools used to display the Index but the Bell curve had a higher level of reception with participants saying it helped to see “when your most at risk” and believing its presentation was “quite straight forward” making you seeing the times you are most susceptible to dangerous levels of UV. The introduction of the fact sheet allowed participants to discover new information about the Index whilst also discussion what facts they found most interesting and the facts that were obvious. The three most surprising facts were; There are only 35 midwinter Perth days per year you can’t get sunburnt, sunburn is unlikely after 4:30pm during the height of Perth summer and Perth UV Index values are ‘very high’ or ‘extreme’ for half of the year. The least surprising facts were; early morning and late afternoon are the safest times to avoid sunburn, UV levels change throughout the day and it is easy to get sunburnt in Autumn and Spring.
5. Discussion

This chapter collates the results and findings from the research in order to transcend facts and engage in productive discussion. This chapter is broken down by the three research questions used to formulate this research project. In doing so, each research question highlights the key results, themes and rational conclusions whilst also comparing past studies and literature. Subsequently, this discussion provides a structured narrative presenting these projects findings whilst also acknowledging limitations and the need for expansion of findings in future studies. This chapter utilises the means of discussion in order to help illuminate a structured path forward.

5.1 Research Question 1: What is the salience of the UV Index relative to other weather reports?

The purpose of this research question is to investigate just how much participants in relation to other weather reports they see recognise the UV Index. This research question was a broad overview to two smaller questions in a salience questionnaire administered to the participants. Blunden, Lower and Slevin (2004) suggest that there is a “very high awareness of the UV Index and a good level of general knowledge” among respondents in Western Australia. Question one of the salience questionnaire asked participants to list “three things reported in a weather forecast” out of the potential 78 chances for the UV Index to be reported it was only listed once (4%) in comparison to top responses of temperature and wind being listed 20 (77%) and 15 (58%) times respectively. These results suggest that the UV index has a low level of salience compared to other weather reports. The current attempts to present it alongside other weather measures has yielded a less than ideal level of base awareness which differs from Blunden, Lower and Slevin (2004) assertion that “campaigns to increase awareness of the UV index by the public are not warranted”.

The second salience question asked participants to list what things “do you pay more attention to in a summer weather forecast”. The UV Index showed an increase level of reporting in that it was listed 7 times (27%) in comparison to temperature and rainfall listed 26 (100%) and 15 (58%) times respectively. The second question was open ended and had an average of 6 responses by each participant, this can account
for a partial reason for the increase in the UV Index being mentioned however it is not the sole factor. The second salience questionnaire only differed in the phrases “summer” and “pay attention to more”; the rest of the question was very similar to the predecessor. Therefore one can assume the word summer instigated higher mention of the UV Index based on the notion that summer has increased sun exposure and dangers of getting sun burnt.

Being aware of the UV Index and utilizing it to inform sun protection behaviours however are two different things. Blunden, Lower and Slevin (2004) suggested that there were high levels of UV Index awareness but low application with only 5% (n=24) of respondents stating “they did notice the UV Index for the day” and 83% (n=20) of respondents stating the UV Index/forecast did not influence their sun protection behaviours. In this study similar notions have arisen in looking at the salience and usability of the UV Index with participants stating “doesn’t influence my decision making…temperature and rain do”. The results between question 1 and 2 show that there is increased awareness and salience of the UV Index under the context of summer however knowledge and application showed lower levels of use.

Some participants correctly identified the UV Index as being a measure of the “strength of the sun” and “radiation of UV Levels”, these correct statements were mitigated with a lack of knowledge about how the UV Index is presented with some participants believing it was a word “measured in names kind of like fire warnings: Others believed it to be presented in a scale format “its high or low…little bar between 1-10”. Research question one showed that despite a low salience and awareness of the UV Index most participants had a base understanding of what it meant. Despite this there were consistent misconceptions, lack of in depth knowledge and application of knowledge into protective behaviours. Even less people could correctly identify the way the UV Index was presented with many references to 1-10 scales and fire warning connotations. These mixed results highlight the fundamental flaws of the UV Index in that despite people knowing what it is, very few people are aware of it or have a substantial level of knowledge of its functionality. In order for that to transpire the increased applications of sun protection behaviours which was after all the UV Index’s original purpose.
5.2 Research question 2: What is the level of pre-existing knowledge that participants have of the UV Index?

