SELF-AFFIRMATION AND HEALTH BEHAVIOUR CHANGE: AFFECTIVE AND COGNITIVE PREDICTORS, MODERATORS AND MEDIATORS

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ABSTRACT

This thesis explored the potential of self-affirmation for use as a health intervention by exploring the effect of self-affirmation on a range of health behaviours (e.g., salt, alcohol, and fruit and vegetable consumption). The moderating effects of risk, motivation (e.g., importance of health, decisional balance, prevention focus) and threat on the effects of self-affirmation were also explored in order to determine under which circumstances self-affirmation manipulations were most effective. The thesis also explored potential mediators of self-affirmation (e.g., explicit and implicit self-related affect and efficacy cognitions).

In four experimental studies, participants completed a self- or non-affirming task prior to exposure to a health message. The effects of self-affirmation on cognitive, affective and behavioural responses were examined. The studies found that self-affirmation increased a range of cognitive (e.g., self- and response-efficacy) and affective predictors of health behaviour change (e.g., negative self-evaluative affect, implicit threat-related affect) and actual behaviour change (e.g., consumption of fruit and vegetables). The thesis found that response-efficacy mediated the effect of self-affirmation on behaviour change. The thesis also found that there was a trend for self-affirmation manipulations to be most effective with lower threat health messages, and on participants who were most vulnerable (i.e., at the highest risk or the lowest motivation). However, the studies also suggested that self-affirmation manipulations may be detrimental when high threat health messages are used or on low risk or highly motivated participants.

The implications of the studies are that self-affirmation manipulations are capable of changing health behaviour; this offered preliminary support to the argument that self-affirmation manipulations have the potential to be developed as health interventions. However, the thesis also suggested that self-affirmation interventions would need to include low threat health information and that careful targeting would be needed when delivering the intervention.

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SELF-AFFIRMATION AND HEALTH BEHAVIOUR CHANGE: AFFECTIVE AND COGNITIVE PREDICTORS, MODERATORS AND MEDIATORS

CHAPTER ONE

Introduction and Literature Review

In recent decades, the remit of health agencies has changed from disease prevention to health promotion, in response to the high level of morbidity and premature mortality from lifestyle choices, such as smoking, excessive alcohol consumption, lack of exercise and poor diet (Bandura, 2005; Department of Health, 2004). In response to this the public is exposed to a wealth of health risk information in the form of posters, leaflets, public information films and websites; for example in the United Kingdom recent public health campaigns targeted cigarette smoking (e.g., "Give up before you clog up"), diet (e.g., "5 a day"), and drugs (e.g., "Frank"; National Social Marketing Centre, 2006). However, despite the widespread presence of health risk information and details of how to change unhealthy lifestyles, unhealthy behaviours are still prevalent, suggesting that those at risk may be resistant to health risk information. Therefore, for health promotion to be successful, i.e., create a permanent behavioural change in the targeted population, health promotion strategies must extend beyond merely providing health risk information, to theory-based methods (Abraham & Michie, 2005). One example of a theory based strategy that is postulated to reduce the tendency to reject health risk information is self-affirmation.

Typical Reactions to Health Information

The tendency to resist health advice is well documented in the psychological literature. Individuals are motivated to use defensive strategies in order to justify not changing their health behaviour, even at the expense of potential physical harm. The literature cites a wide range of self-serving defensive cognitive biases that can be used to

justify disregarding health risk information and recommendations to improve health. For example, health risk information may be denigrated by judging the health message to be low in credibility (Kunda, 1987; Liberman & Chaiken, 1992; Pervin & Latko, 1965). The risk may be minimised by belief in myths; for example, many smokers believe that risk does not increase with amount of cigarettes smoked over a certain threshold (Sastre, Mullet & Sorum, 1999). The severity of the negative health consequences can also be downplayed; for example, by regarding a disease as prevalent (Ditto, Munro, Apanovitch, Scepansky & Lockhart, 2003) or curable (Dillard, McCaul & Klein, 2006; Johnson, 1968; McMaster & Lee, 1991). The use of defensive biases, such as the ones listed above, have been evidenced over a range of health risks including alcohol consumption (Leffingwell, Neumann, Leedy & Babitzke, 2007), cigarette smoking (Sastre et al., 1999), enzyme deficiency (Ditto et al., 2003) and caffeine consumption (Liberman & Chaiken, 1992).

People may not be conscious of their motivation to arrive at a desired conclusion; indeed, they may believe they are processing the health information rationally (Kunda, 2000). For example, when a smoker reads about the risk of increased morbidity from cigarette smoking, they may unconsciously downplay their personal risk by favourably comparing themselves to other smokers who smoke more cigarettes or higher tar cigarettes than themselves, rather than comparing themselves unfavourably to non-smokers (Segerstrom, McCarthy, Caskey, Gross & Jarvik, 1993; Tagliacozzo, 1979). Furthermore, it is those who are most at risk of the health threat that are most likely to use these self-serving strategies and are subsequently least persuaded by the information and least likely to adjust their health behaviour (Ditto & Lopez, 1992; Halpern, 1994; Jemmot, Ditto & Croyle, 1986; Leffingwell et al., 2007).

Self-Affirmation Theory

Self-Affirmation Theory (Steele, 1988) has been used to explain defensive reactions to health risk information and, more importantly, the theory has generated a method to reduce these detrimental reactions. Self-Affirmation Theory proposes that we have a fundamental motivation to protect self-integrity; that is the overall view of the self as "adaptively and morally adequate" (Steele, 1988, p. 262). Relevant health risk information can threaten self-integrity. For example, information that suggests your chosen lifestyle endangers your physical health may jeopardize the positive view of yourself as a "sensible decision maker" or a "healthy person". The motive to protect self-integrity supersedes the motive to protect our selves from the less urgent threat of potential physical harm. Therefore, the health information is processed in a self-serving manner that rejects the health risk information and the recommendations. For example, by using self-serving strategies such as downplaying the severity of the risk, or one's personal susceptibility to it, questioning the diagnostic accuracy of a test or the validity of the research findings (Ditto & Lopez, 1992; Kunda, 1987; Liberman & Chaiken, 1992).

The theory proposes that by satisfying the motive to protect self-integrity before exposure to threatening information, the motivation to defensively respond to the health information will be reduced; thus allowing a more objective evaluation of the information (Steele, 1988). Manipulations that boost self-integrity are divided into those that are esteem-based (such as, providing bogus positive feedback on a test, e.g., Steele, Spencer & Lynch, 1993) and those that are value-based (such as, writing about a personally important value, e.g., Harris & Napper, 2005). There are a variety of different manipulations in use but they have three characteristics in common: (a) They make central and positive aspects of the self-concept salient (Napper, Harris & Epton, 2009), (b) they elicit a reminder of

"who you are" (Sherman & Cohen, 2006), and (c) they act as a reminder that self-worth is derived from sources other than the threatened aspect of the self-concept (Cohen, Aronson & Steele, 2000).

Although at the time of starting the research reported in this thesis, there were only six published self-affirmation papers (seven studies) that had looked at health risk information (Dillard, McCaul & Magnan, 2005; Fry & Prentice-Dunn, 2005; Harris, Mayle, Mabbot & Hepton, 2007; Harris & Napper, 2005; Reed & Aspinwall, 1998; Sherman, Nelson & Steele, 2000), research from other areas that used self-affirmation manipulations found that self-affirmation successfully reduced defensive responses (e.g., making downward comparisons, derogating information, derogating out-groups) after exposure to a range of self-threats (Sherman & Cohen, 2006). For example, self-affirmation manipulations were used to reduce the tendency to use motivated inferences when evaluating information and social situations (Cohen et al., 2000; Cohen et al., 2007; Schmeichel & Martens, 2005; Schimel, Arndt, Banko & Cook, 2004; Sherman & Kim, 2005; Sherman, Kinias, Major, Kim & Prenovost, 2007), minimise self-enhancement strategies such as exaggeration of test scores (Gramzow & Willard, 2006; Stapel & Johnson, 2007; Wood, Giodano-Beech & Ducharme, 1999; White & Lehman, 2005), decrease self-justification (Galinsky, Stone & Cooper, 2000; Sivanathan, Molden, Galinsky & Ku, 2005; Steele & Liu, 1983), reduce motivated distortions in social perceptions (Adams, Tormala & O'Brien, 2006; Crawford, 2007; Fein & Spencer, 1997; Gramzow & Gaertner, 2005; Harvey & Oswald, 2000; Koole & van Knippenberg, 2007; Liu & Steele, 1986; Rudman, Dohn & Fairchild, 2007; Schwinghammer, Stapel & Blanton, 2006; Shrira & Martin, 2005) and encourage self-improvement (Kimble, Deitrich, Couchey &

Wittenberg, 2007; Kumashiro & Sedikides, 2005; Siegel, Scillitoe & Parks-Yancy; 2005; Spencer, Fein & Lomore, 2001).

The review in Chapter 1 will focus mainly on the application of Self-Affirmation Theory to health but will also include references to the wider self-affirmation literature where relevant. This focus reflects the primary applied nature of the thesis and the secondary more general theoretical purpose of the studies. First, this thesis assesses the effectiveness of self-affirmation manipulations as a method of changing health behaviour by examining (a) the effect on variables that predict health behaviour change such as affect, health cognitions and intentions, (b) the effect on health behaviour and (c) potential moderating factors, in order to explore the potential of self-affirmation as a health intervention. Second, the thesis aims to further the theoretical understanding of Self-Affirmation Theory by exploring potential mediators of self-affirmation.

Self-Affirmation and Health

A typical self-affirmation study applied to health involved a self-affirmation manipulation (e.g., completion of questionnaires or essays regarding a salient value, listing of positive attributes) delivered immediately prior to or after a health risk message (e.g., presented as an article, a leaflet, a video or images) compared with a control condition (e.g., that involved completion of a questionnaire or essay about why a personally unimportant value may be important to someone else, neutral behaviour recall task) on various measures of defensiveness (e.g., typically operationalised as acknowledgement of the health risk, intention to change behaviour, immediate behaviour and follow-up behaviour). Manipulations derived from Self-Affirmation Theory had been used to reduce biased processing of information regarding several health risks, including breast disease from caffeine (Reed & Aspinwall, 1998; Sherman et al., 2000, Study 1), AIDS from unprotected

sex (Sherman et al., 2000, Study 2), breast cancer from alcohol (Harris & Napper, 2005) and increased morbidity from smoking (Harris et al., 2007).

Self-affirmation manipulations applied to health were successful in promoting general message acceptance; that is, acknowledgment that the targeted health risk was genuine. For example, self-affirmation increased the believability of the evidence presented (Reed & Aspinwall, 1998), the participant's belief that caffeine was linked to fibrocystic breast disease and that women should decrease their caffeine consumption in order to reduce their risk (Sherman et al., 2000, Study 1) and the threat level and unpleasantness of photographic cigarette warning labels (Harris et al., 2007). However, acknowledging the existence of a health risk does not necessarily instigate the process of adopting a health-related goal (i.e., taking up the behaviour recommended by the health message). A particular behaviour can be acknowledged as a health risk without accepting personal vulnerability (Weinstein, 1988). For example, some smokers show this optimistic bias in that they accept that smoking is a risk to health, as they see themselves as at a higher risk of poor health than non-smokers, but they perceive other smokers to be at higher risk than themselves (Weinstein, Marcus & Moser, 2005).

