PREDICTING THE COGNITIVE CORRELATES OF SUN PROTECTIVE BEHAVIOUR

A thesis completed in partial fulfilment of the requirements for the degree of Master of Arts in Psychology at Massey University, Palmerston North, New Zealand

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1999

ABSTRACT

Previous research has explored the cognitive correlates of sun protective behaviour and has found that intention to use skin protection is likely to affect an individuals decision to use such behaviour. Other research has used social cognition models such as the Theory of Planned Behaviour to predict the use of sun protective behaviours with mixed results. The present study examined sun protective behaviour on beaches in New Zealand (n=80) and used a modified version of the Jones, Abraham, Harris, Schulz & Chrispin (1998) model of sun protective behaviour to predict sunscreen use. This modified version of the model contained variables from social cognition models, including the Theory of Planned Behaviour and Stage models of Health Behaviour such as that of Gollwitzer (1993). Knowledge, norms, threat likelihood, perceived threat, self-efficacy and motivation to prevent negative effects of sun exposure together accounted for 36.5% of the variance in intention to use sunscreen. The findings also suggest that motivation to prevent negative effects of sun exposure and threat likelihood consistently have the strongest correlational relationship (of all the prior cognitions) with both intention and sunscreen behaviour. A measure of planning did not mediate the effects of intentions on sunscreen use as was originally expected, rather, intentions had the largest effect on sunscreen use. It is reasonable to assume that planning may not always be necessary for the prediction of sunscreen behaviours. It was concluded that a modified version of the sun protective behaviour model may be useful in predicting such behaviours but refinement is required of the model and its measures. Implications for further research and model modification are noted.

ACKNOWLEDGEMENTS

I am very grateful to my supervisor, Kerry Chamberlain, for his guidance and helpful suggestions in the preparation of this thesis. His dedication to the finer details of research, his great patience, and his ability to find more than 24 hours in a day are to be applauded.

Thanks also to Jay Abbott for helping hand out questionnaires, and to Ange who kept saying 'I can't wait to read it when it finished'. To my Father and my Grandma for their continued support throughout my degree, my Grandad for showing interest, and my Mum - who said I'd never do it and I just had to prove her wrong. This one's for you.

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CHAPTER ONE
INTRODUCTION

SUN AND SKIN PROTECTION

The incidence of skin cancer has increased rapidly in Caucasian populations world-wide in recent years, with a corresponding increase in mortality from the most serious form, malignant melanoma (Boyle, Maisonneuve, & Dore, 1995). While Australia has the highest incidence (approaching 40 per 100,000 per annum in Queensland), the occurrence of the disease is increasing rapidly in New Zealand (approaching 18.6 per 100,000 per annum in men; and 23 per 100,000 per annum in women). As a comparison to this, in a 1982 New Zealand survey, the melanoma rate was 23 per 100,000 for Europeans; and the non-melanoma incidence was 384 per 100,000 (Freeman, Fairbrother & Rose, 1982). The average annual increase of malignant melanoma in New Zealand is 7% (Boyle et al., 1995, Boyle, 1997). Further to this, it is interesting to note that native residents of Australia and New Zealand, who themselves are mainly of British origins, have experienced incidence and mortality rates of malignant melanoma roughly twice those of recent British immigrants (Cooke & Fraser, 1985). More recent studies of emigrants to Australia and New Zealand show that those who arrive over the age of 15, have a substantially reduced risk of melanoma than those born in these sunny countries (Austoker, 1994).

Despite the levels of incidence and mortality, it is estimated that approximately 80% of all skin cancers are avoidable through protection against excessive exposure to ultra violet radiation (Melia & Bulman, 1995). There remains a need for further research into the efficacy of various types of sunscreen and their relationship to cancer aetiology (McGregor & Young, 1996; Autier, Dore, Schifflers, Cesarini, Bollaerts, Koelmel, Gefeller, Liabeuf, Lejeune, Lienard, Joarlett, Chemaly, & Kleeberg, 1995), but based on the current state of knowledge, most skin cancer campaigns recommend a range of

protective measures. These include the regular use of sunscreen that has a sun protection factor (SPF) of 15 or higher, as well as limiting sun exposure by covering up and avoiding the sun between the hours of 11a.m. and 3p.m.

Sun exposure has been linked to the perceived benefits of sunbathing and skin tanning, coupled with poor knowledge of the threat of skin cancer (Keesling & Friedman, 1987). There also prevails an attitude that having a sun tan is healthy and attractive (Broadstock, Borland & Gason, 1992; Carmel, Shani & Rosenberg, 1994; Robinson, Rigel & Amonette, 1997). Consequently, most interventions have been aimed at changing knowledge and beliefs towards sun tanning through the use of news media. For example, successive surveys of a population revealed that an Australian sun protection campaign with significant national investment resulted in increased knowledge and the establishment of a less positive attitude towards sun tanning, over successive surveys (Hill, White, Marks, Theobald, Borland, & Roy, 1992).

Smaller scale evaluations have also been conducted in the U.K. Newton, Hughes, & Altman (1993) found that a school-based package increased knowledge and decreased positive attitudes towards sunbathing but, although knowledge was correlated with sunscreen use, it was not related to reported sunburn rates. More recently, Castle, Skinner & Hampson (in press) found that knowledge, and the personality trait of conscientiousness were predictors of sun protective behaviour. Additionally, young women who had received a health education leaflet showed an increase in knowledge, but no change in skin protective beliefs, relative to controls. Robinson, Rigel, & Amonette (1997), and Miller, Ashton, McHoskey & Gimbel (1990), found that women are more likely to be aware of information about skin cancer prevention, yet paradoxically, women are more likely to intentionally tan than men. It is also interesting to note that age is positively correlated with skin cancer prevention information awareness (Robinson et al., 1997).

Although sun protective knowledge has increased in terms of a wider recognition towards the dangers of sun exposure (1996 telephone survey, based on a 1986 American Academy of Dermatology survey which compared results over the two time spans), there has been a decline in the ability to identify skin cancer as dangerous (Robinson et al.,

1997). People know that others harm themselves by sun exposure but do not fully recognise the potential harm of sun exposure to themselves (Robinson et al.).

Similarly, Keesling & Friedman (1995) found that knowledge predicted sunscreen use intentions, but although the provision of information increased knowledge and knowledge seeking behaviours, it did not directly increase intentions. Mermelstein & Riesenberg (1992) also found that a school-based intervention was able to increase knowledge and perceived risk but not intentions to take precautions.

Intervention effectiveness may, however, be reduced by the absence of suitable models of psychological antecedents of sun protective behaviour. For example, learning about a potential health hazard may be an essential first step towards preventive action but, as Arthey & Clarke (1995) found in their review of the psychological literature on sun protection, knowledge may not generate preventive action unless other motivational prerequisities are also in place (Weinstein, 1988). It may not be surprising, therefore, that knowledge is not always found to be a useful predictor of sun protective behaviours (e.g., Foot, Girgis, Boyle, & Sanson-Fisher, 1993; Rodrigue, 1996; Vail-Smith, & Felts, 1993). Even when personal susceptibility is recognised, protection may not be regarded as important enough to prompt action, resulting in weak associations between perceived susceptibility and preventive behaviour (Harrison, Mullen & Green, 1992). For example, Mermelstein & Riesenberg (1992) found that once a measure of perceived likelihood to take precautions had been considered, perceived susceptibility explained only 5% of the variance in sunscreen use. So then, if knowledge is not a useful predictor of sun protective behaviour, what factors should be looked at?

Research suggests a need for effective educational interventions to increase sun protective behaviour. For example, after eight years of the Australian Slip, Slop, Slap campaign, Hill et al., (1992) found that 18% of men and 14% of women in a Melbourne sample of 1,655 still reported skin burning (defined as reddening of the skin) during the previous weekend. Similarly, Foot, Girgis, Boyle, & Sanson-Fisher (1993) found that only 45% of 670 Australian beachgoers had a high level of protection (defined as SPF 15+, clothing or shade), with 16% using no protection. Some findings from the first large scale survey of sun protection and sunburn among New Zealand adults (McGee, Williams, Cox, Elwood, & Bulliard, 1995) suggested that on any fine summer weekend,

about three out of four adults are outside for relatively long periods of time on one or both days, with one in every five of those outside experiencing sunburn.

In New Zealand, surveys have documented that children and adolescents often experience excessive exposure to the sun with high rates of burning. For instance, in a sample of 345, adolescents aged 13-15 year olds, over one-third reported getting sunburned to the point of soreness at least once over the preceding summer; with 6% reporting blistering of the skin. Despite relatively high awareness of melanoma as a dangerous form of cancer associated with sun exposure, a significant proportion of the sample showed high positive attitudes towards tanning and sun exposure without adequate sun protection. On a more positive note, reports of exposure to sources of information about melanoma were correlated with melanoma awareness, which in turn predicted use of sun protection measures.

Health promotion efforts of the Cancer Society of New Zealand have increased awareness of melanoma, but it is unclear if this is associated with increased sun protection (McGee, Williams, & Glasgow, 1997). Findings suggest that campaigns such as those of the New Zealand Cancer Society have an important role to play in reducing high levels of sun exposure among adolescents (McGee & Williams, 1992). Melanoma then, is a major public health problem in New Zealand and Australia, and there is clear evidence that sunburn is a major risk factor for melanoma (Whiteman & Green, 1994). Reducing the frequency of sunburn in the community remains the prime focus of efforts to prevent the disease, especially for children and adolescents.

A study undertaken by McGee, Williams & Glasgow (1997) found that younger children are better protected from sunburn than adults, and that the strongest predictor of sun protection among children was the actual use of sun protectants by their parents. Likewise, children were about nine times more likely to be wearing sunscreen if the parent reported sunscreen use. This result was also supported by Zinman, Schwartz, Gordon, Fitzpatrick, & Camfield (1995) who found that sunscreen use in parents is a key determinant of whether they will use it on their children. Parents who have a history of sunburn or perceive their child to be at risk of sunburn will be more likely to protect their child from the sun. Morris, Bandaranayake, & McGee (1998) investigated awareness of sun protection behaviours in a sample of New Zealand primary school children, and

found that the data revealed a bias towards sunscreen as a method of sun protection compared with other protective methods such as clothing and the use of shade.

A comparison between results of children resident in Australia, New Zealand and England indicated a greater awareness of sun protection methods amongst the Australian and New Zealand children compared with children living in England. In addition, they also found that children as young as 5 and 6 can describe the consequences of overexposure to the sun, and can illustrate methods of sun protection, with sunscreen seen as the main method of sun protection. It appears then, that efforts promoting sun protection should be more focused on children and adolescents. This is supported by the literature that suggests that children tend to spend more time outdoors than adults, and that children's activities are more likely to result in more midday sun exposure than adults (Truhan, 1991). Stronger support for this comes from research which states that the lifetime risk of melanoma is at least doubled by having had one or more severe sunburns during adolescence, and excessive exposure to the sun early in life (i.e. prior to 20 years old) is the best predictor of later development of nonmelanoma and melanoma skin cancers (Baum & Cohen, 1998). Under normal circumstances (weather conditions), children receive three times the annual sun exposure of adults; and most of one's lifetime exposure occurs in childhood (Truhan, 1991). Thus, early childhood sun exposure is an important factor (Austoker, 1994). Because of findings like these, children and adolescents have been identified by researchers as a key group for primary prevention.

SUMMARY

Exposure to sunlight should be a readily modifiable risk factor for skin cancer. Most intense exposures to the sun are intentional (e.g. sunbathing) and can be minimised by use of shaded areas when outside, by wearing protective clothing, and by appropriate use of sunscreen (Baum & Cohen, 1998). The ready availability of methods for protecting oneself belie the difficulty of changing these behaviours. Publicity about sun exposure and skin cancer have made many people aware of the risks, but has not produced large-scale behaviour change. Social norms in many groups still associate a suntan with a desirable, healthy appearance. Advertising reinforces the view that having a tan looks good, and there are many reports in the popular press on safe methods of achieving a tan

(Arthey & Clarke, 1995). Together with unrealistic optimism and tendencies to minimise health threats, these factors decrease the likelihood that people will seriously consider or adopt sun protective behaviours.

In the next couple of chapters, we want to look at models of health behaviour and see how they can help to predict use of certain health protective behaviours, in this case sun protective behaviours. We want to look in some depth at a couple of the models and the research using these models undertaken to date. From this, we then want to propose a model to be used to study sun protective behaviours and use this model in conjunction with recent research in the area of sun protective behaviours.

CHAPTER TWO
SOCIAL COGNITION MODELS

A series of social cognitive models specifying cognitive prerequisities of behaviour have been applied to a wide range of health - related behaviours. The study of health behaviours is primarily based upon two assumptions; that in industrialised or westernised countries a substantial proportion of the mortality from the leading causes of death is due to particular behaviour patterns, and that these behaviour patterns are modifiable (Stroebe & Stroebe, 1995). It has become more acknowledged that individuals can make major contributions to their own health and well-being through the adoption of particular health-enhancing behaviours (e.g. exercise) and the avoidance of other health-compromising behaviours (e.g. smoking) (Conner & Norman, 1995).

This identification of the factors that underlie such 'health behaviours' has recently become the focus of extensive research in psychology and other health related disciplines (e.g. Carmel, Shani, & Rosenberg, 1994; Doll & Orth, 1993; Godin, 1984; Godin & Kok, 1996; McCaul, Sandgren, O'Neill & Hinsz, 1993; and Van Ryn, Lytle & Kirscht, 1996). This research has been stimulated by two main factors: first, "a desire to design interventions to change the prevalence of such behaviours and so produce improvements in individuals' and populations' health" (Conner & Norman, 1995:1); and secondly, "a desire to gain a more general understanding of the reasons why individuals perform a variety of behaviours" (Conner & Norman, 1995:1).

A wide range of health behaviours have been explored, including health-enhancing behaviours such as healthy eating and exercise involvement; through health protective behaviours such as vaccination against disease, health screening clinic attendance, and condom use in response to the threat of AIDS; to avoidance of health-harming behaviours such as smoking and extreme alcohol consumption, and sick-role behaviours such as conformity with medical treatments. A unifying theme across these behaviours is that they have immediate or long-term effects upon the individual's health and are at least partially within the individual's control (Conner & Norman, 1995).

Epidemiological studies have revealed substantial variation in who performs these behaviours. The approaches taken to understand the factors underlying this variation have been many and varied. A broad distinction can be made between factors that are intrinsic to the individual (e.g. sociodemographic factors, personality, social support, cognitions) and factors that are extrinsic to the individual, which can be further divided into incentive structures (e.g. taxing tobacco and alcohol), and legal restrictions (e.g. banning dangerous substances). The first of these factors has received the most attention from psychologists. Within the intrinsic factors, cognitive factors have been focused upon as the most important proximal determinants (Conner & Norman, 1995).

Models of how such cognitive factors shape assorted 'social' behaviours are commonly referred to as social cognition models (SCMs) and have been widely applied by psychologists. They are generally recognised to have provided a valuable contribution to the greater understanding of who performs health behaviours (Marteau, 1989) and how factors extrinsic to these may produce behaviour change (e.g. Rutter, Quine & Chesham, 1993). The justification for the focus on social cognitive determinants in SCMs is two-fold. First, "these determinants are assumed to be important causes of behaviour which mediate the effects of many other determinants (e.g. social class). Second, these social cognitive factors are assumed to be more open to change than other factors (e.g. personality)" (Conner & Norman, 1995:2). Together these justifications imply that effective interventions should be based upon manipulations of cognitive variables shown to be determinants of health behaviour.

Predicting the importance of health behaviours

Is it possible to predict who performs health behaviours? By being able to do this, it would allow us to make a contribution to the understanding of the variation in the distribution of health across society (Conner & Norman, 1995). It might also indicate targets for interventions designed to change health behaviours. A variety of factors account for individual differences in the tendency to undertake health behaviours, including demographic factors, social factors, emotional factors, perceived symptoms, factors relating to access to medical care, personality factors and cognitive factors (Rosenstock, 1974; Taylor, 1991; Adler & Matthews, 1994).