In answering Research question 2 established the participant’s base line knowledge of the UV Index was established by giving them an unprompted questionnaire that was administered before focus group discussions and after (without notice) in order to establish both base line knowledge and levels of improvement.

The data revealed that only 8% of the participants could identify what the average UV index rating was during summer, however after the focus group discussion this improved dramatically to 69%. Other improvements included prior to discussion 69% of participants could correctly state that the UV index varies throughout the day, post questionnaire results showed an improvement to 100%. Another major contrast was that only 4% of participants believed correctly that after 5pm in summer you cannot be sunburnt, this improved dramatically to 58% in the posttest results. During the focus groups participants did not discuss the answers to the pre test and were not informed that the questionnaire would be redistributed to see whether knowledge had improved. The average score for a participant improved from 30% in the pre test to 68% in the posttest highlight a significant 38% improvement.

These results highlight an improvement in participant’s basic understanding of UV index fundamental concepts such as the variability of the UV Index throughout the day as well as the peak period of the day (solar noon) and the base level UVI required to get sunburnt (improved from 8-85% knowing 3 or above). The improved results highlight that in a simple forum knowledge improvement of basic concepts can be dramatically improved. The pre existing knowledge however of participants was considerably low with the average participant only scoring 30%. Key themes of not initially understanding variability of the UV Index, solar noon and the base level you can get sunburnt from highlight a missing link between awareness, knowledge and action. These results were similar to that noted by Carter & Donovan (2007) who stated that 55% of participants did not appreciate “UV conditions peak at solar noon” and 61.2% “not appreciating that the UVI is independent of temperature”. Without basic knowledge participants are less likely to use the UV Index as a tool to help adoption of the sun protection behaviours. The results in the current study highlight
that baseline knowledge and understanding among participants are at a low level, which is consistent with Carter and Donovan (2007) who emphasise that “utilisation of the UVI remains low because understanding is poor”.

5.3 Research question 3: How can the UV Index be used as an educational tool to identify risks to prolonged sun exposure?

The third research question was based on prompted awareness in which participants during the focus group were presented six cards with different presentations of the UV Index message. These visual cues can be found in Appendix 8.6-8.10. The first two stimulus materials highlighted major themes of confusion about the presentation of the material, the severity of the message as well as its application. These themes highlight participants having a lack of knowledge and understanding about the UV Index measures and its relation to the adoption of increased sun protection behaviours. The first two visual cues presented the UVI in the form of the numerical measure followed by the associated word for example UVI-5 [moderate]. Often participants would associate the 5 as being a part of a 10-point scale and the word moderate having a negating effect on sun strength “I straightaway think 5 is moderate and out of 10”. These misconceptions are consistent with prior research by Carter and Donovan (2007) who noted when participants were asked to identify the variance in the UVI guesses often ranged from 0-15, with “no participants evidencing great confidence in their responses”.

The second visual cue which presented the UVI being 12[extreme] helped shatter prior connotations of a 10-point scale however similar themes of confusion between the number and word arose “number itself doesn’t mean anything…needs to be associated to the word”. The increased value and negative associations with the word extreme did heighten pretenses among participants about increasing sun protection vigilance. However, other participants dismissed the information often stating that the UVI does not affect their decision making in sun protection behaviours rather things such as temperature and rain do. The results from the first two visual cues show that most participants could somewhat associate the need for increased sun protection behaviours when the higher value was given, however no participant could say from what UV value upwards a person can be sunburnt. The presentation of the UVI in the
form of a basic numerical value and word seemed to be lacking in increasing participant’s knowledge and basic understanding beyond the basement connotation that increased value means increased protection.