According to certain models of health behaviour (e.g., Protection Motivation Theory – PMT, Rogers, 1983; the Extended Parallel Process Model – EPPM, Witte, 1992), health behaviour change involves accepting the health consequences of the behaviour as severe, accepting personal susceptibility to the health risk, accepting that the recommended action can reduce this risk to health (i.e., response-efficacy) and holding the self-belief that one is capable of performing the recommended action (i.e., self-efficacy). Threat and efficacy (coping) appraisals together determine how people respond to the health risk information. If the health information is not successful at increasing threat and efficacy

variables then maladaptive coping responses such as avoidance (i.e., not attending to the information), denial (i.e., denying the existence of the risk or susceptibility to the risk) and hopelessness (i.e., regarding ill-health as inevitable) are the result. If the threat and efficacy variables are sufficiently high, then protection motivation (i.e., the motive to protect oneself from the health risk; this is usually operationalised as a measure of intention to adopt the recommended behaviour) is evoked that leads to adaptive coping responses. Adaptive coping has been operationalised as rational problem solving (e.g., seeking more information), performing preparatory behaviours (e.g., purchasing condoms in order to practice safe sex) or actually taking up the recommended health behaviour (Fry & Prentice-Dunn, 2005; Rippetoe & Rogers, 1987).

Self-affirmation had shown promising effects on predictors of health behaviour change. Self-affirmed participants had reported increased vulnerability to AIDS after watching an AIDS awareness video (Sherman et al., 2000, Study 2) and reported increased perceptions of the personal relevance of photographic cigarette warning labels (Harris et al., 2007) in comparison to a control condition. Self-affirmed participants had reported a higher level of self-efficacy to reduce the number of cigarettes smoked and perceived behavioural control over reducing smoking (Harris et al., 2007) and to reduce caffeine consumption (Reed & Aspinwall, 1998) than non-affirmed participants. Self-affirmation manipulations, in comparison a control task, had also led to increased protection motivation, as illustrated by higher reports of intentions to reduce cigarette smoking (Harris et al., 2007) and to reduce caffeine (Sherman et al., 2000, Study 1). Furthermore, self-affirmed participants were more likely to perform behaviours to address the health risk than were non-affirmed participants. For example, self-affirmed participants displayed a potential willingness to

address the dangers of unprotected sex by taking more information leaflets and purchasing more condoms than non-affirmed participants (Sherman et al., 2000, Study 2).

The evidence at the start of this research programme indicated that self-affirmation does have an influence on health cognitions and initiates preparatory behaviours. Future self-affirmation and health studies need to replicate the effects of self-affirmation on predictors of health behaviour change and to extend the range of health model constructs that are hypothesised to influence health behaviour change in order to determine if self-affirmation could be used successfully as a health intervention.

Limitations of Self-Affirmation

Published research had indicated that there are some limitations to the effects of self-affirmation. First, self-affirmation manipulations were not always successful at changing risk-related cognitions. For example, Dillard et al., (2005) found no effects of self-affirmation on the perceived severity of smoking or the motivation to quit smoking. The lack of effect in this study may have been due to the failure of the manipulation to self-affirm the participants. For example, Dillard et al. used a non-standard manipulation that interweaved the self-affirmational task (e.g., participants were asked to think and write a sentence about a time they exhibited a particular value such as honesty) with the threat information (i.e., various cigarette packet warnings); this technique may not have focused the attention on positive aspects of the self for the same duration, or with the same degree of attention, as other more successful manipulations such writing an essay about a self-selected important value (Harris & Napper, 2005; Sherman et al., 2000, Study 2), completing a detailed questionnaire regarding previous acts of kindness (Reed & Aspinwall, 1998), completing a questionnaire where the possible answers reflect an important value (Sherman et al., 2000, Study 1) or making a comprehensive list of positive

self-attributes (Harris et al., 2007). The choice of manipulation is clearly an important factor in the success of self-affirmation studies.

Second, self-affirmation did not have a uniform effect; that is, it did not always affect the same variables. For example, Harris et al. (2007) found that self-affirmation did not increase vulnerability to smoking related illnesses despite the previous success of the manipulation on this variable (e.g., Sherman et al., 2000, Study 2) and the favourable effect of self-affirmation in the same study in increasing personal relevance, self-efficacy, perceived behavioural control and intentions. The reasons for this are difficult to determine as, although the self-affirmation studies regarding health follow a similar format, they do vary in the type of health behaviour targeted, the difficultly of performing the recommended behaviour, the ambiguity of the health-information (e.g., Reed & Aspinwall, 1998, provided risk-confirming and risk-disconfirming information; whereas Harris et al., 2007, provided unequivocal information about the negative consequences of smoking), the risk level of participants, the severity of the health risk and the focus of the health information. These factors may influence where defensiveness occurs. For example, if the evidence is strong and the risk is widely accepted, defensiveness may be reflected by not accepting personal vulnerability rather than rejecting the credibility of the information. Self-Affirmation Theory suggests that the manipulation removes the need to use defensive responses. Therefore, the self-affirmed condition and control conditions would only differ on variables that have been affected by defensive processing. For example, smokers who accept that cigarette smoking causes lung cancer but who typically see themselves as at lower risk than other smokers after a self-affirmation manipulation would report greater vulnerability to lung cancer than those in the control condition but would not differ on general message acceptance variables (as this factor was not subject to a defensive

response). This would indicate that the inconsistent effects of self-affirmation on predictors of health behaviour change could be due to differences in message content rather than failure of the self-affirmation manipulation.

Third, the studies to date had explored only a small range of outcome variables. This could be problematic as current health models may not be sufficient to explain the effect of self-affirmation manipulations on protection motivation and adaptive coping. That is, the influence of self-affirmation on the constructs proposed by health models may not mediate the effect of self-affirmation on intentions and behaviour. For example, Harris et al. (2007) found that, in comparison to a non-affirmation task, self-affirmation resulted in elevated perceived threat and higher intentions to reduce smoking; however, the relationship between threat and intentions was moderated by self-affirmation. That is, in the non-affirmed group intentions were positively related to threat; however, in the self-affirmed group healthier intentions were not reliant on increased threat. This finding, in the self-affirmed condition, is the converse of predictions made by models such as PMT and EPPM that posit a positive relationship and a direct effect of threat appraisal on intentions. This suggested it is important to consider the possibility that self-affirmation effects may be better explained by constructs other than those explicitly included in most health models. For example, self-regulation models suggest that negative affect signals that a goal has not been attained and thus motivates action towards the goal; therefore self-affirmation may lead to increased negative affect that would signal that the participants' health behaviour should be addressed (e.g., Carver & Scheier, 1990, Higgins, 1987). Self-affirmation may therefore influence affective components such as worry (McCaul & Mullens, 2003), negative self-evaluative affect (Dijkstra & Dijker, 2005) and goal-related emotions (e.g., self-discrepancy related emotions such as dejection and anxiety; Higgins, 1987) as these

have been proposed to influence behaviour change. Furthermore, these affective components may act as mediators of the effects of self-affirmation on intentions and health behaviour.

Fourth, despite the promise of self-affirmation promoting increased perceptions of risk and preparatory behaviours, self-affirmation had at the time of starting this research no effect on long term health behaviour. Self-affirmed participants did not reduce their cigarette smoking despite their reported intentions to do so (Harris et al., 2007) and regardless of their increased acceptance of the health risk they did not reduce their alcohol (Harris & Napper, 2005) or caffeine consumption (Reed & Aspinwall, 1998; Sherman et al., 2000, Study 1). There are three arguments that may explain the lack of effect of self-affirmation on long term health behaviour.

Argument one is that self-affirmation may just make participants simply more agreeable (Correll, Spencer & Zanna, 2004), such that they initially mindlessly accept the conclusions of the health risk information but these cognitions do not endure outside the laboratory. However, there is evidence that suggested that self-affirmed participants are not more agreeable. For example, although self-affirmed participants reported more agreement with counter-attitudinal arguments they were more critical of pro-attitudinal arguments than were non-affirmed participants (Correll et al., 2004). Furthermore, the effects of self-affirmation on health risk cognitions are durable over time; e.g., the belief in the link between alcohol and breast cancer was still apparent at follow-up (Harris & Napper, 2005). It seems unlikely that experimentally induced agreeableness, without actual cognitive changes, would still remain after four weeks.

Moreover, self-affirmation manipulations had affected long term behaviour outside the health domain. Self-affirming improved the long term educational achievement of

African American students by removing the negative effect of stereotype threat (Cohen, Garcia, Apfel & Master, 2006); this indicated that self-affirmation manipulations can have durable effects on behaviour outside the laboratory. Self-affirmation had also had an effect on long term physical health as self-affirmational statements contained in essays were found to mediate the effect of expressive writing on physical symptoms at three months in recovering breast cancer patients (Creswell et al., 2007). Furthermore, self-affirmation also had promising long term effects in the health domain as the desire to quit smoking was elevated in self-affirmed smokers up to one week after exposure to the health risk information (Harris et al., 2007).

Argument two is that the lack of behaviour change may be due to the content of the health message. Published studies had used health information that had focused on the threat component of the health message and had largely neglected information designed to increase response-efficacy and self-efficacy. Indeed, an empirical study suggested that threat information might be irrelevant as responses to response- and self-efficacy information predicted attitude and intention towards breast self-examination whereas threat information did not (Ruiter, Verplanken, Kok & Werrij, 2003). Inclusion of efficacy information, such as tips to reduce alcohol consumption, would reflect the type of information used in public health campaigns and thus would provide greater ecological validity to the studies in this thesis.

The third argument is that the type of behaviour targeted may explain why self-affirmation had been unsuccessful in changing health behaviour. The health behaviours that had thus far been targeted in self-affirmation studies had been those behaviours that are detrimental to health (such as cigarette smoking, alcohol consumption, caffeine consumption and unprotected sex; although see Fry & Prentice-Dunn, 2005, for an

exception). These behaviours may have been particularly difficult to change in a short period due to the physiological or lifestyle adjustments that are necessary (e.g., the UK drinking culture may make it difficult for people to reduce their alcohol consumption as this would involve drastic changes to the participants' social lives). Participants may have even practiced compensatory health behaviour change such as improving their health using other more tractable means (e.g., improving health by adjusting diet rather than reducing alcohol). The effect of self-affirmation on more tractable behaviours, such as reducing the consumption of high salt foods, and on health promoting behaviours, such as eating more fruit and vegetables, that may require less lifestyle change and physiological adaptation, have yet to be tested.

To summarise, the existing research highlighted some limitations of self-affirmation, in particular the lack of long term effects on health behaviour. Future studies need to consider the type of manipulation, the range of outcome measures, the content of the health message and the type of behaviour targeted.