Demographic variables show reliable associations with the performance of health behaviours. In terms of sun protective behaviours, younger age is associated with reported sun burning and less likelihood of actively partaking in sun protective behaviour, for example, using sunscreen and keeping out of the sun. Increasing age, on the other hand is associated with less sunburn of the skin and a greater likelihood of partaking in sun protective behaviours (Carmel, Shani & Rosenberg, 1994; Robinson et al., 1997; Rosenman, Gardiner, Swanson, Mullan & Zhu, 1995). Health behaviour also varies by gender. For sun protective behaviour, an example of this is that women are more likely to be aware of information about skin cancer prevention than men. (Mawn & Fleischer, 1993; Miller, Ashton, McHoskey & Gimbel, 1990).

Differences by socioeconomic status, ethnic status and educational status are also apparent. Generally, in terms of sun protective behaviours, increasing age, income and education increases the likelihood of having skin examinations (Rosenman et al., 1995). Individuals with more education are more likely to engage in health promotion practices than individuals with less education (Friedman, Webb, Bruce, Weinberg, & Cooper, 1995; Carmel et al., 1994; Robinson et al., 1997). However, one can speculate that the social desirability of a tan outweighs the typical association seen between socioeconomic levels and healthy behaviour (Rosenman et al., 1995). This supposition is supported by sun behaviour research. For example, Robinson et al., (1997) found that 68% of respondents in their study reported that people looked better with a tan; and that men and Whites (Caucasians) thought that people looked better with a tan. In other words, having a sun tan is seen as socially desirable.

Social factors, such as parental models, seem to be important in instilling health behaviours early in life (see chapter 1 for examples). Peer influence, cultural values, emotional factors, self-esteem and perceived symptoms will also control health habits. Accessibility of medical care services has been found to influence the use of health services (Whitehead, 1988; in Conner & Norman, 1995). Personality factors have either positively (e.g. optimism) or negatively (e.g. negative affectivity) been associated with the practice of health behaviours (Adler & Matthews, 1994).
Cognitive factors also determine whether or not an individual practices health behaviours. For example, knowledge about behaviour - health links (or risk awareness)

is an essential factor in an informed choice concerning a healthy lifestyle (Conner & Norman, 1995). A variety of other cognitive factors include "perceptions of health risk, potential efficacy of behaviours in influencing this risk, perceived social pressures to perform the behaviour and control over the performance of the behaviour" (Conner & Norman, 1995:4).

The relative importance of differing individual cognitive factors in the performance of various health behaviours has been the focus of numerous studies and the basis of a number of alternative models. For example, Cummings et al., (1980) (in Conner & Norman, 1995) had experts sort 109 variables derived from 14 different health behaviour models. On the basis of non-metric multidimensional scaling six distinct factors were derived:

1. Accessibility of health care services.
2. Attitudes to health care (beliefs about quality and benefits of treatment).
3. Perceptions of disease threat.
4. Knowledge about disease.
5. Social network characteristics.
6. Demographic factors.

(Conner & Norman, 1995).

Factors 2 to 4 represent social cognitive factors (beliefs, attitudes, knowledge). These factors are enduring characteristics of the individual which shape behaviour and are acquired through socialisation processes. They distinguish between individuals from the same background in terms of their tendency to perform health behaviours (Conner & Norman, 1995). They are also open to change and hence represent one route to influencing the performance of health behaviours.

Cognitive factors have thus formed a particular area of study in the field of health promotion because they may mediate the effects of many of the cognitive factors discussed earlier, and because they are believed to be a good focus in attempting to change health behaviours. These cognitive factors constitute the focus of a small number of widely used models of health behaviours. Such models have been labelled social cognition models because they use a number of cognitive variables that are particularly important in the social cognitive approach to understanding individual social behaviours.

Social cognition approaches to health behaviours

Social cognition is concerned with how individuals make sense of social situations. The approach focuses on individual cognitions or thoughts as processes that intervene between observable stimuli and responses in specific real world situations (Fiske & Taylor, 1991). The question of which cognitions are important in predicting behaviour has been the focus of much research. In recent years, the 'social cognitive' approach in social psychology, looking at the person as a thinking organism has become dominant.

The research that has been thus conducted in social cognition can be broadly split into how people make sense of others (person perception) and themselves (self-regulation) (Fiske & Taylor, 1991). Self-regulation processes can be defined as "those mental and behavioural processes by which people enact their self-conceptions, revise their behaviour, or alter the environment so as to bring about outcomes in it in line with their self perceptions and personal goals" (Fiske & Taylor, 1991:181). Self-regulation involves the setting of goals, cognitive preparations and the ongoing monitoring and evaluation of goal-directed activities and shall be looked at in more depth. Recent research has looked at developing models of the role of cognitive variables in volitional processes (e.g. Bagozzi, 1992; Gollwitzer, 1993), and these models are collectively called stage models of health behaviour.

Stage models of health behaviours

From a social cognitive perspective, an important implication of this position is that different cognitions may be important at different stages in promoting health behaviour. There have been many stage models developed over the past two decades, ranging from Prochaska and DiClemente's (1984) transtheoretical model of change, through to Bagozzi's (1992, 1993) goal setting theory. Two important themes run through each of the stage models. First, they all emphasise a temporal perspective such that there are different stages of behaviour change. While the models propose different numbers of stages, they all follow the same basic pattern from a pre-contemplation stage, through a motivation stage, to the initiation and maintenance of behaviour. The important point to

make is that these models are dynamic in nature; people move from one stage to another over time. Second, these stage models imply that different cognitions are important at different stages (Sandman & Weinstein, 1993; in Conner & Norman 1995). For example, in the earlier stages, information may be processed about the costs and benefits of performing a behaviour, while in the later stages cognitions become more focused on the development of plans of action to initiate and support the maintenance of a behaviour.

Volitional Processes

The main social cognition models of health behaviour can be viewed as being fundamentally involved with people's motivations to perform a health behaviour and, as such, can be considered to provide strong predictions of behavioural intentions. Ajzen (1991), for example; reports an average multiple correlation of 0.71 between variables in the Theory of Planned Behaviour and behavioural intention. However, strong intentions do not always lead to corresponding actions. Studies examining the intention - behaviour relationship have reported a wide range of correlations. In their meta - analysis of the Theory of Reasoned Action, Sheppard, Hartwick & Warshaw (1988); reported intention - behaviour correlations ranging from 0.10 to 0.94. From this analysis, it is obvious that many people who intend to perform a behaviour fail to do so. However, the Theory of Reasoned Action and the Theory of Planned Behaviour can be conceptualised as relatively static models that stop at the formation of an intention; they do not go on to distinguish between intenders who become performers and those who do not (Conner & Norman, 1995). As Bagozzi (1993) argues, the variables outlined in the social cognition models are necessary, but not sufficient, determinants of behaviour. In other words, they can provide good predictions of people's intentions (or motivation) to perform a health behaviour, but not their actual behaviours.

At present, relatively little detailed attention has focused on the cognitive processes underlying the effective implementation of intentions. The main social cognition models contain few measures that account for the intention - behaviour gap (Abraham & Sheeran 1993; in Conner & Norman, 1995). The Theory of Planned Behaviour attempts to do this by proposing a direct link between perceived behavioural control and

behaviour. Thus, people's perceptions about the amount of control they have over a behaviour influence the likely performance of behaviour independently of their intentions, although this is only seen to apply when perceived behavioural control reflects actual control (Conner & Norman 1995). Self-efficacy is similarly able to predict behaviour independently of intention and has been related to planning, effort and persistence (Bandura 1989), all activities that are likely to increase the likelihood of successful enactment of an intention. From this, it is clear that there needs to be more detailed analysis of the volitional processes underlying health behaviour, and a number of researchers have started to focus on this issue. In the rest of this section we intend to look at Gollwitzer's (1993) work on implementation intentions and Bagozzi and Warshaw's (1990) theory of trying. This is being done to emphasise the social cognitive variables that may be important in the initiation and maintenance of behaviour.

Gollwitzer (1993) made the distinction between goal intentions and implementation intentions. While the former is concerned with intentions to perform a behaviour or achieve a goal (i.e. 'I intend to achieve x'), the latter is concerned with plans as to when, where and how the goal intention is to be translated into behaviour (i.e. 'I intend to initiate the goal-directed behaviour x when situation y is encountered'). The important point about implementation intentions is that they commit the individual to a specific course of action when certain environmental conditions are met; in so doing they help to translate goal intention into action (Conner & Norman 1995). Take the example of using sun protective behaviours: an individual may have the intention to use sun protective behaviours, but this may not be translated into behaviour if she or he does have an implementation intention that specifies when, where and how she or he will use sun protective behaviours. Gollwitzer (1993) argues that by making implementation intentions, individuals pass over control to the environment. The environment therefore acts as a cue to action, such that when certain conditions are met, the performance of the intended behaviour follows.

Gollwitzer's (1993) work is important in that it identifies one way in which goal intentions may be translated into behaviour. A similar, but more extensive, approach has been put forward by Bagozzi and Warshaw (1990) in their theory of trying. They focus on goal-directed behaviour and argue that to initiate behaviour an individual needs first to form an 'intention to try' to achieve his or her desired goal. Once an intention to try

has been formed, the individual then focuses on the means, or instrumental acts, by which he or she will attempt to achieve the desired goal. Considering the example of sun protective behaviours, a number of instrumental acts can be identified, including buying sun protection (i.e. sunscreen), carrying the sunscreen, raising the use of sunscreen when out in the sun and so on. Bagozzi (1993) argues that for each of these instrumental acts, three appraisal tasks are performed. First, the individual considers the extent to which he or she is confident that he or she could perform the instrumental act (i.e. specific self-efficacies). Second, the likelihood that the instrumental act will help in achieving the desired goal is assessed (i.e. instrumental beliefs). Third, the individual considers his or her affective response towards the instrumental act (i.e. affect towards means). So, individuals are likely to engage in goal-directed behaviour if they can identify instrumental acts that they believe will lead to goal achievement, that they are confident they can perform and that they feel positive towards.

Once an individual initiates efforts to achieve a goal, there a number of cognitive activities that can support the successful initiation and maintenance of goal-directed behaviour. First, the individual can develop plans in order to ensure that instrumental acts are performed. This involves identifying the situation or triggering conditions under which the instrumental act is performed (Bagozzi and Warshaw 1990). This idea that certain environmental conditions may trigger behaviour has a clear overlap with Gollwitzer's (1993) work on implementation intentions. Bagozzi (1993) also proposes that ongoing behaviour has to be monitored to ensure, for example, that the instrumental acts achieve their objectives. Finally, goal-directed behaviour is likely to be stronger and more persistent if the individual has a strong sense of commitment to both the decision to try to achieve the goal and the means to achieve it (Conner and Norman 1995).

The above review highlights one way in which the formation of a behavioural intention may not be sufficient for the successful enactment of behaviour. In many cases, further cognitive activity is required to ensure that intentions are translated into action. This may involve the consideration of potential instrumental acts and the formation of implementation intentions. In addition, ongoing behaviour needs to be monitored and evaluated to ensure the successful behavioural enactment (Conner and Norman 1995).

SOCIAL COGNITION MODELS

Social cognition models (SCMs) which describe the important cognitions and their interrelationships in the regulation of behaviour, have been developed and extensively applied to the understanding of health behaviours. Two broad types of SCMs have been applied in health psychology, predominantly to explain health-related behaviours and response to treatment (Conner, 1993). The first type can be labelled attribution models, which are concerned with individuals' causal explanations of health related events. However, most research to do with this has focused on how people respond to a range of serious illnesses, rather than the health-enhancing and compromising behaviours of otherwise healthy individuals.

A second type of SCM examines various aspects of an individual's cognitions in order to predict future health-related behaviours and outcomes. The SCMs commonly used to predict health behaviours include the Health Belief Model (HBM; e.g. Becker, 1974; Janz & Becker, 1984), Health Locus of Control (HLC; e.g. Wallston, Wallston, & DeVellis, 1978; Seeman & Seeman, 1983), Protection Motivation Theory (PMT; e.g. Maddux & Rogers, 1983; van der Velde and van der Pligt, 1991), Theory of Reasoned Action/ Theory of Planned Behaviour (TRA/TPB; e.g. Ajzen & Fishbein, 1980; Ajzen, 1988, 1991), and Self-efficacy Theory (SET; e.g. Bandura, 1982, 1991; Schwarzer, 1992).

These SCMs provide a basis for understanding the determinants of behaviour and behaviour change. They also provide a list of important targets which interventions designed to change behaviour might focus upon if they are to be successful. Each of these models emphasises the rationality of human behaviour, with health behaviours to be predicted being the end result of a rational decision-making process based upon deliberative, systematic processing of the available information (Conner & Norman, 1995).

SUMMARY

So far, we have looked at the role of social cognition models and social cognition approaches in health behaviour. We have also looked at stage models of health

behaviours and volitional processes, seen how they work, and have suggested how incorporating them into social cognition models may improve the use of testing for health-related, and especially sun protective behaviours. In the next couple of sections, we want to further explore two of these social cognition models, the Theory of Reasoned Action and the Theory of Planned Behaviour. These two models have been chosen as they have been previously studied in relation to sun protective behaviours. This gives the current study a base in which to look at testing such behaviours. We intend to introduce and explore these two theories, and then look at their applicability to health related behaviours.

CHAPTER THREE
THE THEORIES OF REASONED ACTION AND PLANNED BEHAVIOUR

THE THEORY OF REASONED ACTION

The Theory of Reasoned Action (TRA) (Fishbein & Ajzen, 1975; Ajzen & Fishbein, 1980) and the later Theory of Planned Behaviour (TPB) (Ajzen 1988, 1991) are both theories that have attracted and continue to attract attention in psychology. Both models can be regarded to be deliberative processing models in that they appear to imply "that individuals make behavioural decisions based upon a careful consideration of available information" (Conner & Sparks, in Conner & Norman, 1995:121). The Theory of Reasoned Action itself had its origins in Fishbein's early work on the psychological processes by which attitudes might cause behaviour (Fishbein, 1967) and in an analysis of the failure to predict behaviour from knowledge of individuals' attitudes. The previous work used an expectancy-value framework (Peak, 1955) to explain the relationship between beliefs and attitudes, and introduced a new variable, behavioural intentions, between attitudes and behaviours. The latter work generated a strong explanation of when strong attitude-behaviour relationships might be expected (the principle of compatibility).

The principle of compatibility (Ajzen & Fishbein, 1977; Ajzen, 1988) is based upon the assertion that "each attitude and behaviour has the four elements of action, target, context and time, and states that correspondence between attitudes and behaviour will be greatest when both are measured at the same level with respect to each of these elements" (Conner & Sparks, in Conner & Norman, 1995: 121). Further to this, any particular behaviour consists of (a) an action (or behaviour), (b) performed on or toward a target, (c) in a context, (d) at a time or occasion. These elements can be explained by the following example. A person concerned about sun protective behaviour (a) rubs sunscreen, (b) all over their skin, (c) in the house, (d) before going out into the sun. This example illustrates how a behaviour can be aggregated over a range of occasions. Each

element can be specified at any level, from the very general to the very specific. Commonly in the study of health behaviours, it is the repeat performance of a single behaviour (e.g. using sunscreen) or even a general class of behaviours (e.g. healthy eating) that researchers are interested in predicting (Ajzen, 1988).

Attitudes may also be defined with reference to each of the four elements at any level of specificity, although attitudes may commonly only specify a target or an action, as in studies of attitudes towards healthy food or healthy eating (Conner & Sparks, in Conner & Norman, 1995). In emphasising that attitudes and behaviour will be most strongly related when both are assessed at the same level of specificity with regard to those four elements, Fishbein & Ajzen (in Conner & Sparks, in Conner & Norman, 1995) highlighted the proposal that general attitudes should predict general classes of behaviours. For the purposes of the Theory of Reasoned Action and the Theory of Planned Behaviour, they also demonstrated the need to study specific attitudes when attempting to predict specific behavioural acts. In addition, the claimed causal role for such specific attitudes in their relationship to target behaviours formed an important basis of the Theory of Reasoned Action and the Theory of Planned Behaviour (Conner & Sparks, in Conner & Norman, 1995).