Visual cues 3 and 4 were Sun Smart UV Index measures that presented the word “UV Alert” level followed by the times when the UV Index would be above 3. The alert times were represented in the format of a starting and end time. These visual cues can be found in Appendix C. Participants Across the four focus groups were skeptical about the specificity of the proposed time stating “too specific” and “that’s incorrect”. The specificity was a sticking point with participants believing the exact numerical times not to be “necessary”. The short time frame was also a point of controversy “I don’t think that’s enough of a time frame”. From these quotes it is evident that participants did not understand that the time given was when the UV Index was above 3 (base point above from where you can be sunburnt) this meant there were often misconceptions that the time given was only for the maximum UV Index level. Before participants had seen both visual cues there was often confusion about whether the visual cue were taken during summer or winter. The shorter UV Alert time was for winter due to the UV Index only being above 3 for two hours when the 4th visual cue shows an alert spanning most of the day. Previous research by Carter (2005) into the UV alert visual cue as well as the bell curve suggest that the UV alert was seen as “significantly more confusing than any other concepts” and the most probable to “mislead participants into believing that the UV conditions, and the risk of sunburn, remain constant throughout the day”. The previous research combined with the results found in this study highlight the major flaws of the alert cue and how it hinders improvement in participant knowledge and understanding the UV Index.

Visual cues 5 and 6 are the UV Index bell curve, which highlight the varying UV levels that occur throughout the day. The charts highlight the maximum UVI value for the day as well as representing UVI alert times. The bell curve visual cues can be found in Appendix D and E. The presentation of the visual cue seemed to aid as a culminating thought process for many with some participants instantly gravitating to its message, colours and simplicity “seeing the graph makes you aware of the times”. The bell curve similarly in previous research acted as a bridge between participants
base knowledge the understanding of the UV Alert and number measures into a visual medium “it would appear the bell-curve served as all the explanation that the latter participants needed” (Carter, 2005). Many participants instantly recognized key UV Index concepts such as the variability throughout the day and the maximum UV rating being at ‘solar noon’ rather than hottest part of the day stating “that’s when you’re most at risk” This eureka moment helped many participants see “when your most at risk” noting that its “quite straight forward…makes sense”. Despite this positive feedback female groups were less responsive than males with some women initially dismissing the information as too hard and convoluted. Some of these sentiments changed after continued open discussion within the group. One woman for example went from saying “whatever” to “now I get it”.

During the focus groups the moderator did not serve to educate but merely to act as a springboard for ideas which meant such moments of understanding and knowledge improvement were self made helping to show that the bell curve is possible visual medium to represent the key messages of the UV Index. Participants seemingly liked the UV Index bell chart and liked the incorporation of colour, times and how it showed variance in UV levels which was not evident in other UV Index displays. From this key theme identified in the focus group the bell chart (seen in appendix 10.9 & 10.10), should be used as the primary focus in knowledge improvement.
5.4 Cancer Council Recommendations and Practical Implications

For many years, the UV Index has been an underused, misinterpreted and poorly conveyed tool. Therefore its practical application and purpose as an educational tool has been heavily limited. Despite previous research suggesting a moderate to high level of research, this project discovered that moderate awareness of the UV Index with little knowledge does not translate to improved behavior change. The current study highlighted key UV Index misconceptions that were similar to previous research. The mixed methodology including the qualitative data in the research allowed for the expansion of ideas and thought processes. It was revealed that the UV Index needs a consistent look and feel to help increase understanding and usability. It was also found that the UV Index bell curve was the most apparent and currently used form that leads to the most positive feedback. The curve highlight key UV Index fundamental concepts such as variability throughout the day, solar noon, alert times and is easily interpreted with the use of colour. The following is a list of key recommendations to the Cancer Council as to the best perceived approach in better improving UV Index awareness, knowledge and application based on the major findings of this study.