Moderators of Self-Affirmation

Personal relevance. Self-Affirmation Theory implies that a central part of the self-concept must be threatened in order for self-affirmation to be effective; i.e., the threat must be perceived as personally relevant otherwise the need to protect self-integrity is not aroused. Empirical research supported this. For example, self-affirmation led to more open-mindedness about a counter-attitudinal message about US foreign policy only in those who held "being American" as central to their identity (Cohen et al., 2007) and self-affirmation attenuated preference for the pro-attitudinal candidate only in those who regarded the issue as highly important (Correll et al., 2004). With regards to health, it is easy to categorise some health risks as relevant or not relevant to the participant dependent upon that person's

current behaviour. For example, a health risk message regarding the negative health consequences of smoking would be personally relevant to a smoker but not to a non-smoker. For these types of health risks, self-affirmation studies regarding health correspond to the general self-affirmation literature. That is, self-affirmation seems to have no effect on those not at risk of the targeted health behaviour as non-caffeine drinkers who read an article about a caffeine related health risk were non-defensive and did not display an effect of self-affirmation (Sherman et al., 2000, Study 1). However, in health risk research, it may be problematic to label some health messages as relevant or non-relevant; for example, it is often difficult to judge exactly how relevant the health message is to a participant. For example, it is often not feasible, in an experimental study, to obtain detailed dietary records before providing a health message regarding diet.

Risk. Most studies had investigated risk as a moderator of the effects of self-affirmation on health outcomes rather than personal relevance per se. Risk was typically operationalised as a pre-manipulation report of the targeted behaviour. Fortunately, there is evidence that self-affirmation is most effective for those who are most at risk of the health threat. For example, high and moderate risk participants who self-affirmed reported greater personal relevance of the health risk information and intentions to reduce cigarette smoking (Harris et al., 2007) and high risk alcohol consumers reported an increase in acceptance of the health risk both for themselves and others, an improved ability to imagine themselves suffering the negative consequences of their unhealthy behaviour and increased intentions to reduce their alcohol consumption (Harris & Napper, 2005). However, self-affirmation had been shown to have a detrimental effect on those at low risk. For example, participants who drank a low level of alcohol reported lower vulnerability to diseases (such as skin

cancer and cardiovascular problems) that were not targeted by the health message nor related to alcohol consumption (Harris & Napper, 2005).

One interesting idea that requires further examination is the possibility that self-affirmation may also have detrimental consequences for those who experience a very high level of threat (this could be due to factors such as being at very high risk or even due to a vivid health message). For example, self-affirmed participants who had previous vicarious experience of breast cancer (i.e., had a friend or relative with breast cancer) reported maladaptive coping strategies such as avoidance (e.g., avoided thinking about breast cancer) and hopelessness (e.g., believed that there was no point in trying to stay healthy) after exposure to health-information designed to promote breast self-examination (Fry & Prentice-Dunn, 2005).

Defining level of risk can be problematic; for example, participants may be classified as at risk by the experimenter but participants may not perceive themselves as such, as perceived vulnerability to a health risk is subject to many factors (e.g., family history) in addition to level of risk behaviour. It is also important to note that the "high risk" groups in some studies were only high risk relative to the other participants and may not reflect high risk groups in the overall population. For example, the samples in Harris et al. (2007) and Dillard et al. (2005) smoked an average of 8.13 cigarettes and between 6 and 10 cigarettes per day, respectively, compared to the national average of 13 for women smokers and 15 for men smokers (National Statistics, 2006). The participants in the two aforementioned studies would be classified as "light smokers", i.e., smoking under 20 cigarettes per day (National Statistics, 2006), when compared to the overall UK population; therefore labelling a section of this sample as "high risk" could be inaccurate.

It is important to explore risk as a moderator in order to assess the potential of self-affirmation as a health intervention. If further research supports the premise that self-affirmation is most effective for those most at risk this would suggest the manipulation would be useful as a health intervention. However, if the manipulation does have a detrimental effect on those at low risk – or very high risk – then this would suggest that self-affirmation should only be used with carefully targeted populations. Furthermore, studies need to ensure that the risk level of the sample is comparable to the general population in order to more accurately establish at which level of risk self-affirmation would be beneficial.

Motivation. The literature regarding health and self-affirmation had not explored potential health-related moderators of self-affirmation. One potential moderator is generic health-related motivation (e.g., prevention regulatory focus, perceived importance of health) and risk specific health-related motivation (e.g., decisional balance, i.e., the ratio of pros and cons regarding a targeted behaviour). It is not clear whether people with high levels of motivation would benefit the most or least from self-affirmation. It could be argued that self-affirmation would be most effective among those who have high motivation to change their health behaviour or maintain their health. People who have "being healthy" as a central part of their self-concept are more likely to perceive the information as personally relevant and therefore suffer a self-integrity threat from the uncongenial health risk information and subsequently use the manipulation to restore their integrity and overcome their biases (see Cohen et al., 2007; Correll et al., 2004). However, with regards to health it is commonly assumed that most people regard the goal of "being healthy" as at least somewhat important (e.g., see Chaiken, Giner-Sorolla & Chen, 1996), so even those with a lower motivation to maintain their health would still find relevant

health information threatening to their self-integrity. Therefore, self-affirmation may not be as effective in those with high motivation as these people are more concerned with issues of health and may be less defensive when responding to health messages so they would not benefit as much from the self-affirmation manipulation as people with lower motivation. There is clearly a need to determine the effect self-affirmation has on populations that differ in motivation, in order to assess the feasibility and scope of using self-affirmation manipulations as a health intervention.

Mechanisms of Self-Affirmation

Self-affirmation manipulations had been successfully used over the last two decades to alleviate the detrimental effects of numerous and varied self-threats. However, the distal mechanisms (i.e., the resource that self-affirmation replenishes) behind the effect of self-affirmation manipulations had not been adequately explored or determined. Self-affirmation theorists allude to "self-affirmational resources" (e.g., Aronson, Blanton & Cooper, 1995 p. 987) but do not explain what these resources comprise. There were two main contenders proposed as an affirmational resource: State self-esteem (i.e., self-worth that is influenced by the current situation) and affect.

State self-esteem. Several studies have indicated that self-affirmation did not lead to an increase in state self-esteem measured before (Schmeichel & Martens, 2005) or after a self-threat (Harris & Napper, 2005; Koole & van Knippenberg, 2007; Kumashiro & Sedikides, 2005). However, it is too early to conclude that self-esteem resources do not underpin self-affirmation as collective self-esteem (i.e., worth related to an in-group) partially mediated the effect of self-affirmation on reducing group-serving judgements (Sherman & Kim, 2005), reading self-generated positive statements about the self twice daily increased self-esteem over a three-week period in students with low self-esteem

(Lange, Richard, Gest, de Vries & Lodder 1998) and there were self-esteem differences in participants who received negative or positive feedback (Fein & Spencer, 1997). However, the latter two studies were problematic. The affirmation manipulation used by Lange et al. (1998) was not comparable to those typically used in self-affirmation research; typical self-affirmations are ostensibly presented as tasks / surveys unrelated to the main study and therefore the effects are assumed to be unconscious (Sherman & Cohen, 2006). Lange et al. used a manipulation the purpose of which, to increase self-worth, was clearly evident. Fein and Spencer's (1997) study did not determine if affirming positive feedback led to an increase in self-esteem, as they did not include a comparison neutral control condition, therefore the effect could be due to a decrease in self-esteem in the negative feedback condition rather than increased self-esteem in the positive feedback condition.

Implicit state self-esteem (i.e., state self-esteem that the person may not be aware of) had also been proposed as an affirmational resource as higher implicit self-esteem (measured by comparing the participants' preference ratings of their initials to other letters of the alphabet) had been increased by self-affirmation (Boucher & Chen, 2007; Koole, Smeets, van Knippenberg & Dijksterhuis, 1999). However, this increase did not mediate the effect of self-affirmation on rumination about goal failure (Koole et al., 1999). These results suggested that self-esteem cannot be ruled out as an affirmational resource although the evidence for this is not strong, and other mediators may be more promising.

Affect. Affect had been more widely investigated as an affirmational resource than had self-esteem. However, self-affirmation seemed to have no effect on positive mood. Although an increase in positive mood had been found in two studies (Cohen et al., 2007, Study 3; Park, 2007) more studies found that self-affirmation did not affect mood either after a threat (Cohen et al., 2000, Study 3; Cohen et al., 2007, Studies 1 & 2; Creswell et

al., 2007; Dillard et al., 2005; Harris & Napper, 2005; Jacks and O'Brien, 2004; Koole & van Knippenberg, 2007; Kumashiro & Sedikides, 2005; Sherman et al., 2000; Shrira & Martin, 2005), before threat or when no threat is experienced (Brinol et al. , 2007; Blanton, Pelham, DeHart & Carvallo, 2001; Fein & Spencer, 1997; Klein, Blier & Janze, 2001; Lomore, Spencer & Holmes, 2007, Study 2; Steele & Liu, 1983). Furthermore, a positive mood manipulation did not have the same effect of reducing self-justifying rationalisation as that caused by positive feedback or an esteem-based affirmation (Steele et al., 1993).

The mixed results may have been due to the poor reliability of single measures that had been used in some studies (e.g., Cohen et al., 2000; Harris & Napper, 2005; Sherman et al., 2000) or due to confounding factors. Measures of affect had been typically taken after self-affirming and exposure to the threat; therefore the measure of affect was likely to provide ambiguous results that could reflect either (a) the inflated positive self-related affect that may have been derived from the self-affirmation, (b) elevated negative affect from acknowledgment of the threat or (c) a combination of both that may have cancelled out any effects. Surprisingly, there had been no reliable differences in affect between self-affirmed and control groups, even in the few published studies that avoided confounding the measure of positive affect from the self-affirmation manipulation with affect from a threat, by measuring affect prior to or without a threat (Blanton et al., 2001; Brinol et al., 2007, Study 3; Klein et al., 2001; Lomore et al., 2007; Napper et al., 2009; Steele & Liu, 1983).

One study had found that implicit affect (i.e., affect that the individual may not be aware of) was increased after a self-threat from a bogus intelligence test failure. Furthermore, this increase in implicit affect mediated the effect of self-affirmation on

reducing rumination about the failure (Koole et al., 1999). These results suggested that self-affirmation might be mediated by implicit but not explicit positive affect.

However, as self-affirmation manipulations focus attention on central aspects of the self (Napper et al., 2009) it could be argued that only positive self-related affect would be elevated after self-affirmation rather than general affect. Indeed, self-affirmation boosted self-reports of personal characteristics thought to the associated with self-integrity (e.g., useful, confident and successful; Steele & Liu, 1983) and increased confidence in the self (e.g., secure and confident; Brinol et al., 2007, Study 4). There had been mixed results from studies that measured positive self-related affect after a threat; however this could be easily explained. If self-affirmation does boost a positive affective resource, responding objectively to information that threatens self-integrity could deplete this resource and return it to the same level as the control group who have not received a resource boost. For example, self-affirmed and control groups did not differ in self-regard after a threatening health risk message (Dillard et al., 2005) or after a dissonance induction (Matz & Wood, 2005). However, self-affirming a central and salient value may provide greater resources than needed to offset the threat leading to increased positive affect in the self-affirmed condition. For example, self-affirmed participants reported greater positive feelings about the self after exposure to information regarding a personally relevant debate on abortion (Cohen et al., 2000) and after health risk information (Sherman et al., 2000).

In summary, the content of affirmational resources had not been adequately determined by existing research. However, to date evidence for affect, and the theoretical rationale for self-related affect in particular, seemed stronger than that supporting self-esteem and worthy of further investigation.