Determinants of behavioural intentions

The primary goal of the Theory of Reasoned Action is to understand, and therefore predict, social behaviour. To do this, the behaviour has to be clearly stipulated, under volitional control, and performed in a given situation. In addition, an assumption is made that the immediate and sole determinant of the behaviour in question is the intention to perform or not perform that behaviour (Godin, 1994). This idea of intention is the cornerstone of the theory. It is a motivational construct that represents how hard people are willing to try, and how much effort they are planning to exert in order to perform a behaviour (Hausenblaus, Carron & Mack, 1997).

According to the Theory of Reasoned Action, the proximate determinants of the intent to take on a given behaviour are the individual's personal attitude toward performing the behaviour in question, and the influence of factors toward the performance of the

behaviour (Godin, 1994). In short, intentions casually determine behaviour and intentions in turn are caused by the joint influences of attitudes (attitudinal component) toward the behaviour and subjective norms (normative component). These two components are explained below.

Attitudinal Component

Ajzen & Fishbein suggest "that attitudes be viewed as overall evaluations and that they be measured by a procedure which locates respondents on a bipolar evaluative dimension" (1980:55). Presumably then, the more favourable a person's attitude is toward a behaviour, the more they should intend to perform that behaviour; the more unfavourable their attitude is, the more they should intend to not perform the behaviour. As stated earlier, just as a measure of intention must correspond to the behavioural criterion in action, target, context, and time elements, so too must the attitude correspond to the intention. The attitude refers specifically to the person's own performance of the behaviour rather than to its performance in general.

Normative Component

The normative component refers to the person's subjective norm, their perception that most people who are important to them think that they should or should not perform the behaviour in question. In the TRA, "subjective norm" refers to "a specific behavioural prescription attributed to a generalised social agent" (Ajzen & Fishbein, 1980:57). It refers to the person's perception that important others desire the performance or non-performance of a specific behaviour; this perception may or may not reflect what the important others actually think that the person should do. People are viewed as intending to perform those behaviours they believe important others think they should perform. Conversely, if they believe important others think they should not perform a behaviour, they will usually intend not to do so.

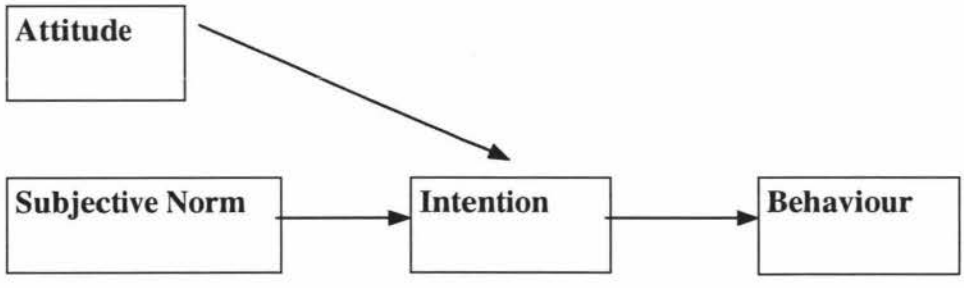
Again, the measure of subjective norm has to correspond to the intention in action, target, context, and time elements (see the beginning of chapter 3 for explanation of these elements). In some cases it may be likely that people hold favourable attitudes toward behaviours their important others think they should perform and negative attitudes toward behaviours their important others think they should not perform. In this type of scenario, the two components are in agreement, and prediction of intention is

relatively straightforward (Ajzen & Fishbein, 1980). However, the two components may not be in agreement. For example, a person may hold a favourable attitude toward performing a behaviour and believe that their important others think they should not perform it or vice versa. In this case, the person's intention will depend on the relative importance of the two components for the person. According to Ajzen & Fishbein (1980), each component is given a weight reflecting its relative importance as determinant of the intention under consideration. A given component may have a very high weight or no weight at all. These relative weights may change from one behaviour to another and from one person to another. The weighted components are summed to predict the intention.

For some behaviours, normative considerations are more important in determining behavioural intentions than are attitudinal considerations. For other behaviours the reverse may be true. In fact, variations in any of the four elements (action, target, context, time) defining the behaviour may influence the relative importance of the attitudinal and normative components. The relative importance of the two components can also be influenced by demographic variables, personality traits, and other individual differences.

Assuming that appropriate measures are obtained, the attitudinal and normative components should always predict the intention; their ability to predict the behaviour will depend on the strength of the intention-behaviour relation. The effects of attitude and subjective norm on behaviour are thus mediated by the behavioural intention.

Figure 1 - Schematic representation of the Theory of Reasoned Action



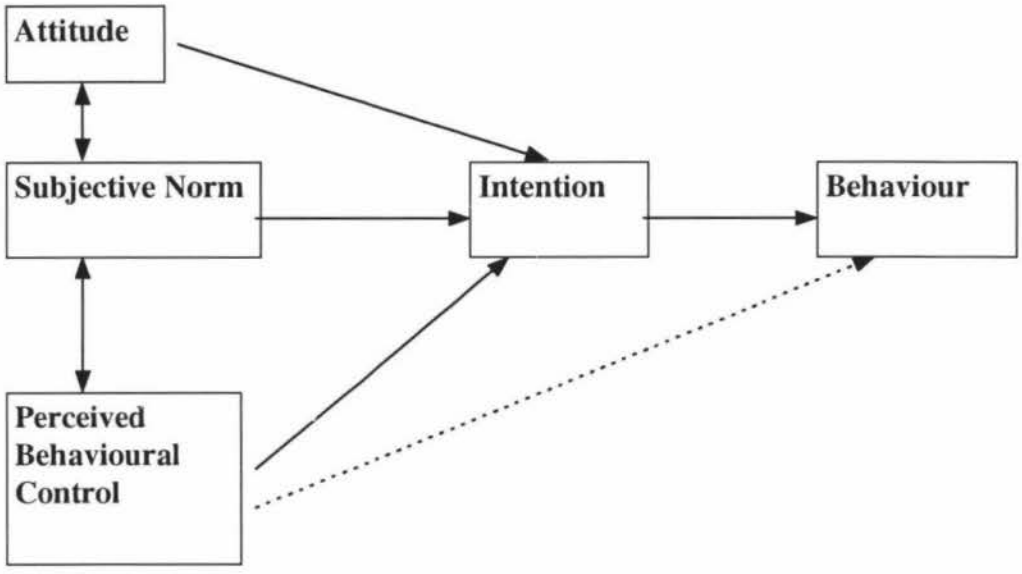
THE THEORY OF PLANNED BEHAVIOUR

The Theory of Planned Behaviour extends beyond the Theory of Reasoned Action and includes the concept of perceived behavioural control. Ajzen (1985, 1988) observed that the theory of reasoned action was particularly valuable when describing behaviours that were totally under volitional control (Godin, 1994). Ajzen (1988, 1991) then argues that it is only in the case of volitional behaviours that the TRA will provide adequate predictions, however, most behaviours are located on a continuum that extends from total control to a complete lack of control. The individual has total control when there are no practical constraints to the adoption of a given behaviour. At the opposite extreme, if adoption of the behaviour requires opportunities, resources, or skills that are currently lacking, the individual has complete lack of control (Godin, 1994). To take into account such limitations, whether they are real or perceived, Ajzen (1985, 1988) added a third element to the original Fishbein & Ajzen model: the concept of perceived behavioural control (PBC).

Perceived behavioural control can influence intention, as can the attitudinal and normative components. It can also influence behaviour directly, in parallel with the potential influence of intention, in situations where behaviour is not under the total control of the person. Attitude toward a behaviour is an expression of one's positive or negative evaluation of performing a given behaviour. The perceived subjective social norm reflects personal perception of the social expectations to adopt a given behaviour (Godin & Kok, 1996). PBC reflects personal beliefs as to how easy or difficult performing the behaviour is likely to be. It is assumed to reflect external factors as well as internal factors. A researcher should examine both the intention and the perceived control of an individual over a given behaviour if the individual has limited control of that behaviour.

The TPB has a belief-based structure formed by the perceived presence or absence of required resources and opportunities, the anticipated obstacles or impediments, and the perceived power of a particular control factor to facilitate or inhibit performance of the behaviour.

Figure 2 - Schematic representation of the Theory of Planned Behaviour



The applicability of the TRA and TPB to health-related and sun protective behaviours

The TRA and the TPB have been widely applied to identify cognitive antecedents of health -related behaviours. The strength of intention-behaviour relationships has been found to vary across behaviours (Sheppard, Hartwick & Warshaw, 1988), but intention is generally a reliable correlate of health behaviour, explaining approximately 20% of the variance (Randall & Wolff, 1994; Sheppard et al., 1988). Godin & Kok (1996), for example, found an average correlation of .46 across 26 applications of the TPB to health behaviours. Once the effects of intention are controlled, self-efficacy or perceived behavioural control measures may or may not explain additional variance in behaviour (Godin & Kok, 1996). This may depend on the actual control which can be exerted over the behaviour in question (Madden, Ellen, & Ajzen, 1992). Godin & Kok (1996) found that the TPB (i.e., intention and self-efficacy) accounted for an average of 34% of the variance across 35 prospective applications to health-related behaviour. By identifying modifiable cognitions which have important implications for future behaviour, such models have considerable potential to shape effective health promotion campaigns.

Hausenblaus, Carron & Mack (1997), conducted a meta-analysis of the applicability of the Theory of Reasoned Action and the Theory of Planned Behaviour to exercise

behaviour and found the following. The Theory of Planned Behaviour is superior to the Theory of Reasoned Action in accounting for exercise behaviour. There are no differences in the ability to predict exercise behaviour from proximal and distal measures of intention, and expectation is a better predictor of exercise behaviour than intention. The constructs embedded in the Theory of Planned Behaviour; attitude, subjective norm, perceived behavioural control, and intention have considerable utility in predicting and explaining exercise behaviour.

However, there have been few tests of cognitive models which combine cognition measures and compare the strength of the various relationships to intention and sun protective behaviour. One such study by Mermelstein & Riesenberg (1992), found that an anticipated behavioural likelihood measure (reflecting intention), perceived susceptibility and skin type, collectively explained 34% of the variance in sunscreen use. Perceived susceptibility accounted for the largest proportion of variance in anticipated behavioural likelihood (25%) with perceived benefits of sun exposure also contributing (3%). This study did not, however, consider the importance of perceived norms or of self-efficacy. Hillhouse, Adler, Drinnon and Turrisi (1997), used the TPB variables in their study of students in the USA. They found that attitudes, subjective norms and perceived behavioural control together accounted for 37% of the variance in sunscreen use intentions. Intentions, in turn, accounted for 49% of the variance in behaviour.

Other studies of sun protection behaviour have also drawn upon these models. Recent research undertaken in Australia and the United Kingdom (Jones, Abraham, Harris, Schulz & Chrispin, (1998) examined sun protective behaviour on beaches in Australia and in the United Kingdom. The study aimed to construct a model of sunscreen behaviour which drew on previous health promotion targets, particularly knowledge and perceived threat, in addition to cognitions specified by the Theory of Planned Behaviour and Social Cognitive Theory (i.e., normative beliefs, self-efficacy, and strength of intention). They also used concepts taken from Gollwitzer's (1993) work on implementation intentions and other theorists such as Schwarzer (1992) and Kuhl (1992). The use of samples drawn from both UK and Australian beaches enabled the researchers to examine the extent to which social cognitive models can be applied across samples in the domain of health behaviours.

They sought to clarify whether action phase cognitions (especially planning) could enhance existing cognitive models of health behaviour, taking into account the degree of importance attached to preventing negative effects of the sun. They found that no previous studies prior to this one had examined mediators of the intention-behaviour relationship in relation to sun protective behaviour. The Jones et al., (1998) study also aimed to identify the salient discriminators between those who used sunscreen and those who, despite similar intentions to protect themselves, failed to carry out the intended behaviour.

Their study showed that the developed cognitive model was applicable to both Australian and UK samples and was able to explain 58% of the variance in sunscreen use behaviour. Their model confirmed the central role of strength of intention and suggested that sunscreen use may not be primarily determined by self-efficacy because it is not an inherently difficult behaviour. Their results also supported two stage models of action regulation by showing that the relationship between intention and behaviour was partially mediated by planning. Self-efficacy predicted strength of intention and planning and, together with planning distinguished between intenders who used sunscreen and those who neither used nor had sunscreen on the beach. The study highlighted the potential importance of intention formation, planning and self-efficacy among intenders and the perceived importance of preventing negative outcomes of sun exposure for future sunscreen promotion campaigns.

Hill, Rassaby, & Gardner, (1984) identified a series of beliefs which were related to skin protection intentions (such as the belief that sunscreen prevents skin cancer and skin damage), but Castle et al., (in press) found that health beliefs were not useful predictors of sun protective behaviour. Foot et al., (1993) looked at knowledge and various attitude factors and reported that only perceived barriers were significantly related to skin protective behaviours. However, Hillhouse, Stair & Adler (1996) found that sunscreen use was predicted by attitudes. Other studies have also found that attitudinal measures are predictive of intentions relevant to skin protection (Eiser, Eiser, & Pauwels, 1993; Wichstrom, 1994) and that perceived social pressure is related to skin protective behaviour (Wichstrom, 1994).

SUMMARY

The research that has thus been undertaken into studying sun protective behaviours has found that intention is a consistently reliable measure of health and sun protective behaviour. Other measures from the Theory of Planned Behaviour such as self-efficacy and subjective norm have not been studied extensively. Within the scope of the present study, these measures shall be studied more rigorously to see what (if any) relationship they have with sun protective behaviour.

REVIEW

In the TPB, behaviour is determined by intention to engage in the behaviour and perceptions of control over performance of the behaviour. Intention is determined by attitude towards the behaviour, subjective norms and perceived behavioural control. Attitude is determined by perceptions of the likelihood of noticeable outcomes and their evaluation. Subjective norm is determined by normative beliefs and motivation to comply with salient referents. PBC is determined by the perceived presence or absence of necessary resources and opportunities and the perceived power of these factors to facilitate or constrain performance of the behaviour.

The model is held to be a complete theory of behaviour in that any other influences on behaviour are held to have their impact upon behaviour via influencing components of the TPB (Conner & Norman, 1995). However, it could be more correctly said that the TPB can be regarded as a theory of the proximal determinants of behaviour. Ajzen (1991) describes the model as open to further elaboration if further important proximal determinants are identified. It has been criticised as being too elaborate (e.g. Fazio, 1986) to be regarded as a realistic description of individual decision-making processes. However, the TRA and the TPB are models of the processes by which individuals form attitudes and intentions, which may be subsequently stored in memory and retrieved when the individual faces a behavioural decision (Conner & Norman, 1995).

The Theory of Reasoned Action and the Theory of Planned Behaviour can be viewed as deliberative processing models in as much as they focus on the conscious processing of information and fail to consider more spontaneous or automatic influences on behaviour

(Conner & Norman, 1995). For this reason, current social cognition models may provide only a partial account of the social cognitive determinants of behaviours. In short, they may only be applicable in situations where the individual has the ability and motivation to engage in such deliberative processing of information (Conner, 1995).

So far, we have looked at sun and skin protection, examined some of the studies that have been undertaken within the research arena and looked at possible areas for future research. We carried on to look at the role of social cognition models and social cognition approaches in health behaviour. We then went on to stage models of health behaviours and volitional processes, saw how they work, and suggested how incorporating them into social cognition models may improve the use of testing for health-related, and especially sun protective behaviours. After this we explored two social cognition models, the Theory of Reasoned Action and the Theory of Planned Behaviour. We took an indepth look at both of these theories, and their applicability to health related behaviours. Finally, we want to bring all this information together and use it to introduce the present study.