1) Further research, both qualitative and quantitative, into the area in order to test baseline knowledge and how this level of knowledge can be increased. The study revealed that the focus group approach allowed for a forum for self-improvement. Therefore their needs to be further research in how to increase knowledge in the most poignant and timely fashion. From a practical sense this means creating a simple message that helps individuals increase their understanding and use of the UV Index.

2) Make the bell curve the one constant visual representation for the UV Index across all mediums. The 3 main types of visual cues used in this study highlight varying instances and displays of the UV Index. The increased number of formats means individuals must learn more and consequently information overload and dissolution can become apparent. The use of the most prominent tool “that contained the most information [will allow] for maximal comprehension” (Carter & Donovan, 2005, p. 51). Carter and
Donovan state that the use of “novel formats may lead not only to a better understanding, but also motivate greater use of the measure”. Subsequently in order for there to be an improvement in understanding there needs to be synergy in its portrayal to help increase understanding.

3) Promotion of UV Index through television campaigns. The campaign will need to have a ‘call to action’ asking individuals to download UV Index smartphone application that displays the bell curve and how to understand and utilise it.

4) 365-day coverage. The UV Index needs to be reported everyday of the year, not just in summer. Awareness can often diminish with lack of prompting; therefore given the Australia climate the UV Index should potentially be as relevant to an individual as temperature. The use of an integrated marketing campaign (including a call to action) across a multitude of mediums with a consistent message and visual display will be needed to ensure success.

5.5 Limitations and Further Research
This research had a range of limitations that need to be taken into account when analysing findings. A major limitation was that the sample size was limited to 26 people. The lack of sample size was due to both a factor of time and the logistics of hosting focus groups. This limitation was somewhat mitigated through the use of dividing the focus groups based on socio economic status and gender, to help create a broad and encompassing reflection of society. Other limitations also that even though the methodology was mixed methods, from a quantitative point of view 26 participants is very small, therefore the results found should not be generalised to the wider community. However, the results were used as a point of reference and provide a numerical picture of the qualitative themes discussed during the focus groups. Other considerations, such as the focus groups were conducted during winter and the participants were all from Western Australia, also need to be taken into account.
Similar research undertaken by Blunden, Lower and Slevin (2004) had limitations of having focus groups during weeknights, which could have influences individuals sun
protection behaviours. However, the practicality of using participants from Western Australia is very valid with West Australians being some of the most at risk of exposure to UV rays due to its extreme, dry summers with ratings often being over 12 and its mild winters. To ensure data validity, further expansion of the data set will be needed including on a national basis. In doing so, results and themes discovered on the topics of awareness, knowledge and application of the UV Index can be more reflective of the wider community. Previous research from Blunden, Lower and Slevin (2004) have suggested that any further research in terms of data collection be conducted on weekend during the peak leisure time periods. Because of the minimal participants, localised data collection and previous literature recommendations future expansion of this research project on a national level is recommended. Such research can encompass data collection on weekdays, increased used of quantitative data and improved means of data validation (increased numbers represents increased representation of society). This expanded research could draw upon the current study as a basis for helping to solve the ‘mystery’ of not only how to showcase the UV Index but how to better use social marketing to fight against skin cancer.

5.6 Conclusion
Skin cancer and the fight to alleviate a highly preventable disease is an unsolved puzzle piece in the Australian culture. Some elements of how to protect one’s self are known to Australians such as to wear sunscreen, to stay out of the sun and to wear a hat. But despite these common and almost inherited behaviours the rate of skin cancer continues to increase. Australia has the “highest skin cancer incidence rate of the world” (Department of Health and Ageing, 2011). Australia’s sun rich nature combined with large populations of fair skinned Australians spells a recipe for disaster (Cancer Council NSW, 2012). But these environmental and biological elements are not the only factors in Australia’s skin cancer puzzle. Despite the best efforts of social marketing to campaign the preventative behaviours needed to combat skin cancer, incidence rates continue to rise. The increased prevalence of skin cancer in Australian society is compounded by a basic lack of skin cancer awareness, understanding and application of protection behaviours (Carter & Donovan, 2007).
With the social element being the only factor that can be changed the importance of research and studies into this field is magnified.