Directions for Research

There was a great deal of research on self-affirmation in the last two decades. However, there was relatively little research on the effect of self-affirmation manipulations on the acceptance of health risk information and health behaviour change. This was concerning because self-affirmation research in other areas may not be applicable to health psychology. For example, in some areas of social psychology it is desirable that self-affirmation reduces negative affect; e.g., after being treated unfairly (van den Bos, 2001) or after losing a sporting match (Sherman & Kim, 2005). However, in health studies it could be argued that it would be desirable if self-affirmation increased fear, worry and anxiety in order to motivate behavioural change (Harris & Napper, 2005). Therefore, there was a need for more research that was dedicated to the particular topic of self-affirmation and health.

The few published studies that applied Self-Affirmation Theory to health had produced promising effects in increasing perceptions of risk, intentions to follow the recommended behaviour and preparatory behaviours. However, to fully understand how self-affirmation changes intentions and promotes adaptive coping future studies need to measure a greater range of variables that have been theoretically proposed or empirically shown to influence health behaviour and to investigate the effect of these variables on health behaviour change.

The literature review identified several ways that the potential of self-affirmation manipulations to influence long term health behaviour may be maximised. First, the selected health risk should be personally relevant to the target population (i.e., a health risk behaviour that has been identified as prevalent in young adults). Second, the targeted behaviours should be expanded to include health promoting behaviours (such as fruit and vegetable consumption) and unhealthy behaviours that had thus far not been used (such as

high salt food consumption). Varying the targeted health risk behaviours would also provide information on the generalisability of the effects of self-affirmation. Third, the health risk message should include efficacy information in addition to threat information in order to maximise its impact on health protective behaviour. Finally, the self-affirmation manipulations used should be validated in order to maximise the success of the manipulation.

To assess the scope of self-affirmation as a potential health intervention the moderators of risk and motivation should also be explored. If self-affirmation manipulations are effective for those at risk (e.g., because of a high level of unhealthy behaviour), they could be suitable for use as a health intervention. Furthermore, research into moderators would help to determine in which circumstances self-affirmation interventions could be used. If self-affirmation manipulations have detrimental effects on particular populations, such as low risk populations, they could only be used as an intervention where careful targeting of the audience could be achieved (e.g., in smoking or weight loss clinics). However, if self-affirmation manipulations do not have detrimental effects for those who are at low risk or at a particular level of motivation then they could be suitable for use in mass media health campaigns.

The existing literature also indicated that the mechanisms of self-affirmation are under-researched; exploration of these mechanisms would have significant theoretical value beyond self-affirmation and health research. For instance, determining the distal mechanism (i.e., an affirmational resource) behind self-affirmation would extend theoretical knowledge about Self-Affirmation Theory and impact on other research areas that found self-affirmation manipulations reduce defensive biases. Affect seemed promising as the "affirmational resource"; the literature indicated that self-related affect rather than

general affect is more likely to mediate the effects of self-affirmation. Understanding how self-affirmation works may also help in the development of practical self-affirmation health interventions; for example, alternative interventions may be designed that are more easily administered than existing self-affirmation tasks.

Summary. The main purpose of the thesis was to explore the potential of self-affirmation manipulations for use as a health intervention. The studies targeted a variety health behaviours and risks that were relevant to young adults including the negative health consequences of high salt foods (Study 1), breast cancer from alcohol consumption (Studies 2 and 3), accidental injury from alcohol consumption (Study 3) and the health benefits of eating adequate fruit and vegetables (Study 4). A variety of cognitive predictors of health behaviour change were included in the studies: Risk-related cognitions (vulnerability and severity; all studies), efficacy cognitions (self and response-efficacy; all studies) and intentions (all studies). Affective predictors of health behaviour change were also explored: Explicit threat-related affect (e.g., fear; all studies), explicit response-related affect (e.g., enthusiasm regarding taking up the recommended responses; Studies 1, 2 and 3), implicit threat-related affect (e.g., implicitly measured fear; Study 2), implicit response-related affect (e.g., implicitly measured determination to take up the recommended responses; Study 2), and self-discrepancy related affect (e.g., dejection; Study 4).

The series of studies examined the moderating effect of explicitly (Study 1, Study 2) and implicitly measured (Study 4) motivation, operationalised as importance of health (Study 1), decisional balance (Study 2) and level of prevention focus (Study 4). The studies also examined the moderating effect of risk operationalised as current behaviour (all studies) and threat level of the health message (Study 3). Putative distal mediators including explicit self-related affect (Study 1), implicit self-related affect (Study 2) and proximal

mediators such as efficacy cognitions (Study 4) behind the effects of self-affirmation were also explored.

Overview of Thesis

Methodology. All the studies followed a similar procedure; changes to this procedure are detailed in the appropriate section of each study. Participants were tested in a private room and told that they were to complete a variety of tasks including a study on the communication and understanding of health information. Next, participants were interviewed about their current behaviour associated with the health risk message. Subsequently, participants were randomly assigned to either the self-affirmation manipulation or the control task by selecting the uppermost questionnaire pack from a stack that was compiled using random number tables. The experimenter and participant were blind to condition as the packs were seemingly identical in their appearance. The questionnaire was ostensibly presented as a colleague's pilot study. Participants were asked to read through the threat part and the response part of the health message; the time taken to read each part of the health message was recorded. Participants then completed a health questionnaire. Long term behaviour was measured using follow-up questionnaires.

Analytical strategy. Unless otherwise stated, the data from all the studies was analysed using a series of hierarchical (three-step) regressions to determine if there was a main effect of self-affirmation and which factors moderated these effects. Continuous moderators were mean-centred to aid interpretation. The main effects of condition (dummy coded), and the moderators were entered at step one; at step two the three two-way interactions were included. And finally, the three-way interaction was added at step three. Where significant interactions were found simple slopes were computed at three levels of the continuous moderator: low (1 SD below the mean), moderate (the mean) and high (1

SD above the mean) (Aiken & West, 1991). Only significant main effects and interactions (and marginally significant main effects and interactions) are reported in this thesis.

CHAPTER TWO

Study 1

Self-Affirmation and Health Behaviour Change: Explicit Self-Related Affect as a Mediator; Risk and Motivation (Health Importance) as Moderators

At the time of conducting Study 1, there were few published self-affirmation studies regarding health so the potential of self-affirmation manipulations to influence predictors of health behaviour change and actual behaviour change had not been fully explored. There was a need to investigate the effect of self-affirmation on a greater range of outcome variables, extend the number of health behaviours targeted and explore moderators and mechanisms of self-affirmation. Study 1 explored a range of constructs that had thus far been under-researched. The purposes of Study 1 were to determine (a) whether self-affirmation affects predictors of health behaviour change, such as efficacy cognitions, threat- and response-related affect, (b) whether self-affirmation can influence long term health behaviour by promoting adoption of the recommended or compensatory health behaviour (i.e., improving health using a different means to the one recommended), (c) whether these effects were moderated by risk and importance of health and (d) whether self-related affect was the resource that underpins the effects of self-affirmation.

Self-Affirmation and Cognitive Predictors of Health Behaviour Change

The published studies had almost exclusively targeted risk-related cognition, such as general message acceptance and vulnerability. The influence of self-affirmation on coping appraisals, such as response- and self-efficacy had not been extensively tested. This was despite the theoretical rationale provided by the health behaviour change literature, that

coping appraisals also impact on the motivation to adopt the recommendations of the health message and subsequent behaviour (Rogers, 1983).

Health behaviour models, such as Protection Motivation Theory (PMT, Rogers, 1983), characterise the evaluation of health information as a two-process appraisal; that is, the threat appraisal and the coping appraisal. The threat appraisal involves evaluating the information in terms of severity of the consequences of the risk behaviour and personal vulnerability to these consequences. The self-affirmation research to date had used health messages that focused on threat and had found that self-affirming impacted on message acceptance by increasing the belief that the health risk is genuine (Harris et al., 2007; Harris & Napper, 2005; Sherman et al., 2000, Study 1) and increasing perceptions of personal vulnerability to the risk (Sherman et al., 2000, Study 2). According to the PMT, the coping appraisal comprises an evaluation of the effectiveness of the recommended preventive response at reducing personal risk and the individual's belief that they can effectively carry out this behaviour. The combined results of the two processes impact on protection motivation, with greater acceptance of severity, personal vulnerability, response- and self-efficacy leading to greater intentions to adopt the recommended behaviour (Rogers, 1983).

As mentioned in Chapter 1, self-affirmation manipulations had resulted in increased self-efficacy for reducing caffeine intake (Reed & Aspinwall, 1998) and for reducing cigarette smoking (Harris et al., 2007). Fry and Prentice-Dunn's (2005) study was the only published study that had examined the effect of self-affirmation on response-efficacy. Fry and Prentice-Dunn found that self-affirmation did not influence the perceived efficacy of breast self-examination for reducing the risk of breast cancer although it did interact with the provision of coping information (including response-efficacy information). Unfortunately, Fry & Prentice-Dunn did not report the direction of this effect; self-

affirmation may have increased or decreased response-efficacy in the presence of coping information. However, the effect of self-affirmation on in-situ preparatory behaviours (e.g., taking information leaflets and purchasing condoms, Sherman et al., 2000, Study 2), suggests that adequate response-efficacy can be elicited with self-affirmation.

Self-affirmation may influence efficacy variables because it allows open-mindedness, thereby permitting a more objective view of the effectiveness of the preventive response and one's ability to adopt this. For example, non-health related self-affirmation studies have shown evidence that self-affirmation prior to an intelligence test eliminated the pessimistic expectation of low scores that is typically exhibited by those with low self-esteem (Spencer et al., 2001).

Self-Affirmation and Affective Predictors of Health Behaviour Change

Self-affirmation studies regarding health had also largely neglected affective predictors of health behaviour change. Affect relating to the actual threat (e.g., fear from acknowledging the risk to health) may be influenced by self-affirmation. According to some health models (e.g., Parallel Process Model - PPM; Leventhal, 1970; EPPM, Witte 1992), fear is a pivotal emotion in determining health behaviour after reading health risk information. If fear is not present, the message is seen as irrelevant and not acted upon; if fear is present, it can act as further motivation that encourages eventual behavioural change (Witte, 1992). Worry is also a measure of threat-related affect; it differs from fear as it has a cognitive component in addition to the affective aspect. Worry can motivate health behaviour as the content of the worrisome cognition can add to the list of reasons to address the health issue, the intrusive nature of worry keeps the health issue salient and behavioural change is motivated in order to remove the negative effect of worrying (McCaul & Mullens, 2003).

PPM and EPPM would predict that self-affirmed participants experience more negative threat-related affect than non-affirmed participants, as threat-related affect is a precursor to elevated vulnerability, increased intentions and preparatory behaviours that have been displayed by self-affirmed participants. Indeed, self-affirmation has been associated with increased threat-related affect (a composite measure of fear, worry and anxiety) in an empirical study; self-affirmed participants with the highest alcohol consumption (i.e., consuming over 14 units per week) reported higher levels of threat-related affect in response to an article detailing the health risks of excessive alcohol consumption (Harris & Napper, 2005).

Negative self-evaluative affect may also be affected by self-affirmation. Dijkstra and Buunk (2008) postulate that risk and response-efficacy perceptions represent a threat to the self (as per Self-Affirmation Theory) but it is the negative self-evaluative affect evoked through accepting the risk that motivates health behaviour change. Indeed, a high level of negative self-evaluative affect predicted acceptance of the negative physical and social consequences of smoking and actual quitting behaviour (Dijkstra & Buunk, 2008).