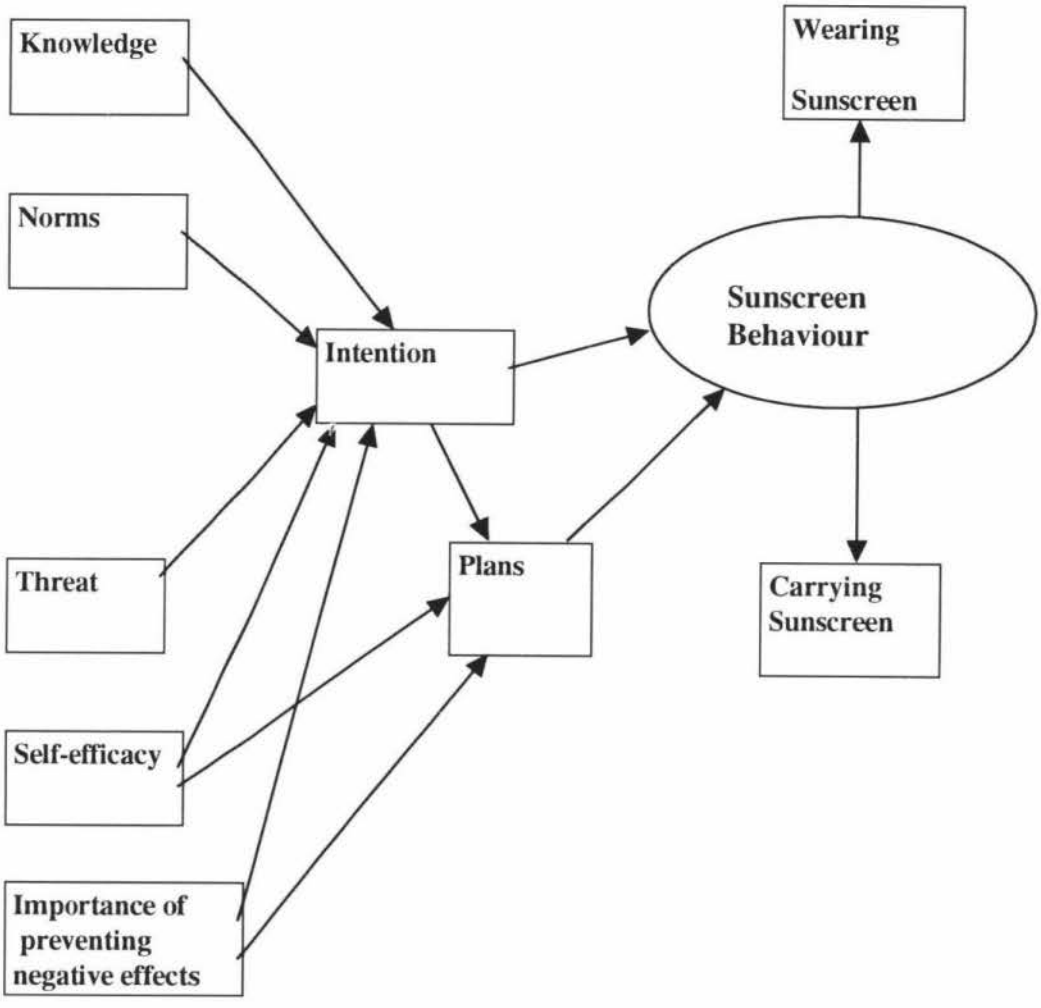
THE PRESENT STUDY

The present study was designed to look at sun protective behaviours in a New Zealand context, drawing upon previous research undertaken in the area. As a refresher, previous research had looked at the following cognitive correlates of sunscreen behaviour:- knowledge about sun protective behaviours, threat of skin cancer, and attitudes towards sun tan. Research has also looked at the use of sunscreen, normative beliefs about sun tanning, perceived likelihood to take precautions, and intentions to use sun protective behaviours. It was necessary then to find a model of sunscreen behaviour that took these cognitive considerations into account.

The model of sun protective behaviour developed by Jones, Abraham, Harris, Schulz, & Chrispin (1998) is such a model. Their model tests health promotion targets, particularly knowledge and perceived threat, in addition to cognitions specified by the Theory of Planned Behaviour and social cognitive theory (i.e., normative beliefs, self-efficacy, and strength of intention). It also looked at using action phase cognitions (especially

planning) to enhance existing models of health behaviour. The model is shown in full, in figure 3.

Figure 3. Schematic representation of Jones, Abraham, Harris, Schulz & Chrispin (1998) cognitive model of sunscreen behaviour.



By using the Jones et al., (1998) model of sun protective behaviour, the researcher hoped to draw on similar results for sun protective behaviours as have been observed in previous research. It was also decided that by using the same sun protective questionnaire as Jones et al., that some comparisons between research could be drawn. However, it should be stated that the Jones et al., model would be used only as a guideline for the current research and it is expected that a modified version of this model would be used for research purposes.

The objectives of the study then, are to see how New Zealanders feel about sun protective behaviours, and also to test the relationships between variables in a modified model of sun protective behaviour. Some of the questions that the current researcher wants to ask were related to the Jones et al., (1998) model. These are:- What effect does the prior cognitions (knowledge, norms, threat, self-efficacy and motivation to prevent negative effects) has on intermediate cognitions (intentions and plans)? What effects do the intermediate cognitions have on sunscreen behaviour, and what effects do the prior cognitions have on sunscreen behaviour? What happens to sunscreen behaviour when one set of cognitions are held constant and another set of cognitions are brought into the equation? From these objectives, the following hypotheses were developed.

Hypotheses

1. To test what effect knowledge, norms, threat, self-efficacy and motivation to prevent negative effects has on intentions.
2. To test what effect self-efficacy and motivation to prevent negative effects has on plans.
3. To test the effect that intentions has on plans.
4. To test the effect that both intentions and plans has on sunscreen behaviour.
5. To test the direct relationship and effect that knowledge, norms, threat, self-efficacy, and motivation to prevent negative effects has on sunscreen behaviour.
6. To see if intention adds to the prediction of sunscreen behaviour after the prior cognitions (knowledge, norms, threat, self-efficacy, and motivation to prevent negative effects) have been accounted for.
7. To see if plans add to the prediction of sunscreen behaviour after prior cognitions (self-efficacy and motivation to prevent negative effects) have been accounted for.
8. To see if plans add to the prediction of sunscreen behaviour after intentions have been accounted for.

CHAPTER FOUR
METHOD

The present study is being undertaken by the researcher to explore the cognitive correlates of sun protection behaviours by focusing on sunscreen use and the use of clothes to protect the skin. Using a combination of observational and self-report methods, fairly accurate measures of sun protection behaviours can be obtained. Therefore, these behaviours can potentially be used to test the predictive value of self-report measures that tap into individual differences in volitional strategies. These strategies are used to implement intentions.

Subjects

Eighty subjects (44 females, 36 males), were recruited from the Hawkes Bay, Manawatu and Wellington regions. The subjects were approached on a specific area of five different beaches and introduced to the study. Many people in groups were approached, which made exact response rate calculations impossible. However, an estimated 20% of people approached refused to participate in the study. The age structure of the participants is shown in table 1.

Table 1 shows the age range of the sample. The majority of subjects (38.9%) placed themselves in the 10 – 19 age bracket; 33.7% (34) were between 20 and 29 years; and 17.7% (14) were between 30 and 39 years. 7.8% (6) subjects were between 40 and 49 years; 1.3% (1) were between 50 and 59 years; and 1.3% (1) subject was over 60 years.

Table 1. Age range of participants in study. N=80.

Age	Frequency	Percentage (%)
10 - 19	31	38.5
20 - 29	27	33.4
30 - 39	14	17.7
40 - 49	6	7.8
50 - 59	1	1.3
60 +	1	1.3

Procedure

The research was carried out during the 1997/98 university summer break (between December and March) in the Hawkes Bay, Manawatu and Wellington regions. Beaches included in the research were - Westshore beach, Waimarama beach, East Pier, Himatangi beach and Titahi Bay beach. Beaches were chosen based on accessibility and popularity of usage. A 7 page questionnaire was administered on the beaches to access the utility of newly developed measures in predicting skin protection behaviours (Jones, Abraham, Harris, Schulz & Chrispin, 1998). The researcher and an assistant attempted to approach all people in a specific area of the beach (unless they were asleep or occupied with child care). People were introduced to the study, and if they were willing to take part, were handed a questionnaire and a pen and asked to read the cover sheet and answer the questionnaire.

The cover sheet included brief information about the research and the researchers involved. It provided details of contact numbers if the subject had any future questions about the research and also assured of complete confidentiality. The researcher stayed within speaking distance of the subject while they completed the questionnaire, in case the subject had any questions. Once they had completed the questionnaire, the researcher thanked them for their participation. The researcher then collected the questionnaire and again assured subjects of full confidentiality.

In the case of the Wellington sample, the researcher had a colleague collect sample data. The researcher specified to the colleague what method of data collection the research required. Once this was understood, the colleague was able to undertake data collection on the behalf of the researcher.

Measures

The questionnaire was designed to investigate social cognition models widely used to predict health behaviours. It specifically used the Theory of Reasoned Action (TRA) (Fishbein & Ajzen, 1975) and the Theory of Planned Behaviour (TPB) (Ajzen & Madden, 1986). These theories propose the use of intentions as the main predictors of behaviour. The measures were demographic, behavioural and cognitive.

The behavioural measures included time spent on the beach, and whether or not individuals had sunscreen with them. Other questions included whether subjects hey were wearing sunscreen, what its SPF rating was, and when they last applied it. The questions- how often they put sunscreen on, and whether they were covering themselves with clothes and, or a hat were also asked.

Cognitive measures included rating the importance of specific goals (for example, enjoying oneself, developing a suntan and protecting skin), specific intentions, and recently developed measures of action-specific planning and self-efficacy. Measures concerning normative beliefs, attitude optimism and knowledge were included as well.

Analysis included the assessment of the reliability of scales (using factor analysis and Cronbach Alpha) and multiple regression analyses. These analyses were aimed at identifying measures other than intention and plans that add additional variance to the prediction of sun protective behaviour. These other measures included; knowledge, normative beliefs, motivation to prevent negative effects, and self-efficacy.

The Questionnaire

The questionnaire structure and format been used previously in the Jones et al., (1998) questionnaire investigating sun protective behaviour. The questionnaire items discussed in this research are set in the context of intentions, goals and planning items. However, this research focuses only on those items related to sun protection. The questionnaire was designed to obtain measures of 9 constructs. (1) motivation to prevent negative effects, (2) intention, (3) plans, (4) self-efficacy, (5) normative beliefs, (6) attitudes, (7) knowledge, (8) threat perception, and (9) individual details.

Instructions for completing the "Sun protective behaviours" questionnaire were printed on the front page. The 7 page booklet was arranged with the behavioural measures first, followed by the measures motivation to prevent negative effects, intention, plans, self-efficacy, normative beliefs, attitudes, knowledge, threat perception, and individual details. The questionnaire is presented in appendix A.

Behavioural Measures

These measures included questions relating to the time spent on the beach, whether the respondents have sunscreen with them, whether they are wearing it, and what SPF rating does the sunscreen have. Subjects were also asked, what time they last applied the sunscreen, how often they put it on, and whether they are covering themselves with clothes / hats. For covering up, scoring was based upon what zone of the body was covered (each covered body part scored 1), and this added up to a score of 5.

Specific motivational factors

Fifteen items assessed the importance of specific goals related to being on the beach. People were asked 'how important were the following to you here on the beach today'. This stem was followed by items including preventing sunburn, preventing sunstroke, getting a suntan, and looking attractive. Participants rated items on a 5 point scale (ranging from 'extremely (scoring 5) to 'not at all'(1). The items were designed to assess the relative importance of goals that may potentially be in conflict and were based on previous research (Jones et al., 1998).

Specific intentions

Seven items assessed intention. Participants were asked to rate items related to intentions, for example, 'I intend to use a sunscreen' using ratings on a 5 point scale, from 'strongly agree' (scoring 5) to 'strongly disagree' (1). Other questions that related to intention included getting a suntan, reapplying sunscreen often enough to assure adequate protection, wearing a t-shirt, avoiding the sun, protecting the skin, and enjoying oneself.

Specific plans

Seven planning items were assessed using measures that followed the stem 'which of the following did you give some thought to before coming to the beach today'. This stem was followed by specific questions, for example, 'how often would I put a sunscreen on to ensure adequate protection'. Each item was followed by three potential responses: 'had a clear plan about this', 'Had given this some thought' and, 'Had not thought about this'.

Perceived self-efficacy

This was assessed using 5 items following from the stem, 'How easy or difficult is it for you to do each of the following?' In conjunction with this, a second stem asked, how easy or difficult would it be if you wanted to do each of the following?' The items included such questions as 'To have a sunscreen with me' and 'To wear a t-shirt when the sun gets too strong'. This was followed by a 5 point scale, ranging from 'very easy'(scoring 5), to 'very difficult'(1).

Norms

Four normative belief items were assessed using the following questions. The four items were, (1) 'Do you think people of your age and sex think that having a suntan looks attractive?'. (2) 'Do you think that people of your age and sex think that having a suntan looks healthy?'. (3) 'Do you think that people of your age and sex think that a suntan is a sign of status?'. (4) 'Do you think that people of your age and sex think they should use a sunscreen lotion to protect their skin while outside in the sun?'. These statements were followed by a 5 point response scale. These responses ranged from 'Definitely'(5), to 'Definitely not'(1).

Attitude to Suntan

Five items pertaining to an attitude to suntan were used. The items consisted of statements such as "people look more attractive with a suntan" and "it's worth a lot of effort to get a suntan". Each item was followed by a 5 point response scale ranging from 'strongly agree'(5) to 'strongly disagree'(1).

Knowledge

A 14 item measure of knowledge of skin cancer and skin protection was used. Questions ranged from general sun protective questions such as "the safest time to suntan is before 11a.m. and after 3p.m.", through to questions that tested peoples' common-sense assumptions about sun protective behaviour. An example of such a question is, "baby oil offers high protection against sunburn". For the questions, three response options were offered, and these options were 'True', 'False', and 'Don't know'. Correct answers scored 1 and incorrect or 'Don't know' scored 0. Scores could range between 0 and 14.

Perceived risk and beliefs about skin cancer

Measures of comparative ratings of self-risk and beliefs about skin cancer were used. The first question in this section rated the likelihood of getting skin cancer compared to other people of the same age and sex. This question was rated on a 7 point scale scored from 1= much less likely to 7= much more likely. Questions then rated beliefs about seriousness, treatability, preventability, likelihood of skin cancer (perceived susceptibility) and the extent people had thought about skin cancer. These questions were rated on 7 point scales, (For example, 1= not at all serious, easy to treat, through to 7= extremely serious, easy to treat).

Individual details

The final section requested information about gender, where the subject was from, age, and hair colour. The final item asked a question about skin type. This was based on a question asking 'How easily does you skin get sunburnt?'. This was rated on a 7 point scale where 1= not at all easily and 7= very easily.

CHAPTER FIVE
RESULTS

The first part of this chapter will describe the scoring of the research scales, the criteria for, and treatment of missing data. Following that, percentages and numbers of subjects using sun protective behaviours and their thoughts on sun protective behaviours will be viewed. Following this, the researcher developed measures for the items from the questionnaire. This was achieved using Principal Components Analysis and Reliability Analysis for the measures. The use of the measures in the model will be given justification within these analyses. To complete the chapter, the analysis procedures used to test hypotheses will be discussed, and the results of these analyses will be presented.

SECTION 1

The scores used in the present study were established by adding together each of the items to make up each measure. For example, the final intention measure was a composite score of the intention to use sunscreen, the intention to apply sunscreen, and the intention to cover up with clothes. Threat was scored to provide two measures, threat likelihood and perceived threat. These were treated separately rather than as a single perceived threat measure as used by Jones Abraham, Harris, Schulz, & Chrispin (1998).