This study aimed to shed light on the complex puzzle by determining if the UV index is a usable tool in which to educate Australians about the dangers of prolonged sun exposure that can result in skin cancer. The results showed that despite initial low salience and baseline knowledge of the UV Index and its concepts the use of tools such as the UV Index bell curve, facts and group discussion understanding could be greatly improved. This can be best seen in the pre and post UV Index Knowledge results. Prior to the introduction of stimulus material participants scored an average of 30% overall. The introduction of the stimulus material, group discussion and the facts sheets helped to improve 30% to 68% average in the post results.

Previous research from Blunden, Lower and Slevin (2004) highlighted that Western Australians have a high rate of awareness of the UV Index. However current research differs with participants only mentioning the UV Index 8 out of a possible 226 times (times measured by the amount of responses given) during the salience questionnaire. Despite the low level of salience when asked about the UV Index most participants had general awareness and a low level appreciation of its meaning.

The introduction of the visual stimulus material showed varied results with most participants not liking the first two tools used to display the UV Index. There was a base understanding of what the Index was trying to show but the use of words such as ‘moderate’ combined with a numerical value confused participants, as they could not seem to find a useful way to use the tools useful. The bell curve had a higher level of reception with participants stating that it helped to show “when you’re most at risk” and believing its presentation was “quite straight forward” showing when one is most susceptible to heightened levels of UV radiation. The introduction of the fact sheet allowed participants to discover new and surprising information about the UV Index whilst also discussing what facts they found most interesting and what facts were obvious.
The results from this research project highlighted the flaws within the current application as well as understanding of the UV Index. The use of visual cues, facts and open discussion allowed for the improvement in participant’s knowledge and understanding of the UV Index. With this improved knowledge comes better understanding of just how an individual can use the UV index in their everyday lives to educate and foster their daily sun protection behaviours.

Consequently, this study should be seen as a gateway to future research within the framework of increasing UV Index knowledge. The low number of participants in this study means the results from these focus groups is somewhat restricted in providing recommendations and themes. However consistent literature such as Blunden, Lower and Slevin (2004) and Carter and Donovan (2007), for example common themes and hypotheses of lack of awareness and knowledge have also emerged in this study to some extent.

The UV Index is a tool that can be used to educate Australians; however, improved and more comprehensive research is needed. This study shows that the puzzle pieces of how to avoid skin cancer are highly visible and known however putting them together to solve the problem is still an ongoing process. The increasing high number of preventable skin cancer deaths in Australia highlights the significance of any future research in the field. Overall, the findings suggest that with the correct tool, message and application, the UV Index can still be an effective medium. However, its use must be part of a larger effort to improve knowledge and application of preventative behaviours in combating the effects of harmful UV radiation and to reduction the rates of skin cancer in Australia.
6. References