As mentioned in Chapter 1 the relationship between threat and intentions after self-affirmation may not be straightforward. Harris et al. (2007) showed that ratings of threat and unpleasantness of pictorial anti-smoking warnings had a lesser effect on intentions in the self-affirmed condition than in the control condition (Harris et al. 2007). Taken together with the finding that intentions to reduce cigarette smoking were higher in the self-affirmed condition this suggested that a variable other than threat-related cognitions and threat-related negative affect influenced intentions. One alternative variable might be affective attitudes. Conner and Sparks' (2005) Two-Component Model of the Theory of Planned Behaviour proposed that affective attitudes toward the behaviour could predict intentions to

change behaviour. Indeed how pleasant, enjoyable and fun participants regarded exercise predicted their exercise intentions (Courneya, Conner & Rhodes, 2006). In the Harris et al. study (2007), self-affirmed participants may have felt more positively about reducing their smoking and this may have influenced their intentions rather than the level of reported threat. Response-related affect had thus far not been investigated in self-affirmation studies regarding health.

A methodological consideration, mentioned in Chapter 1, was that measures of threat-related affect were typically taken after participants had read both the threat and response component of the health message. This may not have given an accurate measure of threat elicited by the threat message as the threat may be reduced by exposure to reassuring action recommendations (Das, de Wit & Stroebe, 2003) or through the defensive rejection and control of threat-related affect (Leventhal, 1970; Witte, 1992). A more accurate measure of threat-related affect could be obtained by measuring threat-related affect immediately after the threat component of the health message.

Long Term Behaviour Change

To date, self-affirmation studies had been unsuccessful at changing actual health behaviour despite changes in risk-related cognitions (Harris et al., 2007; Harris & Napper, 2005; Reed & Aspinwall, 1998; Sherman et al., 2000), intentions (Harris et al., 2007) and in situ preparatory behaviour (Sherman et al., 2000, Study 2). As argued above, this may be due to the health messages emphasising vulnerability rather than boosting response and self-efficacy. That is, the participants could accept that they are at risk but if the health risk message does not include sound strategies they may be uncertain of how to address the risk and so be incapable of realising their intentions. It is also possible that self-affirmed participants who do not follow through on their intentions may perform an alternative

compensatory health behaviour, i.e., adjust another behaviour in order to improve their health. Kruglanski et al.'s (2002) model of goal systems postulated a hierarchy of goals with each major goal constructed of sub-goals with various means of attaining each. Participants, when attending to a health message, may activate a more general health-related goal or sub-goal. For example, the participant may pursue the sub-goal of improving diet using the means targeted in the health message (e.g., reduce salt intake by avoiding salty foods) or through improving diet through an alternative means (e.g., eating more fruit and vegetables). This compensatory health behaviour may occur because the chosen means are more associated with the goal or perceived as easier to attain.

Furthermore, Action Identification Theory (AIT; Vallacher & Wegner, 1987) suggests a reason why self-affirmation may activate goals that are more abstract. AIT stated that actions can be identified at different levels of abstraction from concrete goals, such as "eat banana", to more abstract goals, such as "maintain health". Self-affirmation may result in high levels of identification (e.g., the goal of maintaining health or improving diet) as these abstract goals are regarded as more self-defining than are lower levels of identification (e.g., eating low salt foods). Priming the self through self-affirmation could increase the likelihood that self-defining, abstract goals are activated. Previous studies had only measured the targeted behaviour at follow-up and had not looked at abstract goals, such as overall diet improvement. Study 1 implicitly offered participants an opportunity to take up an alternative means of improving their diet by inviting them to take part in a study regarding fruit and vegetable consumption.[1]

[1] Only one compensatory health behaviour was measured due to time constraints.

Motivation as a Moderator

In order to explore the potential of self-affirmation as a health intervention it is necessary to find factors that may moderate its effectiveness. As mentioned in Chapter 1 it is not clear whether the effects of self-affirmation depend upon the participants' level of motivation. This is an important issue because if self-affirmation were not effective for particular populations then this would limit its scope as an intervention. The present study examined health-related motivation, operationalised as health importance, as a moderator. The assumption made was that those who regard their health as most important were more likely to have high motivation to change their health behaviour when confronted with health risk information in comparison to those who regarded their health as less important.

Self-Related Affect as a Mediator

Chapter 1 discussed that self-affirmation studies had been unable to adequately determine if affect was the mechanism behind the effects of self-affirmation but suggested that self-related affect (rather than general affect) was a potential mediator. The limitations of previous studies (e.g., use of single measures, confounds from a threat) are addressed in Study 1.

The Current Study

Study 1 used a health message regarding the negative health consequences of eating high salt foods that had not previously been targeted in the literature regarding self-affirmation and health; this was in order to expand the list of behaviours that self-affirmation can be generalised to. A variety of outcome variables such as efficacy cognitions, threat- and response-related affect and compensatory health behaviours were included to explore the range of constructs that may be influenced by self-affirmation manipulations. The health message was broken down into threat and response components

so that threat- and response-related affect could be measured after the corresponding component to avoid confounds. Risk and importance of health were explored as moderators of self-affirmation on cognitive, affective and behavioural responses. Study 1 also examined a putative mechanism of self-affirmation, self-related affect. Self-related affect was measured immediately after the self-affirmation manipulation in order to prevent the confounding effects of the health message on this variable.

The hypotheses were that, in comparison to the control condition, self-affirmed participants would:

1. Show (a) an elevation in cognitive and affective predictors of health behaviour and (b) either a decrease in salt consumption at follow-up or a compensatory increase in fruit and vegetable consumption; and the effects of self-affirmation on these measures would be moderated by risk and importance of health.
2. Report greater self-related affect that would mediate the effect of self-affirmation on health cognitions, affect and behaviour.

Methods

Participants

Eighty-five undergraduates (age M = 18.92; range = 18 to 23 years, N = 72 females) were recruited for a study regarding the communication and understanding of health information. Participants received course credit for their time. The mean frequency of high salt foods consumed per week was 28.67 items.

Materials

Pre-test interview. Participants were asked to state how many times per week they ate a range of 23 foods identified as having a high salt content (e.g., cooking sauces, bacon; Food Standards Agency - FSA, 2007a), how often they added salt to a meal, how often they

ate restaurant and take-away food and if they monitored their salt intake. The interview also included an item, on a 5-point scale: "How important is health to you?" (*1 = not at all important, 2 = not very important, 3 = somewhat important, 4 = very important, 5 = extremely important*). In order to emphasise their risk, all participants were told during the interview phase that the foods listed and restaurant and take-away food were high in salt content. An electronic version of these questions formed the follow-up questionnaire.

Self-affirmation manipulation. Following Napper et al. (2009) participants were given 30 desirable self-statements (e.g., "I treat all people equally regardless of who they might be") and asked to indicate the extent to which the statement described themselves on 5-point scales (*1 = very much unlike me, 2 = unlike me, 3 = neutral, 4 = like me, 5 = very much like me*; see Appendix 1). Participants in the control group were asked to indicate the extent to which the same statements applied to a well-known celebrity (in this case, David Beckham).

Health message. The health message (see Appendix 2) targeted the consumption of high salt foods as the population, from which the sample was taken, were on average exceeding the national guidelines of 6g per day. Specifically, 19-24 year old men consumed on average 11g and women 9.1g of salt per day (FSA, 2004). The threat components of the health message, "Salt and High Blood Pressure" and "Salt and Heart Disease" described the increase in the risk of high blood pressure and the subsequent increased risk of heart disease from eating high levels of salt. The article was mainly based on information taken from the websites of the UK Food Standards Agency (2007b; 2007c) and the charity, Consensus Action on Salt and Health (CASH, 2007a). The response component of the message contained the recommendation of eating no more than 6g of salt per day (CASH, 2007b; FSA, 2007d), details of a successful salt monitoring intervention study (CASH,

2007a) and a list of strategies to sensibly manage and monitor salt consumption including how to reduce salt intake when eating out (FSA, 2007d; 2007e).

Self-related affect. Self-related affect (see Appendix 3 for a full list of dependent variables) was measured by asking participants to rate the extent to which each of 8 adjectives applied to their "feelings right now" on a 5-point scale (*1 = very slightly / not at all, 2 = a little, 3 = moderately, 4 = quite a bit, 5 = extremely*); the adjectives were selected from the PANAS-X guilt (e.g., angry at self) and self-assurance scales (e.g., proud; Watson & Clark, 1994). The negatively valenced items were recoded and the items were combined into one scale (Cronbach's alpha = .81).

Threat-related affect. Threat-related affect was measured using an abridged fear scale (adapted from Witte, 2007). The scale consisted of 4 questions (Cronbach's alpha = .90); e.g., "How much did this message make you feel frightened?" measured on a 4-point scale (*1 = not at all, 2 = a little, 3 = rather much, 4 = very much*). Explicit negative self-evaluative affect related to the threat was measured using 4 items (Cronbach's alpha = .88); e.g., "When thinking about your salt consumption to what extent do you feel dissatisfied with yourself?" (Dijkstra & Dijker, 2005) measured on 5-point scales (*1 = very slightly / not at all, 2 = a little, 3 = moderately, 4 = quite a bit, 5 = extremely*). Worry was measured using 4 items (Cronbach's alpha = .88); e.g., "I worry about my health because of my salt consumption" (Dijkstra & Brosschot, 2003) measured on 7-point scales (*1-7, not at all – very much*).

Response-related affect. Response-related affect (i.e., affective attitudes) was measured using 4 semantic differential items (Cronbach's alpha = .80; Courneya et al., 2006); e.g., "For me, reducing my salt consumption over the next 7 days would be *unenjoyable - enjoyable*" on 7-point scales. Three additional positive response-related

emotion questions asked participants to rate on 5-point scales how they felt about taking up the recommended response (Cronbach's alpha = .81) using affective adjectives from the PANAS-X and synonyms selected from the thesaurus; e.g., "enthusiastic" (*1 = very slightly / not at all, 2 = a little, 3 = moderately, 4 = quite a bit, 5 = extremely*). Self-evaluative negative affect related to the response (Dijkstra & Dijker, 2005) was measured using 6 items (Cronbach's alpha = .92); e.g., "If I do not reduce my salt intake I would feel regretful", measured on 5-point scales (*1 = very slightly / not at all, 2 = a little, 3 = moderately, 4 = quite a bit, 5 = extremely*).

Health questionnaire. The health questionnaire included items to measure threat and efficacy components from PMT (Rogers, 1983), all items were on 7-point scales. Vulnerability was measured with 2 items ($r(83) = .74, p < .001$); e.g., "How likely do you think YOU will be to experience high blood pressure, in the future as a result of your current salt consumption?" (*not at all likely – extremely likely*) (adapted from Harris & Napper, 2005). Severity was measured by 1 item: "In your opinion, how severe is high blood pressure" (*not at all severe – extremely severe*).

Response-efficacy was measured using 2 items; e.g., "Reducing my salt consumption will reduce my chances of developing high blood pressure" (the items were analysed separately due to a low correlation). Two self-efficacy items were included ($r(83) = .58, p < .001$); e.g., "It would be easy for me to reduce my salt consumption in the next seven days" (*strongly disagree – strongly agree*) (adapted from Milne, Orbell & Sheeran, 2002). Intentions were measured using 2 items ($r(83) = .73, p < .001$); e.g., "I intend to cut down on the amount of salt I eat in the next seven days" (*strongly disagree – strongly agree*; adapted from Harris & Napper, 2005).