Criteria were established for the treatment of missing data, and list-wise deletion of missing cases was used in the analyses. Consequently, subject numbers vary slightly in each analysis. In the questionnaire, if any of the items were unanswered, missing data was replaced with a 9. The analysis of the data using the SPSS package took into consideration these missing values.

Although a variety of variables were measured in the questionnaire, to contain the scope of the present thesis not all of these variables were analysed. The variables used in the present study were restricted to those contained in the model, and demographic information was not included as we were not interested in the results of this. Not all of the items from each set of chosen variables were included. Those items which did not

represent sun protective behaviours were excluded during the course of both Principal Components and Reliability Analyses. From these analyses, separate measures were formed to be used for the testing of the hypotheses.

General Sun Protection Behaviour Variables

Two measures of behaviour were used, having sunscreen available and wearing sunscreen. The answers for these two questions were presented in a yes/no format. Over two-thirds of respondents in the New Zealand sample (67.5%) had a sunscreen with them on the beach. In the Australian sample (Jones, Abraham, Harris, Schulz, & Chrispin, 1998), 73% of people approached had a sunscreen with them. In the UK sample, only 46% of people had a sunscreen with them.

Over four-fifths of subjects (83.8%) of subjects were wearing sunscreen at the time they were interviewed on the beach. In the Australian sample, 66% of subjects approached were wearing sunscreen. In the UK sample, only 36% of subjects approached were wearing sunscreen.

In addition, subjects were asked what SPF rating their sunscreen had, whether they were covering themselves with clothes, and or a hat (skin cover), and whether they thought their skin burnt easily (sunburn). The numbers and percentages of SPF use are presented in Table 2.

Table 2. Numbers and percentages for SPF value of sunscreen (N=80).

SPF	Frequency	Percent (%)
8	1	1.5
15	52	78.8
30	12	18.2
45	1	1.5
TOTAL	80	100.0

Of those subjects wearing sunscreen 98.5% were using sunscreen of the recommended SPF (level 15 or higher). In the Australian sample, 81% of subjects were wearing sunscreen of the recommended SPF, and in the UK sample only 24% of subjects were wearing sunscreen of SPF 15 or higher.

Over four-fifths (65) subjects (82.3%) reported that they were covering up their head, and or body with clothes. In a further break down of this category, 58.8% (47 subjects) had their heads covered, and 46.3% (37 subjects) were covering their eyes with sunglasses. 41.3% (33 subjects) were covering their torso with clothes, 35% (28 subjects) were covering their upper legs, and 7.5% (6 subjects) were covering their lower legs.

Twenty-five (31.3%) subjects thought that their skin does not burn easily, while 25 (31.3%) subjects were neutral about their skin burning. Thirty (37.5%) subjects thought that their skin does burn easily.

Perceived Threat variables

Participants were asked to rate beliefs about seriousness and treatability, and preventability and likelihood of skin cancer. Only 2 subjects (2.5%) thought that skin cancer is not serious, 8 (10%) subjects were neutral about the seriousness of skin cancer, and 70 (87.5%) subjects thought that skin cancer was serious.

Very few subjects - 6 (7.5%) thought that skin cancer is not easy to treat, and only 4 subjects (5.1%) thought that skin cancer is neither easy nor difficult to treat. Sixty-seven subjects (83.8%) thought that skin cancer is easy to treat.

Only four (5%) subjects thought that skin cancer is not preventable, while 6 (7.6%) subjects were neutral about skin cancer being preventable. Sixty-nine (86.3%) subjects think that skin cancer is preventable.

Over a third (35%) of subjects (28) thought that skin cancer was not likely to happen to them, while 32 (40%) subjects thought that it was neither likely nor unlikely that skin cancer would happen to them. Twenty (25.1%) subjects thought that it was likely that skin cancer would happen to them.

Norm

Only 2 (2.5%) subjects thought that peers probably did not think that they should use sunscreen to protect their skin. Seventy-eight (97.5%) subjects thought that peers would expect them to use a sunscreen lotion to protect their skin while outside in the sun.

Self-efficacy

Respondents were asked how easy or difficult it would be for them to "have a sunscreen with me" and "use sunscreen often enough". Almost all the subjects, seventy-two (90%) said it would be easy for them to have a sunscreen with them, while only two (2.5%) subjects said that it would be difficult to have a sunscreen with them. Six (7.5%) subjects said it would be neither easy nor difficult for them to have a sunscreen with them.

Almost all the subjects, seventy-three (91.3%) thought that it would be easy for them to use sunscreen often enough to protect their skin, while only 1 subject (1.3%) thought that it would be difficult for them to use sunscreen often enough to protect their skin, and six (7.5%) subjects thought that it would be neither easy nor difficult for them.

Intention

Two items assessed strength of intention to use and reapply sun screen, i.e., "I intend to use a sunscreen", "I intend to reapply my sunscreen often enough to ensure adequate protection". The majority of subjects, sixty-five (81.3%) agreed with the intention to use sunscreen item, while three (3.8%) subjects disagreed with the intention to use sunscreen, and 12 (15%) subjects neither agreed nor disagreed that they intended to use sunscreen.

Again the majority of subjects, 64 (80%) agreed with intention to use sunscreen, while only four (5%) subjects disagreed with the intention to reapply sunscreen. Twelve (15%) subjects neither agreed nor disagreed with intention to use sunscreen.

Prior Planning

Approximately one-third of all the subjects, 33 (41.3%) had a clear plan about having a sunscreen lotion with them before coming to the beach, thirty-one (38.8%) subjects had given it some thought, while Sixteen (20%) subjects had not given any thought to having a sunscreen with them before they went to the beach. Only one-fifth of all subjects 17 (21.3%), had a clear plan of how often they would apply sunscreen before they went to the beach, while nearly the same amount, fifteen (18.8%) subjects had given no thought to how often they would apply sunscreen before going to the beach. Forty-eight (60%)

subjects had given some thought to how often they would apply sunscreen before going to the beach.

Importance of preventing negative effects

Only 5 (6.3%) subjects did think that it was important to prevent sunburn, while 75 (93.8%) subjects thought that it was important to prevent sunburn. Only 6 subjects (7.5%) did not at all think that preventing sunstroke was important, while 74 (92.5%) of subjects thought that it was important to prevent sunstroke.

Nearly one-quarter (17.5%), 14 subjects thought that it was important to prevent the skin from drying, while 66 (82.5%) subjects thought that it was important to prevent their skin from drying.

SECTION 2: DEVELOPMENT OF MEASURES

The intention of the present study was to test sun protective behaviours in a New Zealand context using items from the Jones, Abraham, Harris, Schulz, & Chrispin (1998) questionnaire. It was necessary to combine items from the sun protective behaviour questionnaire in a manner similar to the measures shown in the model of sun protective behaviours (see figure 3). Therefore, analysis was needed for the prior cognitions (knowledge, normative beliefs, threat, self-efficacy, and motivation to prevent negative effects), intermediate cognitions (intentions and plans), and the behaviour (sunscreen behaviour). This analysis would be used to turn the items from the questionnaire into separate measures for further analysis.

Firstly, a conceptual analysis was conducted upon all the items in each grouping, particularly, items relating to suntanning and leisure type activities (i.e. relaxation and enjoyment). These particular items were looked at carefully as the researcher only wanted items that related to sun protective behaviours. These items were not dropped not immediately, but were carefully considered in the next stage of analysis and were subjected to statistical reasoning.

Secondly, principal components (PC) analyses were conducted to determine the factor structure of the variables relating to suntanning and skin protection (prior cognitions,

intermediate cognitions and behaviour). The PC analyses organised dimensions of constructs and reduced the number of measures. This led to looking at items in terms of their loadings. For example, items that had moderate to high loadings and which related to sun protective behaviours were kept for further analysis. Items that did not relate to sun protective behaviours, and which did not load on the same factors were then dropped from further analysis. An example of this is the motivation to prevent negative effects, where items sorted into four distinct factors relating to sun protective behaviour, leisure, fitness and attractiveness. In most cases, the initial conceptual analysis supported the PC analysis.

Finally, reliability analyses were conducted to check the reliability of the resulting items which tested the internal consistency of the items. After the conceptual, PC and reliability analyses, items which were chosen for further analysis, were kept and summed to create single measures.

Prior Cognitions

Knowledge

Firstly, the 12 knowledge items were looked at conceptually, and as all 12 items related to sun protective behaviours, it was decided to test the items in a PC analysis. A three factor solution was found to have the best loadings ranging from .526 to .820 (moderate to high loadings). When placed in a two factor solution, factor loadings were still reasonable (.408 to .853). The items were again looked at conceptually, and for both the three and two factor solutions there was no easily interpretable pattern in terms of the way items were set. For example, when forced into a two factor solution, some of the sun knowledge items would load onto one factor with health knowledge items. On the other factor health knowledge items would load with sun knowledge items. This proved to be unsatisfactory and the researcher decided that it would be reasonable to use all 12 items for analysis. A one factor solution was then conducted and results showed low to moderate loadings (.193 to .668). However, as the three and two factor solutions were not easily interpretable, this solution was seen as the most appropriate.

A reliability analysis was then conducted on the 12 items and this found a reasonable alpha value (alpha = .7305). As a final result, the 12 knowledge items were summed to create a single measure called knowledge.

Normative Beliefs

Conceptually, the researcher only required items that were related to sunscreen behaviours. In terms of the normative belief items, only one item warranted this status. This item related to the idea that people should use a sunscreen. The other three normative items related to perceptions of attractiveness, looking healthy and status. It was then decided to keep the sunscreen item and drop the other three items. The conceptual analysis was backed up by a PC analysis where the sunscreen item loaded highly onto one factor while the other three items loaded highly onto another factor. As a final result one normative belief item related to sunscreen was used. This normative belief asked the question, "Do you believe that people of your age and sex think they should use a sunscreen lotion to protect their skin while outside in the sun?", and was established as the normative belief variable.

Self-efficacy

Firstly, the five self-efficacy items were looked at conceptually. One item that was looked at carefully was the suntan item, and it was decided to see what the PC analysis showed. The PC analysis found that the best result was a one factor solution with factor loadings ranging from .51980 to .87412, which explained 35.4% of variance in the solution (see appendix B for full factor matrix). The items were looked at carefully, and the suntan item was found to show the moderate loading (.5198). As conceptually, the researcher only wanted items related to sun protective behaviours, it was decided that it would be reasonable to drop the suntan item out of future analysis. A reliability analysis was then conducted on the four remaining items (sunscreen, apply, clothes, and avoid) and this found a good alpha value (alpha = .8781). As a final result four self-efficacy items (to have sunscreen, to put on sunscreen, to wear clothes, and to avoid the sun) were summed to create a single measure called self-efficacy.

Motivation to prevent negative effects

Firstly, all 15 motivational items were looked at conceptually and the researcher found that these items sorted into four distinct categories; sun protective behaviours, leisure,

fitness, and attractiveness items. Though only sun protective behaviour items were required, the researcher decided to test all 15 items in a PC analysis before dropping any items from further analysis. The results from the PC analysis found the following. A four factor solution had factor loadings ranging from .537 to .937 (see appendix B for full factor matrix). When put into a three factor solution, factor loadings were still reasonable (.36702 to .90267) with 53.6% of the variance explained, and a two factor solution found that factor loadings still held well (.56838 to .89707) with 32.9% of variance explained.

The items were then looked at carefully, and the four factor solution appeared to be the best as the items clearly dropped into four distinct factors (sun protective behaviour, leisure, fitness and attractiveness). After the PC analysis, and the initial conceptual analysis, it was decided that the leisure and fitness items, as well as the attractiveness items should be dropped from further analysis. This was done as they were unrelated to specific sun protective behaviours.

A reliability analysis was then conducted on the remaining five items (prevent sunburn, prevent sunstroke, prevent skin drying, protect skin, and wear a t-shirt when the sun gets too hot). This found a good alpha value (alpha = .8539). It was decided that it would be reasonable to keep these five items for further analysis. These five items, were summed to create a single measure called motivation to prevent negative effects.

Threat

Firstly, all the threat items were examined in a conceptual analysis. All the items appears to be suitable and it was decided to carry on with the PC analysis. In the PC analysis, the three factor solution found factor loadings ranging from .769 to .956 (see appendix B for full factor matrix); with items sorting into three distinct factors; treatability of skin cancer (one item), likelihood of the threat of skin cancer (two items), and perceived threat of skin cancer (three items). The two factor solution found that factor loadings were still reasonable (.65528 to .92477) with 26.9% of variance explained. The items were then looked at again conceptually and it was found that there was no conceptual reason for taking the treatability item out of the analysis. Statistically however, taking the item out was supported. In the three factor solution, the treat item loaded onto a factor by itself, while the other five items loaded statistically and conceptually on the

remaining two factors. In the two factor solution, the treatability item loaded very low. It was decided to keep the remaining five items from the two factor solution which represented threat of skin cancer (seriousness, preventable, absolute likelihood, comparative likelihood and thinking about) for further analysis.

A reliability analysis was then conducted on the five items and as these items split into two factors, reliability was first tested on the comparative and absolute likelihood items. A reasonable alpha value was found (alpha = .7359). A reliability analysis was then conducted on the other three items (seriousness, prevent and think), and the alpha value again was reasonable (alpha = .7083). As these five items related to sun protective behaviours, and as the two factors related to two separate constructs (threat likelihood and perceived threat), the items were summed to create two measures. One measure called threat likelihood contained the absolute and comparative likelihood items; while the other measure, perceived threat, contained the seriousness, preventable and think items. As an end result, two threat measures, threat likelihood and perceived threat were used for further analysis.

Intermediate Cognitions

Intention

Firstly, all the intention items were looked at conceptually. However, a PC analysis was conducted before any items were taken out of the analysis. The PC analysis found the following. A two factor solution found factor loadings ranging from .39877 to .92415 with 52.5% of variance explained. Loadings were still reasonable in a one factor solution with factor loadings ranging from .74671 to .91751 with 17.1% of variance explained (See appendix B for full factor matrix). In the PC analysis it was found that the sun protective items loaded on a factor separate to the enjoyment, relaxation, and suntan intentions (leisure intentions). The items were again looked at conceptually and it decided based upon the premise that sun protective behaviours were to be tested, to take out the intention items not related to these behaviours. These items were the enjoyment, relaxation, and suntan intentions (leisure intentions), as well as the sun avoid item as it loaded low (.39877).

A reliability analysis was then conducted on the three sun protective items and this found a good alpha value (alpha = .8134). As a final result, the three sun protective items, intention to use sunscreen, to apply sunscreen, and to cover up with clothes, were summed to create a single measure called intention for further analysis.

Plans

Firstly, all the planning items were looked at conceptually. It was decided that it would be probable that the leisure items would need to be taken out of the analysis, but before this could be done, a PC analysis tested all the planning items. A two factor solution found factor loadings ranging from .53737 to .94678 with 40.9% of variance explained (see appendix B for full factor matrix). A one factor solution found that factor loadings had more variance within the solution (-.13387 to .82811) with 96.2% of variance explained. The items were then looked at conceptually and it was decided to take out the plan to enjoy and relax items as they were unrelated to sun protective behaviours. This was supported by the PC analysis as these items loaded clearly on a separate factor from the sun protective behaviour items. Further to this, the plan to have sunscreen item was also taken out as it did not load as clearly as the other sun protective items though it was still a reasonable loading (.5 loading as opposed to .8 loadings).

A reliability analysis was then conducted on the remaining three items (how often apply sunscreen, wearing clothes, and sun avoidance) and this found a good alpha value (alpha = .8271). As a final result, it was decided that these three items - how often sunscreen would be applied, use of clothes to protect the skin, and avoiding the sun when it got too hot, would be used for further analysis. These three items were summed to create a single variable called plans.