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7. Appendices

7.1 Salience Survey (before focus group commences)

Survey

1. List three things reported in the weather forecast

__________________________________________________________________________

__________________________________________________________________________

__________________________________________________________________________

2. Which things do you pay more attention to in summer weather forecasts?

__________________________________________________________________________

__________________________________________________________________________

__________________________________________________________________________

__________________________________________________________________________
Pre & Post Questionnaire

1. What is the average UV index rating in Perth during summer?

2. What is the average UV index rating in Perth during winter?

3. The sun’s UV intensity remains fairly constant throughout the day (Agree/Disagree)

4. Does cloud cover increase or decrease the intensity of the sun’s UV rays? (Y/N)

5. At what time of the day are you most likely to get sunburnt? (to nearest hour)

6. Where have you seen the UV index reported?

7. From what UV index value upwards is it possible to get sunburnt?

8. What is the earliest time in the morning you can get sunburnt in Perth in December?

9. Can you get sunburnt in Perth summer at 5pm? (Y/N)

10. It is difficult to get sunburnt in Perth from May to September (Agree/Disagree)

11. In Perth the sun’s UV intensity is highest at around 2pm (Agree/Disagree)
7.3 UV Index fact sheet

**UV Index Fact Sheet**

- Is the time you get sunburnt fastest
- Is when the sun is at its highest point in the sky
- Is when your shadow is the shortest
- Is when you are closest to the sun
- UV levels change throughout the day
- UV levels are just as intense at 9am as they are at 3pm
- Early morning and late afternoon are the safest times to avoid sun burn
- You cannot get sunburn after 4:30pm in Perth
- You can easily get sunburnt at 9am in Perth during summer
- In Perth there are only 20-odd days per year in midwinter that you can’t get sunburnt
- UV levels peak during summer
- It is easy to get sunburnt in Autumn and Spring
- In January you can get sunburnt from 8:30am to 4:30pm
- In June you can get sunburnt from 11am to 1pm
• There are no days a year in Carnarvon when sun protection is not required

• Sun protection is required all year round in the northwest

• The higher your altitude the higher the UV levels

• In Western Australia UV levels increase the further north you travel

• The full sun is no more UV intense in the desert than on the coast

• UV levels are not dependent on temperature

• UV levels peak at midday even though temperatures continue to increase in the afternoon

• UV radiation is invisible and can't be seen or felt

• Sun protection is required when the UV index is 3 or more

• There are only 20-odd days a year when the UV index in Perth is 2 or below

• In Perth in the middle of summer the UV index reaches 12 (extreme) on most days

• Perth remains at ‘very high’ and ‘extreme’ UV index levels for 6 months of the year
7.4 Participation Agreement Letter

Dear Sir/ Madam

As per the introductory (Information) letter I require your consent to be part of this research. Therefore, I kindly request that you sign and return this form to the researcher to confirm your consent to participate in this research:

Consent Form,

I understand that I am free to participate or withdraw my consent and discontinue my participation at any time without prejudice. I also understand that all materials in this study will be treated with strictest confidentiality. I agree that the research data gathered for this study may be published provided that neither my organisation nor I are identified. Due to these statements, it is advised to answer questions and interact in the focus group in an honest and forthright manner. Please feel free to ask any questions of which we promise to provide satisfactory answers to you before you proceed with signing this consent letter.

Name of Participant:…………………………………………………………………………………........
Signed: ………………………………………… Date: …………………
Researcher: David Mercovich (dmercovi@our.ecu.edu.au)
Signed: ……………………………………………………………………… ….

You are free to contact the supervisory panel and ethics committee below for any further information:

Edith Cowan University, Faculty of Business & Law

- Principal Supervisor, Dr. Alicia Stanway a.stanway@ecu.edu.au
- Professor Owen Carter o.carter@ecu.edu.au
- The Research Ethics Officer at Edith Cowan University, Phone: +618 6304 2170; Email: research.ethics@ecu.edu.au

Thank you for your support

David Mercovich
7.5 Fundamental UV Index Concepts

7.6 Visual Cue A- UV Index measure

UV Index: 5 Moderate

7.7 Visual Cue B- UV Index measure

UV Index: 13 Extreme
7.8 Visual Cue C - Sun Smart UV alert times

UV ALERT
11:15am - 1:15pm

UV ALERT
8:15am - 4:20pm
7.9 Visual Cue D- UV Index bell chart
7.10 Visual Cue E- UV Index bell chart
### Focus Group Breakdown

1. **Initial icebreakers, introductions of each participant and the moderator**

2. Each participant will be asked to wear a name badge for convenience purposes for the moderator.

3. Participants will be asked to fill in an initial broad questionnaire (salience questionnaire).

4. Participants will be asked about their responses in an open forum.

5. Participants will then be asked to fill in another pre-focus group questionnaire that has more explicit UV related questions.