Fruit and vegetable interview and follow-up. In a second interview, participants were asked to list everything that they had eaten the previous day. The participants were also asked to estimate the number of servings of fruit and vegetables they usually ate each day, whether the number of servings of fruit and vegetables they ate the previous day was typical and if not how it differed from usual. The number of fruit and vegetable portions were recorded (using colour photographs to accurately assess portion sizes, as recommended by Cade, Thompson, Burley & Warm, 2002). For the purposes of follow-up, participants were instructed to keep a record of the number of portions of fruit and vegetables eaten in the 7 days after the manipulation and the ways in which they were eaten, e.g., 'fruit as a starter' (Cox et al., 1997), and were provided with comprehensive information on portion sizes including colour photographs of small, medium and large portions.

Procedure

The procedure was as detailed in Chapter 1. However, participants completed self-related affect measures directly after the self-affirmation manipulation, the threat-related affect measures directly after reading the threat part of the health message, and then the response-related affect measures and the health questionnaire immediately after reading the response part of the health message. Seven days after attending the laboratory participants were e-mailed the salt consumption follow-up questionnaire.

After participants had completed the salt study they were asked, by the undergraduate experimenter, to take part in an ostensibly unrelated second study that the experimenter's supervisor was running. A second experimenter interviewed the participants regarding their consumption of fruit and vegetables over the previous 24 hours and asked

them to keep and return a diary of their fruit and vegetable consumption over the following week.

Results

Manipulation Check

Previous studies had used self-affirmation manipulations such as the Allport-Vernon-Lindzey value scales to create low and high states of self-affirmation. The scales were constructed to allow participants in the high affirmation condition the opportunity to reflect on important values several times whereas participants in the low affirmation condition have far fewer opportunities to do this (Allport, Vernon & Linzey, 1960). In relation to the Study 1, this suggests that insufficient affirmation may occur in participants who agree that only a few of the desirable self-statements presented in the manipulation were "very much like me" or "like me". Therefore, participants who had indicated that at least 40% of the desirable self-statements were "very much like me" or "like me" were assumed to be self-affirmed. Two participants were removed from the sample, as they had not reached the criteria; 95% of the experimental condition ($N = 43$) were considered to be self-affirmed.

Randomisation Check

The 2 conditions did not differ in sex, $\chi^2(1, N = 83) = 2.05, p = .448$, accommodation type ("living with parents" and "catered halls" were collapsed into one category due to a small number of participants in the "living with parents" category), $\chi^2(1, N = 83) = 2.61, p = .082$, or age, $F(1,81) < 1$. The conditions also did not differ in baseline number of high salt foods consumed, $F(1,81) = 1.11, p = .295$, frequency of eating restaurant and take-away food, $F(1,81) < 1$, frequency of adding salt to meals (adding salt "regularly" and "every meal" were collapsed into one category due to a small number of

participants in the "every meal" category), $\chi^2(1, N = 83) = 1.93, p = .454$, or monitoring salt intake, $\chi^2(1, N = 83) = .07, p = .555$. The conditions did not differ in the importance of health, $F(1,81) = 2.55, p = .114$. There were no differences between conditions in agreement to participate in the fruit and vegetable study, $\chi^2(1, N = 66) = .01, p = 1.00$, return of the fruit and vegetable diaries, $\chi^2(1, N = 62) = .02, p = 1.00$, and completion of the follow-up salt consumption questionnaire, $\chi^2(1, N = 66) = .20, p = .424$. The sample appeared to be randomised on the above measures (see Table 1).

Table 1. *Baseline Characteristics of the Sample*

Variable		Non-affirmed ($n = 43$)[a]	Self-affirmed ($n = 40$)[b]	Full sample ($N = 83$)
Age	*M*	18.88	18.95	18.92
	SD	1.12	1.08	1.10
High salt foods consumed	*M*	27.56	29.88	28.67
	SD	8.95	11.04	10.01
Restaurant and take-away food	*M*	2.19	2.04	2.21
	SD	1.23	1.49	1.37
Health importance	*M*	3.95	3.70	3.83
	SD	.72	.72	.73
Fruit & vegetables consumed	*M*	4.66	3.67	4.18
	SD	2.42	1.91	2.23
Fruit & vegetable estimate	*M*	3.55	2.62	3.10
	SD	1.29	1.32	1.38
Accommodation	*Catered / parents*	13	19	32
	Self-catered	30	21	51
Sex	*Male*	5	6	11
	Female	38	34	72
Monitor salt	*Yes*	4	3	7
	No	39	36	75
Adding salt	*Never*	17	15	32
	Rarely	18	16	34
	Regularly / every meal	8	9	17

[a] $n = 32$, [b] $n = 30$ for fruit and vegetables consumed & estimate

The conditions did differ significantly in their estimates of fruit and vegetable consumption, $F(1,60) = 7.88, p = .007$, and this approached significance in their reported fruit and vegetable consumption, $F(1,60) = 3.21, p = .078$; the 2 measures correlated significantly, $r(60) = .56, p < .001$, so were combined into a single fruit and vegetable consumption measure (level of fruit and vegetable consumption was controlled for in the

relevant analysis). The groups did not differ in the typicality of their fruit and vegetable consumption, $\chi^2(1, N = 60) = .35, p = .372$. An analysis was not possible for why their consumption was not typical due to the low numbers of participants ($N = 2$) who reported they usually ate less.

Affective Predictors of Health Behaviour Change

A series of three-step regressions were conducted to determine if self-affirmation led to an increase in threat- and response-related affect (see Table 2) and if these were moderated by risk (i.e., frequency of high salt food consumption taken at baseline) and importance of health (see Table 3).

There was a main effect of condition on self-evaluative negative emotions regarding the threat, $\beta = .24, p = .038$; the self-affirmed condition reported that they felt more negatively about themselves due to their consumption of salty foods than the non-affirmed condition. There were no other main effects of condition on affective predictors of health behaviour change. There were main effects of risk on affective attitudes, $\beta = -.52, p = .012$; high risk participants reported that reducing their salt intake would be less positive compared to low risk participants.

Table 2. *Mean Responses to Affective Predictors of Health Behaviour Change*

Dependent variable		Non-affirmed ($n = 43$)	Self-affirmed ($n = 40$)	Full sample ($N = 83$)	Effect size *d*
Threat-related affect					
Fear	*M*	2.12	2.10	2.11	-.03
	SD	.72	.72	.72	
Worry	*M*	3.16	3.39	3.27	.16
	SD	1.24	1.27	1.25	
Self-evaluative related to the threat	*M*	1.83	2.31	2.06	.59
	SD	.81	1.02	.94	
Response-related affect					
Affective attitudes	*M*	3.90	3.74	3.82	-.15
	SD	1.04	.91	.98	
Affective adjectives	*M*	2.91	2.83	2.87	-.11
	SD	.73	.83	.78	
Self-evaluative related to response	*M*	2.02	2.23	2.12	.25
	SD	.84	.99	.92	

Table 3. *Summary of Moderated Regression Analyses for Condition x Risk x Health Importance to Predict Affective Predictors of Health Behaviour Change*

Variable	Step	Variable entered	β			R^2	Model F	R^2 Change	F Change
			Step 1	Step 2	Step 3				
Fear	1	Risk	-.02	.03	.03				
		Importance	-.13	-.24	-.28				
		Cond	-.03	-.01	-.01	.02	.44		
	2	Cond x Importance		.15	.17				
		Cond x Risk		-.04	-.05				
		Importance x Risk		-.18	-.31	.05	.70	.04	.96
	3	Cond x Imp x Risk			.16	.06	.67	.01	.48
Worry	1	Risk	.05	-.23	-.22				
		Importance	-.01	-.09	-.18				
		Cond	.09	.08	.08	.01	.29		
	2	Cond x Importance		.08	.14				
		Cond x Risk		.34	.30				
		Importance x Risk		.03	-.30	.06	.87	.05	1.44
	3	Cond x Imp x Risk			.39	.10	1.22	.04	3.19
Self-evaluative negative affect related to the threat	1	Risk	.08	.09	.09				
		Importance	-.13	-.17	-.13				
		Cond	.23*	.24*	.24*	.09	2.57†		
	2	Cond x Importance		.04	.02				
		Cond x Risk		.01	.02				
		Importance x Risk		-.09	.04	.10	1.34	.01	.19
	3	Cond x Imp x Risk			-.15	.10	1.21	.01	.45

Variable	Step	Variable entered	β			R^2	Model F	R^2 Change	F Change
			Step 1	Step 2	Step 3				
Response-related (affective attitudes)	1	Risk	-.24*	-.43*	-.43*				
		Importance	.21	.25	.26				
		Cond	-.02	-.01	-.01	.10	2.90*		
	2	Cond x Importance		-.12	-.13				
		Cond x Risk		.31	.31				
		Importance x Risk		-.13	-.08	.15	2.29*	.05	1.62
	3	Cond x Imp x Risk			-.06	.15	1.95	.00	.09
Response-related (affective adjectives)	1	Risk	-.03	-.31	-.31				
		Importance	.11	.12	.11				
		Cond	-.04	-.03	-.03	.02	.44		
	2	Cond x Importance		-.08	-.07				
		Cond x Risk		.40*	.39*				
		Importance x Risk		-.05	-.09	.08	1.10	.06	1.75
	3	Cond x Imp x Risk			.05	.08	.94	.00	.05
Self-evaluative negative affect related to the response	1	Risk	-.01	-.16	-.16				
		Importance	-.02	-.12	-.12				
		Cond	.12	.15	.15	.01	.38		
	2	Cond x Importance		.05	.06				
		Cond x Risk		.27	.27				
		Importance x Risk		-.29*	-.31	.10	1.47	.09	2.53
	3	Cond x Imp x Risk			.03	.10	1.24	.00	.02

*† p = .06, p < .05

Cognitive Predictors of Health Behaviour Change and Behaviour at Follow-up

The analyses were repeated to determine if the self-affirmation manipulation successfully promoted increases in risk-related cognitions and an improvement in diet at follow-up (see Table 4) and if this was moderated by risk level (i.e., frequency of high salt food consumption taken at baseline) and importance of health (see Table 5). Baseline frequency of eating restaurant and take-away food and fruit and vegetable consumption were controlled for by addition at step 1 in the relevant analyses.

There were no main effects of condition on cognitive predictors of health behaviour change or actual health behaviour change. There were main effects of risk on severity, $\beta = -.45$, $p = .007$, self-efficacy, $\beta = -.44$, $p = .008$, and frequency of eating restaurant and take-away food at follow-up, $\beta = .65$, $p = .007$. Higher risk was linked to lower reports of severity and self-efficacy and more frequent eating restaurant and take-away food at follow-up.