Behaviour

Sunscreen Behaviour

Only two items made up the measure sunscreen behaviour, and these items were 'wearing sunscreen' and 'carrying sunscreen'. Both items were tested in a PC analysis and a one factor solution resulted in high loadings for both items (both items loaded as .842). A reliability analysis was then conducted on the two items and the alpha value

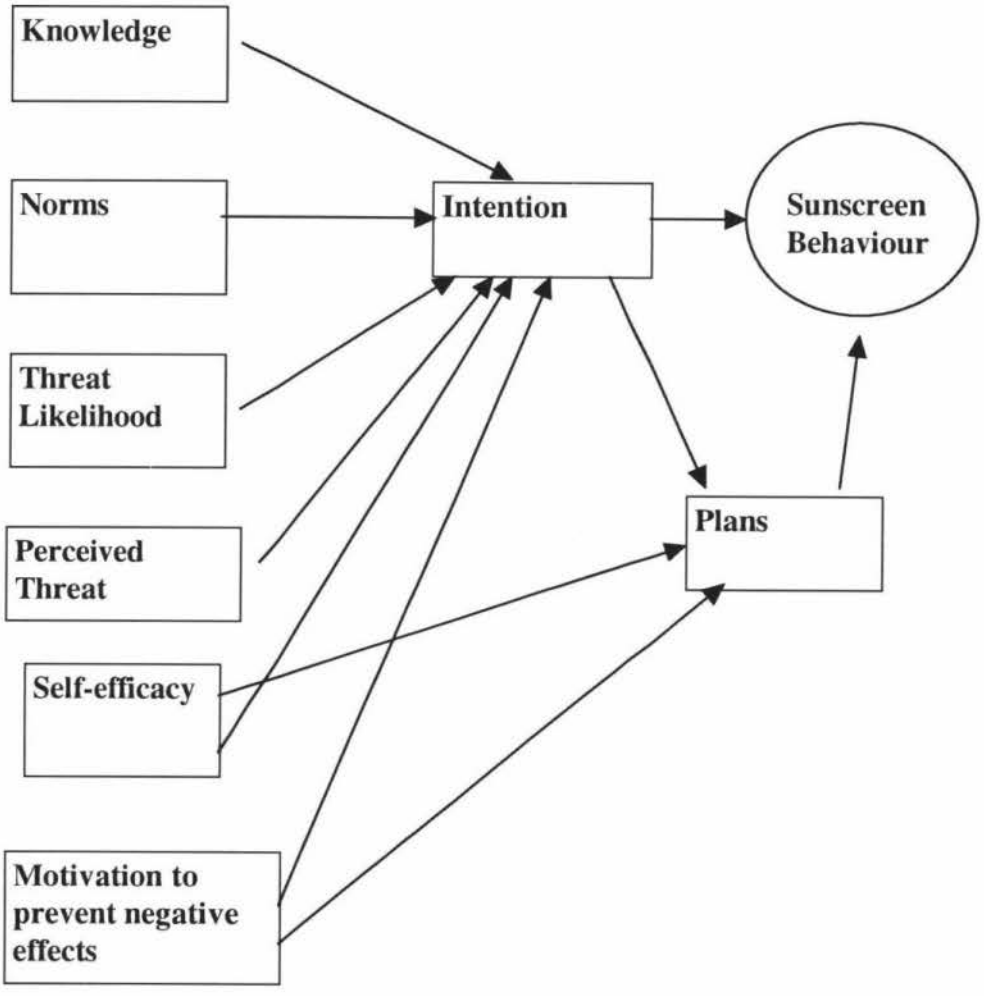
was moderate (alpha = .578). As there were only two items for sunscreen behaviour and the PC and reliability analysis supported their inclusion, it was decided to sum the two items to create a single measure called sunscreen behaviour.

Summary

* 12 knowledge items were summed to create a single measure called knowledge.
* A single item related to the idea that people should use a sunscreen became a measure called normative belief.
* Four self-efficacy items (to have sunscreen, to put on sunscreen, to wear clothes, and to avoid the sun) were summed to create a single measure called self-efficacy.
* Five items (prevent sunburn, prevent sunstroke, prevent skin drying, protect skin, and wear a t-shirt when the sun gets too hot) were summed to create a single measure called motivation to prevent negative effects.
* Threat likelihood and perceived the items were summed to create two measures. One measure called threat likelihood contained the absolute and comparative likelihood items; while the other measure, perceived threat, contained the seriousness, preventable and think items.
* Three sun protective items, intention to use sunscreen, to apply sunscreen, and to cover up with clothes, were summed to create a single measure called intention.
* Three items - how often sunscreen would be applied, use of clothes to protect the skin, and avoiding the sun when it got too hot, were summed to create a single measure called plans.
* Two items called 'wearing sunscreen' and 'carrying sunscreen' were summed to create a single measure called sunscreen behaviour.

Having created nine measures for further testing of sun protective behaviours, and as these measures differ from those used by Jones, Abraham, Harris, Schulz, & Chrispin (1998), a modified version of the Jones et al., (1998) model was required. This model is depicted in figure 4.

Figure 4. A schematic representation of a modified version of the Jones et al., (1998) model of sun protective behaviour.



This modified version of the model of sun protective behaviour differs from that of Jones et al (1998), in that it contains two measures of threat while the Jones et al (1998) model contains only one measure of threat. In the current model, one measure called threat likelihood contains the absolute and comparative likelihood items; while the other measure, perceived threat, contains the seriousness, preventable and think items.

SECTION 3: HYPOTHESES TESTING

The researcher wanted to test the relationships between variables in the modified version of the Jones, Abraham, Harris, Schulz & Chrispin (1998) model of sun protective behaviour. To do this, multiple regressions (both standard and hierarchical) were needed to test relationships between the prior and intermediate cognitions, and sunscreen behaviour. Standard multiple regressions were used to test hypotheses one through to five, while hierarchical multiple regressions were carried out on hypotheses six through eight. Sunscreen behaviour was the dependent variable and intentions, plans, knowledge, norms, threat, self-efficacy and motivation to prevent negative effects as the independent variables. In the first three hypotheses, either intentions or plans was the dependent variable.

Hypothesis 1 tested what effect knowledge, norms, threat, self-efficacy and motivation to prevent negative effects (prior cognitions) has on intentions. In line with this hypothesis, it was necessary to test for the effect of the prior cognition measures on intention, and a standard multiple regression seemed best suited to this purpose. Initially, correlations between variables were tested. As can be noted in table 3, intention was moderately correlated with four of the prior cognition variables, (Knowledge, $r = .425$, $p<.0001$; norm, $r = .248$, $p<.05$; threat likelihood, $r = .237$, $p<.05$; and self-efficacy, $r = .401$, $p<.0001$), but not with perceived threat ($r=.115$, ns). In addition, intention was highly correlated with motivation to prevent negative effects ($r = .717$, $p<0001$). Intention then, appears to be more likely if an individual has a high motivation to prevent negative effects.

Table 3. Correlations of Pearson's r between prior cognition variables and intention (N = 70).

	Intention	Knowledge	Normative Belief	Threat Likelihood	Perceived Threat	Self-efficacy
Knowledge	.425***					
Normative Belief	.248*	.001				
Threat Likelihood	.237*	.397***	.085			
Perceived Threat	.115	.156	.124	.313**		
Self-efficacy	.401***	.316**	.223	.254*	.277**	
Motivation	.717***	.451***	.288**	-.029	.029	.331**

*p<.05 **p<.01 ***p<.001

A standard multiple regression was then conducted. The results of the standardised regression of prior cognition variables on intention are presented in Table 4. Prior cognition variables explained 55.3% of variance on intentions, (R squared = .553, $F(6, 63) = 15.203$, $p < .001$). Motivation to prevent negative effects showed the greatest impact on intention (Beta = .691, $t(79) = 6.744$, $p<.001$); greater motivation is associated with greater intention. The other significant contributor was threat likelihood (Beta = .235, $t(79) = 2.442$, $p<.05$), whose positive impact on intention may be interpreted as greater threat likelihood may increase intention. Knowledge, norm, perceived threat and self-efficacy were not significant, when the effects of all other variables were controlled.

Table 4. Standard MR of prior cognition variables and intention, showing standardised regression coefficients (Beta), R, R squared, Adjusted R squared and significance (N=70).

VARIABLE	BETA	t VALUES
Knowledge	-.0168	.8734
Norm	.0033	.9698
Threat Likelihood	.2354	.0174*
Perceived Threat	-.0099	.9098
Self-efficacy	.1200	.1967
Motivation	.6906	.0000***
Multiple R	.76908	
R squared	.59149	
Adjusted R squared	.55258	
(F (6,63) = 15.203, p<.001)		

*p<.05 **p<.01 ***p<.001

Hypothesis 2 tested what effect self-efficacy and motivation to prevent negative effects has on plans. In line with this hypothesis, it was necessary to test for the joint effect of these two prior cognition variables on plans, and multiple regression seemed best suited to this purpose. Initially, correlations between the variables were tested. Plans was significantly correlated with both self-efficacy ($r = .197$, $p < .05$) and motivation ($r = .368$, $p < .001$). For plans, it appears that the more self-efficacy, and the greater the motivation to prevent negative effects that an individual has, then the more likely it is that they will use plans.

A standard multiple regression was then conducted. The two prior cognition variables explained 11.9% (R-squared = .119, $F(2, 77) = 6.335$, $p<.01$) of the variance on plans, while motivation showed the biggest impact on plans (Beta = .341, $t(79) = 3.034$, $p<.01$). Self-efficacy was found not significant (Beta = .0796, $t(79) < 1$, ns). What these results suggest, is that motivation to prevent negative effects will have an impact

on plans to do an activity. If an individual is highly motivated to do an activity, then it is more likely that they will plan to do the activity.

Hypothesis 3 tested the correlation between intentions and plans. Intentions was significantly correlated with plans ($r = .370$, $p < .001$). In simple terms, the more an individual intends to do an activity, then the more likely it will be that they plan to do the activity.

Hypothesis 4 tested the relationship between intentions, plans and sunscreen behaviour. Firstly, a simple correlation was used to show the relationship between intentions, plans, and sunscreen behaviour. Intention was significantly correlated with sunscreen behaviour ($r = -.582$, $p<.0001$), and plans was significantly correlated with sunscreen behaviour ($r = -.331$, $p<.0001$).

Using standard regression, the relationship of both intentions and plans with sunscreen behaviour was tested. The two intermediate cognition variables explained 33.7% of the variance on sunscreen behaviour, (R-squared =.337, $F(2,77) = 21.070$, $p<.001$). Intentions and plans were significantly related to sunscreen behaviours, but when the joint effects of these were tested (controlling for the effects of each on the other), only intentions were significant, (Beta = -.532, $t(79) = -5.394$, $p<.001$), while plans were not significant (Beta = -.134, $t(79) = -1.361$, ns). If an individual intends to use sunscreen behaviours, then they will be more likely to use sunscreen behaviours. However, if an individual plans to use sunscreen behaviours, then they are neither likely or unlikely to use those behaviours.

Hypothesis 5 tested the relationship that knowledge, norms, perceived threat and threat likelihood, self-efficacy, and motivation to prevent negative effects (prior cognitions) have with sunscreen behaviour. Initially, correlations between the variables were tested. The results of these correlations are shown in table 5. Sunscreen behaviour was not significantly correlated with perceived threat, norm, and self-efficacy. It was however, significantly correlated with three other prior cognition variables (knowledge, r = -.338, p<.01; motivation to prevent negative effects, r = -.494, p<.0001 and threat likelihood, r = -.252, p<.05). If an individual has knowledge about, motivation to prevent negative effects and feel that threat to themselves of skin cancer is likely, then they will be more likely to use sunscreen behaviours.

Table 5. Correlations of Pearson's r between prior cognition variables and sunscreen behaviour (N = 70).

	Sun behaviour	Perceived Threat	Knowledge	Normative belief	Self-efficacy	Motivation to prevent negative effects
Perceived Threat	-.068					
Knowledge	-.338**	.156				
Normative belief	-.051	.124	.001			
Self-efficacy	-.122	.277*	.316**	.223*		
Motivation	-.494***	.029	.451***	.288**	.331**	
Threat Likelihood	-.252*	.313**	.397	.085	.254*	-.029

*p<.05 **p<.01 ***p<.001

Using a standard regression, knowledge, norms, threat likelihood, perceived threat, self-efficacy and motivation to prevent negative effects were entered and tested against sunscreen behaviour. The results of this regression are presented in table 6. Prior cognition variables explained 28% (R-squared = .279, $F(6, 63) = 5.46$, p<.001) of variance on sunscreen behaviour, and motivation to prevent negative effects showed the

greatest impact on sunscreen behaviour (Beta = -.5815, t(79) = -4.475, p<.0001). The other significant contributor was threat likelihood (Beta = -.312, t(79) = -2.552, p<.05). All the other prior cognition variables were not significant. It is interesting to note the negative direction of both the motivation to prevent negative effects, and the threat likelihood variables on sunscreen behaviour. What can be assumed from this is that negative motivation and negative threat likelihood (i.e. non sun protective behaviours being viewed as negative) will be likely to influence an individual if they decide to partake in sunscreen behaviours.

Table 6. Standard MR of prior cognition variables and sunscreen behaviour showing standardised regression coefficients (Beta), R, R squared, Adjusted R squared and significance (N=70).

VARIABLE	BETA	t-VALUES
Knowledge	.0100	.9404
Norm	.1160	.3017
Threat Likelihood	-.3122	.0000***
Perceived Threat	-.0028	.9796
Self-efficacy	.1216	.3017
Motivation	-.5815	.0000***

Multiple R = .58489

R squared = .34209

Adjusted R squared=.27943

(F(6,63) = 5.45969, p<.0001)

*p<.05 **p<.01 ***p<.001

Hypothesis 6 tested if intention adds to the prediction of sunscreen behaviour after the prior cognitions (knowledge, norms, threat, self-efficacy, and motivation to prevent negative effects) have been accounted for. By testing this hypothesis, the researcher wanted to see if intention contributes to sunscreen behaviour in addition to the effects that the prior cognitions have on sunscreen behaviour. In line with this hypothesis, hierarchical multiple regression analysis was used. The first block to be entered into the equation was the prior cognition variables. The results of this step are presented in Table 7. The prior cognition variables explained 34.21% (R squared = .3421, F = 5.460, $p<.0001$) of variance on sunscreen behaviour. Motivation showed the greatest impact on sunscreen behaviour (Beta = -.5021), and its negative impact on sunscreen behaviours could be interpreted as the more negatively motivated an individual is, the more likely it is that they will use sun protective behaviours. The other major contributor in the first step was threat likelihood (Beta = -.2517) whose negative impact on sunscreen behaviour may be interpreted as the more likely threat is, the more likely sun protective behaviours will be used. Norm, perceived threat, self-efficacy and knowledge were not significant.

The intention variable was then entered into the equation and its effect on sunscreen behaviour was assessed after the variance attributable to the six prior cognition variables were accounted for. These results are also presented in Table 7. The intention variable did not explain any further variance (R squared change = .023, Fchange = 5.45969, ns), and the total variance explained in sunscreen behaviour was 36.5%, (R squared =.294, $F(7,62) = 5.096$, $p<.0001$). What these findings appear to tell us is that intention does not add any further variance to the model once the prior cognitions are accounted for. It is the prior cognition variables, rather than intention which has an effect on sunscreen behaviour.

Table 7. Hierarchical MR of sunscreen behaviour on prior cognition variables and intention showed standardised regression coefficients (Beta), R, R squared, Adjusted R squared, and R squared change (N = 70).