6. The interviewer will then display and discuss with the participants a range of visual queues related to the UV Index and ask participants to give their feedback on each of them in terms of understanding, knowledge and applications of the information.

7. The moderator will then give out a facts sheet containing truths about the UV index. Participants will be asked to tick statements they found surprising and cross facts they didn't find surprising. This will then be openly discussed in the focus group.

8. The moderator will then ask the participants to go over their fact sheet and label their top 3 surprising statements in order. This will then be briefly discussed.

9. Participants will then lastly be asked to fill in a post focus group questionnaire. The moderator will then explain the explicit purpose of the focus group and how once again their responses will remain confidential.

10. Participants are thanked for their time and the focus group ends.
7.12 Qualitative responses to visual data

**UV Index: 5 [moderate]**
- Few people recognized this format “UV”
- Near universal appreciation “Index”
- Self-explanatory
- “I’ve seen UV rating before but not index” “5”
- Largely meaningless without descriptor
- “Now I am confused- I thought it was out of 5”
- “5 is the average throughout the day” “Moderate”
- ‘Moderate’= average
- “if 5 s ‘moderate’ then it must be out of 10”
- “it means there’s a ‘moderate’ chance of sunburn”
- ‘moderate’ is comforting”
- “I’ve only ever seen ‘extreme’ reported”

**UV Index: 12 [extreme]**
- “12”
- Again largely meaningless without descriptor
- “ Well there goes it being out of 10 now I’m guessing its 15” “extreme”
- “Stay out of sun”
- “You’re definitely going to get burnt”
- “The sun is at a dangerous level”
- “Slip, slop, slap”
- “The ‘extreme’ grabs my attention”
- no one had ever seen it
- Sun Smart logo widely recognized “UV Alert”
- “UV is the most extreme during these periods”
- “this is the worst time of the day”
- “this is when the UV levels plateau for the day”
- “what’s the threshold for the alert?”
- “there should be something before the alert” “11:15-11:15”
- “a bit more realistic than most”
Knowledge of the UV Index within Western Australia

David Mercovich 10143243

- “that’s incorrect”
- “it’s too precise”
- “the minutes are unnecessary”
- must have a scientific basis”
- “you can still get burnt outside these times”

- “8:15 am- 4:20pm”
- “put sunscreen on all day”
- “cover up between 8:15 and 4:20”
- “you can relax a bit at 5pm”
- “you can still get burnt outside these Hours”

UV Alert/Peak UV time
- “ the UV peaks at noon”
- “the sun is strongest at midday”
- “the sun is stronger in the afternoon”
- “the intensity keeps building until late afternoon”
- “between 11 and 3 sit under a tree”
- “9am much safer than 3pm”
- 3pm worse than 11 am
- 10 am to 3pm is peak UV time
- “12-2 is peak UV alert”

- no one had ever seen it

Curve
- “Makes sense”
- “I haven’t seen it but that’s how I’d imagined it”
- “the graph is very good”
- “It’s a peak not a plateau?!”
- “it makes you aware of the times”
- “the UV alert means something now”

Comprehension
- “it’s too hard”
- “I look at it and go ‘whatever!’”
- “ a lot of people won’t understand it”
- “puts the whole day into perspective”
- “its quite straight forward and to the point”

- Despite mixed feedback about the bell curve after a short discussion the groups with eh most resistance to the graph (especially female groups) began to understand it more and appreciate its message. Initial thoughts of “whatever” and “too Hard” turned into “now I get
it” and “if you explain it slowly people will get it…eventually”. Both male focus groups differed in that they appreciated and liked the graph from the outset and required less time to understand its functionality and meaning.