Table 4. *Mean Responses to Cognitive Predictors of Health Behaviour Change and Behaviour at Follow-up*

Dependent variable		Non-affirmed (n = 43)[a]	Self-affirmed (n = 40)[b]	Full sample (N = 83)	Effect Size d
Vulnerability	*M*	3.45	3.81	3.63	..30
	SD	1.19	1.28	1.24	
Severity	*M*	5.72	5.80	5.76	.05
	SD	1.62	.85	1.30	
Self-efficacy	*M*	5.03	4.48	4.77	-.38
	SD	1.43	1.26	1.37	
Response-efficacy 1	*M*	6.14	6.03	6.08	-.07
	SD	1.47	1.07	1.29	
Response-efficacy 2	*M*	5.98	5.53	5.76	-.39
	SD	1.16	1.57	1.38	
Intentions	*M*	4.52	4.61	4.57	..07
	SD	1.25	1.29	1.26	
High salt foods consumed	*M*	17.50	19.43	18.41	1.65
	SD	1.17	1.28	6.06	
Restaurant & take-away food	*M*	2.42	2.47	2.44	.03
	SD	1.85	1.50	1.68	
Monitor salt	*Yes*	5	4	9	
	No	21	19	40	
Adding salt	*Never*	15	11	26	
	Rarely	9	9	18	
	Regularly / every meal	2	3	4	
Fruit & vegetable consumption	*M*	4.01	3.33	3.68	-2.52
	SD	.27	.27	1.38	

[a] n = 22 for salt consumption follow ups, n = 26 for fruit and vegetable consumption follow up
[b] n = 19 for salt consumption follow ups, n = 24 for fruit and vegetable consumption follow up

Table 5. *Summary of Moderated Regression Analyses for Condition x Risk x Health Importance to Predict Cognitive Predictors of Health Behaviour Change and Behaviour at Follow-up*

Variable	Step	Variable entered	β			R^2	Model F	R^2 Change	F Change
			Step 1	Step 2	Step 3				
Vulnerability	1	Risk	.07	.12	.11				
		Importance	-.16	-.14	-.07				
		Cond	.11	.11	.11	.05	1.40		
	2	Cond x Importance		-.02	-.08				
		Cond x Risk		-.04	-.02				
		Importance x Risk		-.02	.27	.05	.70	.00	.05
	3	Cond x Imp x Risk			-.32	.08	.95	.03	2.39
Severity	1	Risk	-.23*	-.45**	-.45**				
		Importance	.17	.30	.20				
		Cond	.09	.08	.08	.08	2.24		
	2	Cond x Importance		-.23	-.16				
		Cond x Risk		.32	.29				
		Importance x Risk		.02	-.37	.14	2.13	.07	1.94
	3	Cond x Imp x Risk			.46*	.20	2.62*	.05	4.87*
Self-efficacy	1	Risk	-.24*	-.44**	-.44**				
		Importance	.24*	.12	.18				
		Cond	-.14	-.12	-.12	.15	4.56**		
	2	Cond x Importance		.11	.07				
		Cond x Risk		.27	.29				
		Importance x Risk		-.12	.13	.19	2.95*	.04	1.29
	3	Cond x Imp x Risk			-.29	.21	2.84*	.02	1.96

Variable	Step	Variable entered	β			R^2	Model F	R^2 Change	F Change
			Step 1	Step 2	Step 3				
Response-efficacy 1	1	Risk	-.07	-.13	-.13				
		Importance	-.14	-.01	-.08				
		Cond	-.06	-.07	-.07	.03	.68		
	2	Cond x Importance		-.18	-.13				
		Cond x Risk		.09	.07				
		Importance x Risk		.07	-.20	.05	.62	.02	.58
	3	Cond x Imp x Risk			.31	.07	.81	.02	1.91
Response-efficacy 2	1	Risk	-.03	.09	.09				
		Importance	-.10	.04	.07				
		Cond	-.18	-.21	-.21	.04	1.00		
	2	Cond x Importance		-.13	-.16				
		Cond x Risk		-.19	-.18				
		Importance x Risk		.22	.34	.09	1.26	.05	1.49
	3	Cond x Imp x Risk			-.14	.10	1.13	.01	.43
Intentions	1	Risk	-.17	-.12	-.12				
		Importance	.06	-.03	.02				
		Cond	.07	.07	.07	.03	.83		
	2	Cond x Importance		.13	.10				
		Cond x Risk		-.08	-.06				
		Importance x Risk		-.01	.18	.04	.54	.01	.28
	3	Cond x Imp x Risk			-.23	.05	.61	.01	.101

Variable	Step	Variable entered	β			R^2	Model F	R^2 Change	F Change
			Step 1	Step 2	Step 3				
Consumption (at one week)	1	Risk	.39**	.41	.40				
		Importance	.11	.17	.16				
		Cond	.15	.18	.18	.19	3.56*		
	2	Cond x Importance		-.13	-.13				
		Cond x Risk		.09	.09				
		Importance x Risk		-.21	-.25	.24	2.25	.05	.95
	3	Cond x Imp x Risk			.04	.24	1.88	.00	.02
Restaurant and take-away food	2	Risk	.15	.65**	.65**				
		Importance	-.10	-.04	-.06				
		Cond	.01	-.03	-.03	.36	6.11***		
	3	Cond x Importance		.01	.02				
		Cond x Risk		-.68**	-.68**				
		Importance x Risk		.11	.06	.46	5.07***	.11	2.73†
	4	Cond x Imp x Risk			.06	.47	4.34***	.00	.06
Compensatory health behaviour	2	Risk	.21	.08	.07				
		Importance	.05	.02	.03				
		Cond	-.09	-.16	-.11	.49	10.71***		
	3	Cond x Importance		-.01	-.01				
		Cond x Risk		.23	.24				
		Importance x Risk		-.05	-.05	.51	6.27***	.02	.67
	4	Cond x Imp x Risk			-.01	.51	5.35***	.00	.00

† $p = .056$, *$p < .05$, ** $p < .01$, ***$p < .001$

There was a significant interaction between condition and risk on eating restaurant and take-away food at follow-up, $\beta = -.68$, $p = .008$ (see Figure 1). Simple slopes revealed that condition had a negative effect on frequency of eating restaurant and take-away food at low risk, $\beta = .27$, $p = .228$; i.e., the low risk self-affirmed group reported they ate restaurant and take-away food more frequently than the low risk non-affirmed group. There was a positive effect at high levels of risk, $\beta = -.18$, $p = .431$; the high risk self-affirmed participants reported less frequent consumption of restaurant and take away food than the high risk non-affirmed group. There was no effect at moderate risk, $\beta = .05$, $p = .764$. However, none of the Beta weights attained significance.

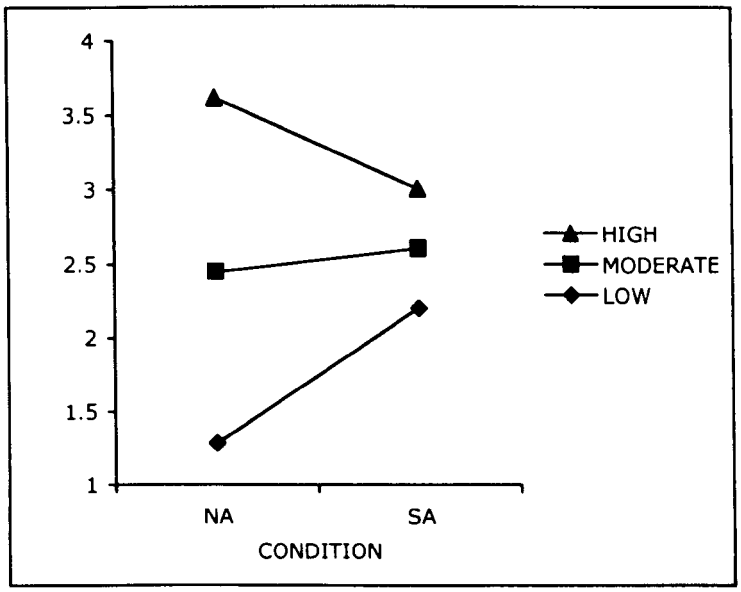

Figure 1. The effect of self-affirmation on frequency of eating restaurant and take-away food at follow-up as a function of risk: Simple slopes at three levels of risk.

There was a significant three-way interaction between condition, importance of health and risk on severity, $\beta = .46$, $p = .030$. Simple slopes examining the interaction of condition and importance were conducted for high, moderate and low risk (determined by a tertile split). For low risk, simple slopes revealed that self-affirmation did not have a

significant effect on severity at low, $\beta = .01$, $p = .984$, moderate, $\beta = .03$, $p = .937$, or high, $\beta = .05$, $p = .935$, importance of health (see Figure 2). For moderate risk, simple slopes revealed that self-affirmation increased perceptions of severity at low, $\beta = .42$, $p = .214$, and moderate, $\beta = .19$, $p = .483$, importance of health. There was no effect at high importance of health, $\beta = -.06$, $p = .912$ (see Figure 3). For high risk, simple slopes revealed that self-affirmation increased perceptions of severity at low, $\beta = .20$, $p = .356$, importance of health. There was no effect at moderate importance of health, $\beta = .03$, $p = .828$. Self-affirmation decreased severity at high importance of health, $\beta = -.14$, $p = .482$ (see Figure 4). However, none of the Beta weights achieved significance.

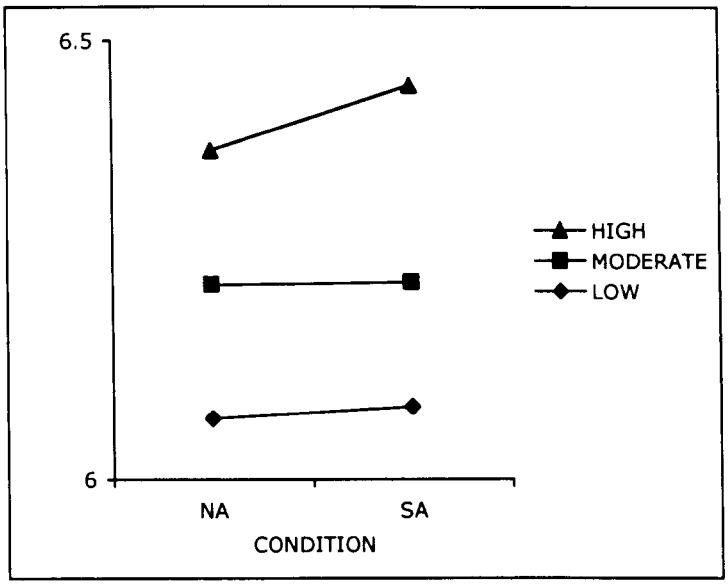

Figure 2. The effect of self-affirmation on severity as a function of health importance in participants at low risk: Simple slopes at three levels of health importance.

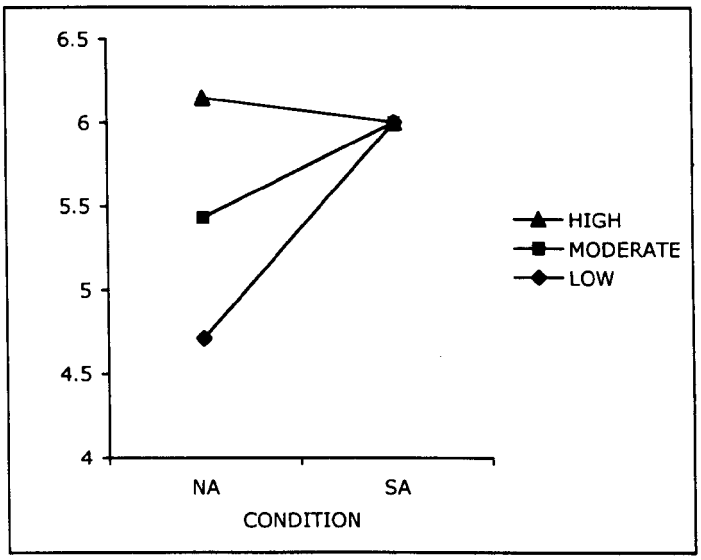

Figure 3. The effect of self-affirmation on severity as a function of health importance in participants at moderate risk: Simple slopes at three levels of health importance.