VARIABLE	STEP 1 (Beta)	STEP 2 (Beta)
Knowledge	.0100	.0060
Normative Belief	.1276	.1168
Threat Likelihood	-.2517***	-.2562*
Perceived Threat	.0213	-.0052
Self-efficacy	.1225	.1501
Motivation	-.5021***	-.4172*
Intention		-.2380

After step 1 - R squared = .3421 (F (7, 62) = 5.460, p<.0001)

After step 2 - R squared = .3652 (F(7,62) = 5.096, p<.0001)

Delta R square change = .02314 (Fchange (7, 62) = 2.25994, ns)

*p<.05 **p<.01 ***p<.001

Hypothesis 7 tested if plans add to the prediction of sunscreen behaviour after prior cognitions (self-efficacy and motivation to prevent negative effects) have been accounted for. By testing this hypothesis, the researcher wanted to see if plans contribute to sunscreen behaviour in addition to the effects that the prior cognitions have on sunscreen behaviour. The first block to be entered into the equation included self-efficacy and motivation to prevent negative effects. The two prior cognition variables explained 30.1% (R squared = .3014, F = 16.611, p<.0001) of variance on sunscreen behaviour. Motivation showed the greatest impact on sunscreen behaviour (Beta = -.5635), with negative motivation being associated with the use of sunscreen behaviour. The other

major contributor in the first step was self-efficacy (Beta = -.1460) which showed that a negative self-efficacy score is associated with the use of sunscreen behaviour.

The plans variable was then entered into the equation and its effect on sunscreen behaviour was assessed after the variance attributable to the two prior cognition variables were accounted for. The plans variable explained only a further 2% (R squared change = .02, Fchange = 2.294, ns) in unique variance and the total variance explained in sunscreen behaviour was 32.2% (R squared = .32189, F(3,76) = 12.025, p<.0001). Of the prior cognition variables, motivation to prevent negative effects maintained its significant relationship with sunscreen behaviour (Beta = -.510812, t(79) = 4.800, p<0001), while self-efficacy became non-significant with a drop in Beta, (Beta= .059679 (t(79) =.591, ns). What these findings appear to tell us is that plans do not add any further variance to the model once the prior cognitions are accounted for. It is the prior cognition variables, rather than plans which has an effect on sunscreen behaviour.

Hypothesis 8 wanted to test if plans add to the prediction of sunscreen behaviour after intentions have been accounted for. By testing this hypothesis, the researcher wanted to see if plans contribute to sunscreen behaviour in addition to the effect that intention has on sunscreen behaviour. In line with this hypothesis, hierarchical multiple regression analysis was used. The first block to be entered into the equation consisted of the variable intention. The results of this step are that the intention variable explained 33.8% (R squared = .3382, F(2,77)=39.853, p<.0001) of variance on sunscreen behaviour, and its impact on sunscreen behaviour was significant (Beta = -.5815).

The plans variable was then entered into the equation and it explained only a further 1.6% (R squared change = .0155, Fchange = 1.852, ns) in unique variance. The total variance explained in sunscreen behaviour was 35.4% (R squared = .3537, F(2,77) = 21.07035, p<.0001). After the addition of the plans variable, intention remained significant, (Beta = -.532, t(79) = -5.394, p<.0001) while plans was non significant

(Beta=-.134, t(79) = -1.361, ns). What this suggests is that the relationship between intentions, plans and sunscreen behaviour is not mediated by plans.

Summary

Testing prior cognitions and intermediate cognitions

As was to be expected, all the prior cognitions had an effect on intention. The most significant of these effects was the motivation to prevent negative effects. Threat likelihood had a moderate effect on intention, while knowledge and self-efficacy had a small effect on intention. What can be taken from this is that the more an individual is motivated to prevent negative effects (sunburn, sunstroke, etc) then that individual will be more likely to intend to do something about it (e.g. having sunscreen with them, keeping out of the sun). If an individual feels that the threat of skin cancer is likely, then this will also increase their intention to use sun protective behaviours. In terms of planning behaviours, motivation to prevent negative effects had the greatest impact on plans. Therefore, if an individual has the motivation to prevent the negative effects of the sun, then it is more likely that they will plan sun protective behaviours to prevent the negative effects. Intention was also significantly correlated with plans. If an individual intends to use sun protective behaviours, then they will be more likely to plan to use sun protective behaviours.

Testing sunscreen behaviour

Intention to use sun protective behaviours had a significant effect on sunscreen behaviour while plans to use sun protective behaviours did not. This means that an individual will be more likely to intend to use sun protective behaviours but it does not necessarily mean that they will plan to use sun protective behaviour. Motivation to prevent negative effects and threat likelihood had the greatest effect on sunscreen behaviour out of all the prior cognitions. This means that if an individual is motivated to prevent the negative effects of the sun, and perceives the threat of skin cancer to be

likely to happen to them, then they will be more likely to participate in sunscreen behaviour. When intention is added it does not improve an individual's motivation to prevent the negative effects of the sun and does not improve their perception of the threat of skin cancer being likely to happen to them.

When plans is entered into the regression, and intention is taken out, plans show no further variance in the model and motivation to prevent negative effects maintains its significant relationship with sunscreen behaviour. Finally, intentions and plans were tested against sunscreen behaviour. Initially, intentions had an effect on sunscreen behaviour and once plans were added into the regression, intention remained significant while plans were non-significant. Presumably then, the relationship between intention, plans and sunscreen behaviour is not mediated by plans.

CHAPTER SIX

DISCUSSION

This chapter consists of a discussion of the results as they relate to the hypotheses followed by issues concerning the meaning and measurement of sun protective behaviours. Limitations of the present study and implications of the findings for future research are also addressed.

This research has shown that intention is the most reliable predictor of sunscreen behaviour in a model of sun protective behaviour. Intention is a better predictor of sunscreen behaviour than plans. Furthermore to this, intention becomes even more reliable as a predictor when it is tested in conjunction with the motivation to prevent the negative effects of the sun, and threat likelihood. This is over and above the effect of other cognitions such as knowledge, normative belief, self-efficacy and perceived threat.

So how do the results of the current study compare to research previously conducted into sun protective behaviours? The best study to begin with is that conducted by Jones, Abraham, Harris, Schulz & Chrispin (1998) from which this study has used a modified version of the model of sun protective behaviours. Jones et al., (1998) found that their research supported an extended Theory of Planned Behaviour model. They found that sunscreen use was moderately to strongly correlated with intention and planning, and moderately correlated with self-efficacy and the importance of preventing negative consequences of sun exposure. The results from the current study partially agreed with Jones et al. In the current study, the researcher found that sunscreen use was moderately to strongly correlated with intention and planning. However, it was also strongly correlated with the motivation to prevent negative effects, and was moderately correlated with threat likelihood. Jones et al., also found that the strength of intention to use sunscreen was also strongly related to planning and importance, and moderately to strongly correlated to self-efficacy.

In the current study, strength of intention to use sunscreen was strongly related to the motivation to prevent negative effects, was related to threat likelihood, was weakly related to planning, and also correlated with sunscreen behaviour. This was to be expected, as the model of sun protective behaviour used was loosely based on constructs from the Theory of Planned Behaviour (TPB). Other studies that have tested sun protective behaviour using constructs from the TPB have found similar results. Hillhouse et al., (1997) found in their study that prior cognitions accounted for 37% of the variance in sunscreen use intentions. Intentions, in turn, accounted for 49% of the variance in sun protective behaviour. Jones et al., (1998) found that the prior cognition measures were able to account for 44% of the variance in strength of intention, and intention had the strongest impact (.44) on prior planning. Plans and intentions were the most proximal predictors of behaviour in the final Jones et al., model, and explained 58% of the variance in sunscreen behaviour.

Unlike the Jones et al., (1998) study which showed that the relationship between intention and behaviour was partially mediated by planning, the current study found that the relationship between intention and behaviour was not mediated by planning. Rather, it was intentions that mediated the relationship between plans and sunscreen behaviour. This particular result is interesting in that it does not lend support to the Jones et al., assertion that supports the theoretical proposals of Schwarzer (1992) and Gollwitzer (1993). However, Jones et al., found that the relationship was only partially mediated, and went on to make the speculation that planning may not always be necessary to implement sunscreen use intentions. The results of the current study support this speculation. Other research into sun protective behaviours have also shown that planning is not always necessary for the implementation of sun protective behaviours.

For example, Zinman et al., (1995) found that sunscreen use in parents is a key determinant of whether they will use sunscreen on their children. Parents who have a history of sunburn or perceive their child to be at risk of sunburn will be more likely to protect their child from the sun. From this, we could assume that threat perception is a factor in the use of sun protective behaviour. However, other studies have concluded otherwise. Harrison, Mullen & Green (1992) found that even when personal susceptibility is recognised, protection may not be regarded as important enough to prompt action to use sun protective behaviours. This results in weak associations

between perceived susceptibility and preventive behaviour. Mermelstein & Riesenberg (1992) also found that once a measure of perceived likelihood to take precautions had been considered, perceived susceptibility explained only 5% of the variance in sunscreen use. These results can be linked back to the current study where it was found that perceived threat had very little or no effect on upon intentions, plans and sunscreen behaviour. On the other hand, threat likelihood was found to correlate with intention and sunscreen behaviour. In the current study, threat was split into two measures called perceived threat and threat likelihood. This may inadvertently have caused some differences in results between studies. The Jones et al., (1998) study used only one measure of threat that combined both constructs of perceived threat and threat likelihood. Most other studies that have tested sun protective behaviours also only use one measure of threat, as well as measures of perceived susceptibility.

By having two separate measures of threat in the current study, it is possible that correlations found with these measures were distinct and separate. This is in opposition to correlations that are reliant on a single measure of threat. Future research should look into such separation of the measure of threat as it could be possible that a construct split into two measures may be more likely to be able to predict sun protective behaviours.

Other results from the current study also correspond in certain areas to previous research. Results from the current study found that the more distal cognitions were less strongly related with use and intentions. For example, knowledge correlated with both intention and sunscreen behaviour in initial analyses, and this led the researcher to assume that if an individual has sun protective behaviour knowledge, then it would be more likely that they will intend to use such behaviours and participate in using sunscreen behaviour. However, in more thorough analyses where other variables were used to test effects over and above the initial correlations, knowledge would be found to be non-significant. This finding agrees with previous research that has tested knowledge as a predictor of sun protective behaviours. Keesling & Friedman (1995), for example, found in their study, that although knowledge predicted sunscreen use intentions it did not directly increase intentions. Newton, Hughes, & Altman (1993) found that a school-based package increased knowledge and decreased positive attitudes towards sunbathing

but, although knowledge was correlated with sunscreen use, it was not related to reported sunburn rates.

This is not to say though, that knowledge about sun protection will not predict an individual's use of sun protective behaviours. There has been research that has supported knowledge as a useful predictor of sun protective behaviour. Castle, Skinner & Hampson (in press), found that knowledge, and the personality trait of conscientiousness were predictors of sun protective behaviour. Robinson, Rigel, & Amonette (1997), and Miller, Ashton, McHoskey & Gimbel (1990), found that women are more likely to be aware of information about skin cancer prevention. However, in terms of this last piece of research, although women are more likely to be aware of the information, it does not necessarily mean that they will follow the advice given, or that they will even seek out the information concerned. It seems then, that knowledge is not always found to be a useful predictor of sun protective behaviours (e.g., Foot et al., 1993; Rodrigue, 1996; Vail-Smith, & Felts, 1993). Knowledge may not generate preventive action unless other motivational prerequisites are in place (Arthey & Clarke, 1995).

This final statement seems to be especially true when it is related to the current research. The researcher found that the measure motivation to prevent negative effects, when tested in multiple regression analyses, would have a moderate to strong effect on the measures it was tested with (e.g. intention, plans, and sunscreen behaviour). From this, it was assumed that if an individual perceives not using sun protective behaviours negatively, then they will be more likely to intend to, plan to, and actually participate in sun protective behaviours. Perhaps then, if an individual is highly motivated to use sun protective behaviours, then that in conjunction with their knowledge about skin and sun protection may induce them to use preventive action against the effects of the sun.

In terms of the model used in the current study, it appears that there is scope for future research to consider bringing other measures into the model. The original version of the model, as proposed by Jones et al., (1998) did not use a measure of attitude, though attitude was tested in the original questionnaire, and though it is a construct of the Theory of Planned Behaviour. It is a measure that could easily have been used in the model, and has previously been found to be reliable in testing for sunscreen use. For example, Hillhouse, Stair & Adler (1996) found that sunscreen use was predicted by

attitudes. Broadstock et al., (1992); Carmel, et al., (1994); and Robinson et al., (1997) found that the attitude that having a sun tan is healthy and attractive still prevails. Other studies have also found that attitudinal measures are predictive of intentions relevant to skin protection (Eiser, Eiser, & Pauwels, 1993; Wichstrom, 1994). Any future modifications to the model of sun protective behaviour should include a measure of attitude towards such behaviour.

The generalisability of the results reported in this study could be limiting. The use of a small sample size could have caused problems for analysis but it did not as there were sufficient people using sun-screen to make the analyses of prior cognitions, intermediate cognitions and sunscreen behaviour viable. Additionally, there were also a number of points where the adopted questionnaire could have been improved before being used. However, these points were mainly to do with the wording of some of the questions. An initial look at subjects' answers found that very few people misread, or misunderstood the questions asked of them. The majority of questions in the questionnaire were answered, and the questions that were misread were unrelated to the measures used in the model for testing.

In terms of the questionnaire, future research should look further at questions that ask individuals about their sun tanning behaviour. As the model used measures that related only to sun protective behaviours, an idea of what behaviours cause individuals to ignore using sun protective behaviours was unknown. This is a valid point as previous research into sun protective behaviours have found, among other things, that sun exposure is related to the perceived benefits of sunbathing and tanning, combined with poor knowledge and threat of skin cancer (Keesling & Friedman, 1987). If researchers knew what caused individuals to indulge in sun tanning behaviours, it may be possible that this information could be used to work towards developing strategies of sun protection. For example, publicity about sun exposure and skin cancer have made many people aware of the risks, but has not produced large-scale behaviour change. Social norms in many groups still associate a suntan with a desirable, healthy appearance, advertising reinforces the view that having a tan looks good, and there are many reports in the popular press on safe methods of achieving a tan (Arthey & Clarke, 1995). Together with unrealistic optimism and tendencies to minimise health threats, these factors decrease the likelihood

that people will seriously consider or adopt sun protective behaviours. Future research needs to look at and define, problem areas, such as peer and media reinforcement of the attractiveness of a sun tan. This information should be used to further test the cognitive correlates of sun protective behaviour.

CONCLUSION

The results of the present study suggest that plans do not mediate the strength of intention to use sunscreen behaviour. It would be premature to exclude plans without further testing the model of sun protective behaviours, and without using a larger sample. Plans by itself does have an effect on sunscreen behaviour and is also related to intention, motivation to prevent negative effects, and threat likelihood. Further, the prior cognitions that it is related to the most (i.e. motivation to prevent negative effects and self-efficacy), also have an effect on sunscreen behaviour.

It is important to note, that the present study suggests that it is reasonable to be able to split a construct into two measures. It was found that the measure of threat likelihood had a far greater effect on intention, plans, and sunscreen behaviour, than the measure of perceived threat. It could be assumed then, that individuals will be more likely to use sun protective behaviours if they feel that it may be likely that they will get skin cancer. However, more research needs to be conducted in this area before it can be assumed that it is the likelihood of threat rather than the perception of threat that will contribute to an individuals likelihood to use sun protective behaviours.

The model of sun protective behaviour may be a useful model for applying to the health psychology domain once further theoretical development has taken place (including the inclusion of a measure of attitude). The present study, though not contributing to that theoretical development specifically, has drawn attention to a number of issues that require resolution, and suggest directions for further research.

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APPENDIX A

SUN PROTECTIVE BEHAVIOUR QUESTIONNAIRE

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ANDREA SEYMOUR - THESIS RESEARCH

MEASURING SUN PROTECTION BEHAVIOUR AS A PREVENTIVE HEALTH BEHAVIOUR

INFORMATION SHEET
Questionnaire

Researchers from Massey University are conducting research on the nature of sun protection behaviour as a preventive health behaviour and focuses on sunscreen use and the use of clothes to protect the skin. The study involves collaboration with UK researchers at the Universities of Hertfordshire and Sussex. Researchers are Assistant Professor in Psychology, Dr Douglas Paton and Masters student Andrea Seymour. We would like to take this opportunity to invite you to participate in this study and assure you that complete confidentiality and anonymity is assured. The information gathered from these questionnaires will only be used for the proposed study and information will not be given to other sources.

The preliminary stage involves answering a questionnaire which should take approximately 15 minutes to complete. The researcher will attempt to approach all people in a specific area of the beach (unless they are asleep). People will be introduced to the study and, if willing to take part, will be handed a questionnaire and a pencil and asked to complete the questionnaire.

We will be seeking approximately 300 people from all the beaches to be surveyed. Absolute confidentially is assured.

Please do not hesitate to contact either of the researchers if you have any queries about the questionnaire or the research in general. You may wish to contact us at Massey University, Fax us at (06) 3505673 or phone Douglas Paton on (06) 3506151 or Andrea Seymour on (06) 3546253.

WHAT IS THE PRESENT STUDY ABOUT?

The present study has two main aims: (1) to consider cross cultural issues by comparing a New Zealand sample recruited on beaches with previously studied UK and Australian beach samples (Jones et al, 1997); and (2) to explore the extent to which measures based on recent advances in models of self-regulation can enhance the behavioural prediction of more widely applied social cognition models such as the Theory of Planned Behaviour.

ELIGIBILITY

You are eligible to take part in the study if you are on the beach at the same time as the researcher and are willing to participate in the study.

WHAT YOU WILL BE ASKED TO DO

You will be asked to fill out a questionnaire provided by the researcher that will take about 15 minutes of your time. You will not be expected to answer any questions that you do not feel comfortable about and you have the right to decline to answer any question(s). In addition, you have the right, at any point during the questionnaire, to decline to participate any further in the questionnaire and in the study.

YOUR RIGHTS AS A PARTICIPANT:

All participants:

* have the right to contact the researchers at any time during the research to discuss any aspects of the study.
* have the right to refuse to answer any question.
* have the right to withdraw from the study at any time.
* provide information on the understanding that the questionnaires will be held in complete confidence by the researchers, to be used only for the purposes of the research. It will not be possible to identify individuals in any reports of the results.
* have the right to receive summary information about the results of the study on its completion.

THIS QUESTIONNAIRE IS BEING DISTRIBUTED ON BEACHES IN NEW ZEALAND, the UK, and AUSTRALIA AS PART OF A PSYCHOLOGY RESEARCH PROJECT. WE WOULD GREATLY APPRECIATE YOUR HELP.

YOUR NAME IS NOT REQUIRED AND ALL INFORMATION IS TOTALLY ANONYMOUS.

HAVING COMPLETED THE QUESTIONNAIRE, PLEASE RETURN IT TO THE RESEARCHER ON THE BEACH.

What is the date today? _____

What beach are you at? _____

What time is it now? _____

Approximately what time did you arrive on the beach today?_____

If you are in your swimsuit, approximately what time did you uncover?

_____

Approximately what time do you think you will leave?

_____

Do you have any other activities planned for today e.g., shopping, going to work, sight seeing? Yes / No

If YES, please list:

_____

_____

Have you got a sunscreen lotion with you? Yes / No

If not, are you with someone you definitely knew would have a sunscreen lotion?

Yes / No

Are you wearing a sunscreen now? Yes / No

If so, what factor is it? _____

Is it water resistant? Yes / No

Approximately what time did you last apply it?_____

Approximately how often have you put it on so far today?_____

Are you covering up your skin /head at all (with clothing, hat etc)? Yes / No

If yes, what have you put on and for how long?

_____

HOW IMPORTANT WERE THE FOLLOWING TO YOU HERE ON THE BEACH TODAY?

(Please tick the one response which most closely matches your view for each item listed)

	Extremely	Very	Fairly	A bit	Not at all
Enjoying myself					
Relaxing					
Spending time with friends / family					
Getting fit					
Feeling healthier					
Looking healthier					
Developing a suntan					
Looking attractive					
Preventing sunburn					
Preventing sunstroke					
Preventing my skin from becoming dry					
Protecting my skin by using a sunscreen					
Enjoying sporting activities					
Doing some reading					
Wearing a T-shirt (or similar) when the sun gets too strong					

FOR EACH OF THE FOLLOWING PLEASE TICK THE ONE RESPONSE WHICH MOST CLOSELY MATCHES YOUR VIEW?

	Strongly agree	agree	Neither agree nor disagree	Disagree	Strongly disagree
I intend to enjoy myself					
I intend to relax					
I intend to get a suntan					
I intend to use a sunscreen					
I intend to re-apply my sunscreen often enough to ensure adequate protection					
I intend to wear a T-shirt (or similar) when the sun gets too strong					
I intend to avoid the sun when it gets too strong					

WHICH OF THE FOLLOWING DID YOU GIVE SOME THOUGHT TO BEFORE COMING TO THE BEACH TODAY?
(Please tick the one response which most closely matches your view for each item listed)

	Had a clear plan about this	Had given this some thought	Had not thought about this
How I would enjoy myself			
How I would relax			
How I would develop a suntan			
Having a sunscreen lotion with me			
How often I would put a sunscreen on to ensure adequate protection			
Wearing a T shirt (or similar) when the sun gets too strong			
Avoiding the sun when it gets too strong			

HOW EASY OR DIFFICULT IS IT FOR YOU TO DO EACH OF THE FOLLOWING?
OR
HOW EASY OR DIFFICULT WOULD IT BE IF YOU WANTED TO DO THESE THINGS?
(Please tick the one response which most closely matches your view for each item listed)

	Very easy	Fairly easy	Neither easy nor difficult	Fairly difficult	Very difficult
To develop a suntan					
To have a sunscreen with me					
To put sunscreen on often enough to ensure adequate protection					
To wear a T-shirt (or similar) when the sun gets too strong					
To avoid the sun when it gets too strong					

WHAT DO YOU THINK MOST PEOPLE THINK?

(Please tick the one response which most closely matches your view for each item listed)

	Definitely	Probably	Possibly	Probably not	Definitely not
Do you think people of your age and sex think that having a suntan looks attractive?					
Do you think that people of your age and sex think that having a suntan looks healthy?					
Do you think that people of your age and sex think that a suntan is a sign of status?					
Do you think that people of your age and sex think that they should use a sunscreen lotion to protect their skin while outside in the sun?					

TO WHAT EXTENT DO YOU AGREE WITH EACH OF THE FOLLOWING STATEMENTS?

(Please tick the one response which most closely matches your view for each item listed)

	Strongly agree	Agree	Neither agree nor disagree	Disagree	Strongly disagree
Once you get a suntan it is easier to enjoy the summer months					
People look more attractive with a suntan					
I feel healthier with a suntan					
It's worth a lot of effort to get a suntan					
A sun-tanned person looks healthier					

FOR EACH OF THE FOLLOWING ITEMS PLEASE TICK THE ONE RESPONSE WHICH MOST CLOSELY MATCHES YOUR VIEW FOR EACH ITEM LISTED

	True	False	Don't know
Baby oil offers high protection against sunburn			
A sun tan is a sign of a healthy body			
Skin damage can occur after 12 minutes of unprotected sun in the middle of the day			
One application of sunscreen, at the beginning of the day provides adequate protection all day			
Lying in the sun for 60 minutes a day tans you faster than 15 minutes a day			
The higher SPF on a sunscreen the less protection it offers			
Skin self-examination can help detect skin cancers			
The safest time to suntan is before 11 a.m. and after 3 p.m.			
Sunscreen products prevent you from tanning			
A sunscreen with SPF of 10 lets you stay in the sun safely for 100 minutes			
None of the three main types of skin cancer is fatal			
Exposure of the skin to the sun enables the body to produce Vitamin D			

Which hours of the day (if any) is it advisable to keep out of the sun?

_____

What do you think is the main reason for the increase in the incidence of skin cancer in New Zealand?

_____

_____

Compared to other people of my age and sex my chances of getting **skin cancer** in the future are:

Much less likely	Less likely	Slightly less likely	About the same	Slightly more likely	More likely	Much more likely
1	2	3	4	5	6	7

Skin cancer is:

Not at all serious	1	2	3	4	5	6	7	Extremely serious
Not at all easy to treat	1	2	3	4	5	6	7	Extremely easy to treat
Not at all preventable	1	2	3	4	5	6	7	Extremely preventable
Not at all likely to happen to me	1	2	3	4	5	6	7	Extremely likely to happen to me
Something I never about think about	1	2	3	4	5	6	7	Something I think a lot

AND FINALLY

Are you : **FEMALE** _____

MALE _____

Where are you from? _____

How old are you? _____

i) **What is your natural hair colour?**

1. Black ____
2. Brown ____
3. Light Brown ____
4. Blond or fair ____
5. Red _____

ii) **How easily does your skin get sunburnt?**

Not at all easily 1 2 3 4 5 6 7 Very easily

(Please circle one number on the scale)

APPENDIX B

PRINCIPAL COMPONENTS ANALYSIS

Principal Components Analysis (PCA) for Konwledge Items.

Three Factor Analysis.

VARIMAX converged in 8 iterations.
Rotated Factor Matrix:

	Factor 1	Factor 2	Factor 3
KNOW1	.09722	.22201	.82038
KNOW2	.32324	.56487	.27046
KNOW3	.53705	-.17585	-.08798
KNOW4	.18555	-.10359	.81892
KNOW5	.68168	.07782	.18238
KNOW6	.54547	.17859	.10346
KNOW7	.02389	.53695	.49567
KNOW8	.20307	.69051	-.22032
KNOW9	.58477	-.03708	.32825
KNOW10	.51460	.45401	-.13702
KNOW11	.51104	.25245	.08034
KNOW12	-.16921	.71907	.20210

Two Factor Analysis.

VARIMAX converged in 3 iterations.
Rotated Factor Matrix:

	Factor 1	Factor 2
KNOW1	.85275	.01344
KNOW2	.45356	.49199
KNOW3	-.10707	.38519
KNOW4	.75381	-.07211
KNOW5	.23760	.57340
KNOW6	.18661	.52531
KNOW7	.64032	.17708
KNOW8	.02132	.55893
KNOW9	.33374	.40352
KNOW10	.04399	.68704
KNOW11	.18600	.53767
KNOW12	.40837	.16762

Principal Components Analysis (PCA) for the Self-efficacy items.

One Factor Analysis.

Rotated Factor Matrix:

	Factor 1
S_Suntan	.51980
S_Snscr	.77380
S_Apply	.87412
S_Cloths	.87298
S_Avoid	.86121

Principal Components Analysis (PCA) for the Motivation to prevent negative effects items.

Four Factor Analysis

VARIMAX converged in 6 iterations

Rotated Factor Matrix:

	Factor 1	Factor 2	Factor 3	Factor 4
GENJOY	.13618	.26398	.86315	.10680
GRELAX	-.07884	.22720	.86070	-.00210
GFRNFAM	.20751	.13021	.82407	.14691
GFIT	.02490	.52296	.44750	.53659
GFLHEALT	.08124	.70288	.38222	.35167
GLKHEALT	.06292	.82093	.24425	.20801
GSUNTAN	-.11315	.78823	.13807	-.12100
GLKATTR	-.01975	.87523	.11129	-.05828
GPRVBURN	.85651	.01102	.12366	.13782
GPRVSTRK	.93715	.06837	.02670	-.02563
GPRVDRY	.60106	.10625	-.05229	-.40788
GSKINPRO	.87656	-.00684	.04568	-.12686
GSPORT	-.02886	.06418	.39454	.81177
GREADING	.16687	-.03587	.10421	-.85358
GTSHIRT	.63399	-.37671	.15160	-.09021

Three Factor Analysis

VARIMAX converged in 8 iterations.

Rotated Factor Matrix:

	Factor 1	Factor 2	Factor 3
GENJOY	.25688	.65505	.42028
GRELAX	.07660	.56072	.41907
GFRNFAM	.31613	.66009	.27256
GFIT	-.03609	.71060	.47608
GFLHEALT	.03586	.53459	.67014
GLKHEALT	.01697	.33779	.78282
GSUNTAN	-.09815	.01105	.80928
GLKATTR	-.03232	.04715	.86695
GPRVBURN	.81158	.22281	-.02989
GPRVSTRK	.90267	.04073	.03506
GPRVDRY	.64756	-.31406	.15366
GSKINPRO	.87447	-.02790	-.00605
GSPORT	-.13264	.87178	-.02949
GREADING	.36702	-.57183	.17571
GTSHIRT	.67479	.04988	-.32839

Two Factor Analysis

VARIMAX converged in 3 iterations.

Rotated Factor Matrix:

	Factor 1	Factor 2
GENJOY	.77692	.20728
GRELAX	.69705	.03122
GFRNFAM	.68095	.27429
GFIT	.83594	-.09028
GFLHEALT	.85170	-.02215
GLKHEALT	.78960	-.03936
GSUNTAN	.56838	-.14272
GLKATTR	.63883	-.08163
GPRVBURN	.19148	.80252
GPRVSTRK	.11373	.89707
GPRVDRY	-.07220	.65011
GSKINPRO	.03429	.87390
GSPORT	.58971	-.16529
GREADING	-.25857	.37922
GTSHIRT	-.14965	.68926

Principal Components Analysis (PCA) for the Threat items.

Three Factor Analysis

VARIMAX converged in 5 iterations.

Rotated Factor Matrix:

	Factor 1	Factor 2	Factor 3
C_LIKELY	.00189	.91251	.10982
SERIOUS	.81562	.11023	-.10948
TREAT	-.01219	.05300	.95599
PREVENT	.80318	.07925	.37288
LIKELY	.25886	.86422	-.08420
THINK	.76929	.18022	-.50286

Two Factor Analysis.

VARIMAX converged in 3 iterations.

Rotated Factor Matrix:

	Factor 1	Factor 2
C_LIKELY	-.01378	.79761
SERIOUS	.71627	.29587
TREAT	-.59235	.50245
PREVENT	.40914	.50034
LIKELY	.30490	.74588
THINK	.92477	.14764

Principal Components Analysis for the Intention items.

Three Factor Analysis.

VARIMAX converged in 5 iterations.
Rotated Factor Matrix:

	Factor 1	Factor 2	Factor 3
IENJOY	.13568	.92474	-.02025
IRELAX	-.10672	.92244	-.10189
ISUNTAN	.08839	.08987	-.85489
ISNSCRN	.91656	.03528	-.16560
IAPPLY	.92748	.05049	.09683
ICLOTHES	.68613	-.05220	.31537
ISNAVOID	.22414	-.02395	.76666

Two Factor Analysis.

VARIMAX converged in 3 iterations.

Rotated Factor Matrix:

	Factor 1	Factor 2
IENJOY	.21110	.83009
IRELAX	-.04298	.85838
ISUNTAN	-.11194	.48322
ISNSCRN	.84909	.13899
IAPPLY	.92415	.02968
ICLOTHES	.73406	-.17141
ISNAVOID	.39877	-.37337

One Factor Analysis
Factor Matrix:

	Factor 1
IENJOY	.13390
IRELAX	-.12170
ISUNTAN	-.15588
ISNSCRN	.83272
IAPPLY	.91751
ICLOTHES	.74671
ISNAVOID	.43140

Principal Components Analysis (PCA) for Plans Items.

Two Factor Analysis.

VARIMAX converged in 3 iterations.

Rotated Factor Matrix:

	Factor 1	Factor 2
PENJOY	.17252	.91937
PRELAX	.07328	.94678
PSUNTAN	-.23502	.21744
PSUNSCRN	.53737	.13595
PHOWOFTN	.82120	.18148
PCLOTHES	.86474	-.14066
PAVOID	.84194	.05510

One Factor Analysis

Factor Matrix:

	Factor 1
PENJOY	.51135
PRELAX	.43017
PSUNTAN	-.13387
PSUNSCRN	.54848
PHOWOFTN	.82811
PCLOTHES	.74501
PAVOID	.79889