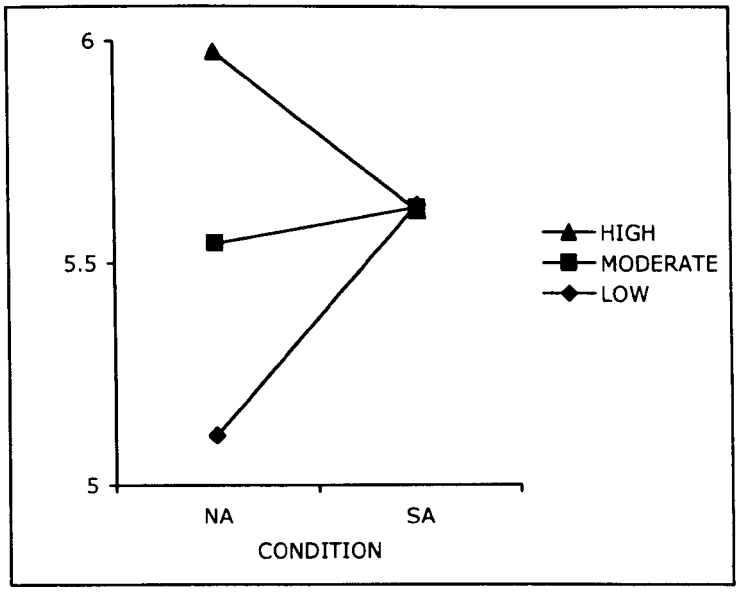

Figure 4. The effect of self-affirmation on severity as a function of health importance in participants at high risk: Simple slopes at three levels of health importance.

Reading Times

Two three-step regression analyses were conducted with total reading time for the threat component and for the response component of the message as the dependent variables to determine whether self-affirmation influenced reading time (see Table 6) and whether this was moderated by risk (i.e., frequency of high salt food consumption taken at baseline) and health importance (see Table 7).

Table 6. *Mean Reading Times of Health Message (in seconds)*

Dependent variable		Non-affirmed (n = 43)	Self-affirmed (n = 40)	Full sample (N = 83)	Effect size d
Threat message	*M*	72432.84	67968.95	70281.57	-.19
	SD	23009.10	23028.97	22987.67	
Response message	*M*	88332.79	87049.00	87714.10	-.05
	SD	24105.31	25497.45	24642.22	

There were no main effects of condition or risk on reading times. There was an interaction between risk and condition on reading times of response information, $\beta = -.43$, $p = .012$ (see Figure 5); simple slopes revealed no significant effects of condition on reading time for low, $\beta = .20$, $p = .203$, or moderate levels of risk, $\beta = -.05$, $p = .615$, but this approached significance at high levels of risk, $\beta = -.30$, $p = .053$. Self-affirmation decreased reading times of response information at higher levels of risk.

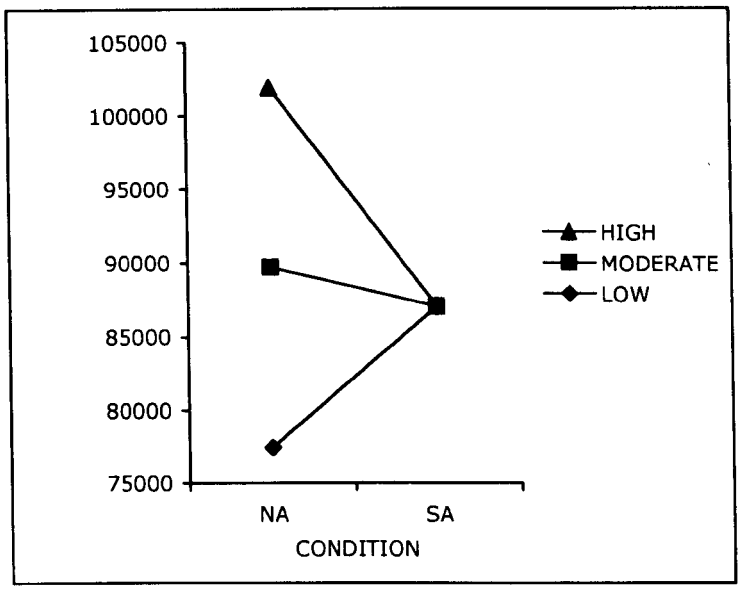

Figure 5. The effect of self-affirmation on reading time of the response health message as a function of risk: Simple slopes at three levels of risk.

Self-Related Affect as a Mediator

A one-way ANOVA with self-related affect as the dependent variable and condition as the independent variable was conducted to explore whether positive self-related affect could be the mechanism behind the effects of self-affirmation (see Table 8). There was no main effect of condition on self-related affect, $F(1,81) < 1$, suggesting that explicit self-related affect did not mediate the effects of self-affirmation.

Table 7. *Summary of Moderated Regression Analyses for Condition x Risk x Health Importance to Predict Reading Times*

Variable	Step	Variable entered	β Step 1	β Step 2	β Step 3	R^2	Model F	R^2 Change	F Change
Threat message	1	Risk	.26*	.41*	.41*				
		Importance	-.12	.11	.14				
		Cond	-.13	-.15	-.16	.08	2.19		
	2	Cond x Importance		-.11	-.13				
		Cond x Risk		-.23	-.22				
		Importance x Risk		.19	.29	.13	1.82	.05	1.43
	3	Cond x Imp x Risk			-.11	.13	1.59	.00	.27
Response message	1	Risk	.21	.49**	.49**				
		Importance	-.11	.03	.03				
		Cond	-.07	-.11	-.11	.06	1.52		
	2	Cond x Importance		-.09	-.09				
		Cond x Risk		-.43	-.43*				
		Importance x Risk		.31	.32	.19	3.05**	.14	4.38**
	3	Cond x Imp x Risk			-.00	.19	2.58*	.00	.00

*$p < .05$, **$p < .01$

Table 8. *Mean Responses to Self-Related Affect Measures*

Dependent variable		Non-affirmed ($n = 43$)	Self-affirmed ($n = 40$)	Full sample ($N = 83$)	Effect size d
Self-related affect	*M*	3.48	3.49	3.48	.02
	SD	.61	.67	.63	

Discussion

Study 1 aimed to determine whether self-affirmation could influence under-researched cognitive and affective predictors of health behaviour change and actual or compensatory health behaviour change; and also to examine the moderating effect of risk and motivation on these variables. An additional purpose was to explore whether self-related affect is the resource that underpins the effects of self-affirmation. Study 1 employed an experimental design comparing self-affirmed and non-affirmed participants on their explicit affective responses to a control or self-affirmation task. Study 1 also compared participants' cognitive, affective and behavioural responses to a health message regarding salt consumption. Study 1 found that self-affirmed participants reported more negative threat-related self-evaluative affect than non-affirmed participants. Self-affirmed participants at the highest risk spent marginally less time reading the response information.

Affective and Cognitive Predictors of Health Behaviour Change

Study 1 confirmed that self-affirmation can influence threat-related affect. Self-affirmation resulted in greater negative self-evaluative threat-related affect; as a result of the participants thinking about their current salt consumption they felt more dissatisfied with themselves and less proud. This finding implied that the self-affirmed participants were more accepting of the health message than the non-affirmed participants. Furthermore, the finding may suggest that negative affect relating to the self may be a more sensitive measure of threat than alternative measures of threat-related affect (e.g., fear, worry) and cognitive variables; perhaps because the self-concept is already be activated by the self-affirmation manipulation. Study 1 found no effect of self-affirmation on efficacy cognitions despite the inclusion of efficacy information. However, this may be due to

ceiling effects as all the participants reported high self- and response-efficacy, suggesting that defensiveness was not a problem for these constructs.

Risk as a Moderator

Study 1 indicated that self-affirmation interacted with risk on consumption of restaurant and take-away food (a situation that had been emphasised as one in which salt intake was difficult to control). Examination of the Beta weights indicated a trend for self-affirmation to have a negative effect at low levels of risk and a positive effect at high levels of risk. However, the differences between the conditions were not significant for any of the risk levels. It is difficult to establish what is happening in this instance, as the analysis controlled for pre-manipulation behaviour but could not compare pre- and post-manipulation behaviour due to the relatively small numbers of participants in each group (precluding a three-way mixed ANOVA to examine the means for each condition, at each risk level, at each time point).

There was also a marginally significant interaction between self-affirmation and risk on reading time of the response information; when compared to non-affirmed participants at high risk, self-affirmed participants at high risk spent less time reading the information regarding the recommended guidelines, tips on how to reduce salt intake when eating in and out and tips on monitoring salt intake. Previous studies had not compared differences between self- and non-affirmed conditions on reading time of threat and response information. Reed and Aspinwall (1998) compared the reading times of self- and non-affirmed groups on the reading time of risk-confirming and risk-disconfirming health information. They concluded that self-affirmed participants were less interested in the risk-disconfirming information as they spent less time reading this type of information in addition to reporting greater message acceptance (Reed & Aspinwall, 1998). However, in

Study 1 there was little evidence to support an interpretation that the high risk self-affirmed participants were less interested in the response information due to their shorter reading time. There were non-significant trends that those at high risk and who were self-affirmed ate less restaurant and take-away food one week after the manipulation, compared to their non-affirmed counterparts. In the absence of additional evidence, these findings could indicate that the high risk self-affirmed participants either (a) displayed a lack of interest in the recommendations and tips or (b) had sufficient interest but processed the response information more efficiently, than the high risk non-affirmed participants. This is discussed further in Study 4.

Study 1 suggested that risk does moderate the effect of self-affirmation but it provided inconclusive results regarding at which level of risk self-affirmation is most effective. Additionally, the measure of risk in Study 1 may not be ideal as the measurement of salt intake may not have been accurate as it is difficult to estimate salt intake in grams without a comprehensive food diary. Future studies could target health behaviours where a more accurate measure of risk can be established (e.g., alcohol consumption can be estimated by calculating total units).

It is also important to note that Study 1 could be underpowered. A sensitivity power analysis (see Appendix 4) indicated that the regression analysis with seven predictors is capable of detecting a medium effect (Buchner, Faul & Erdfelder, 2007). Harris et al. (2007) found a small and medium effect (of three predictors: Self-affirmation, risk and the self-affirmation and risk interaction) on the explained variance for vulnerability and self-efficacy, respectively (calculated using Thalheimer & Cook, 2002). A large effect of the three predictors was found for intentions and threat-related affect (Harris et al., 2007). As a greater number of predictors (seven in the case of Study 1) leads to less sensitivity it is

likely that Study 1 was unable to detect small and medium effects on vulnerability and self-efficacy but should have been capable of detecting large effects on intentions and threat-related affect (comparison effect sizes were not available for some variables, e.g., response-efficacy, behaviour).

Motivation as a Moderator

Study 1 showed a non-significant trend for self-affirmed participants, who regarded their health as least important and were at moderate and high risk due to their salt consumption, to not downplay the health risk of a high salt diet. In fact, these participants tended to regard high blood pressure as more severe than their non-affirmed counterparts. These findings tentatively suggest that the benefits of self-affirmation could depend upon the level of motivation of the participant; self-affirmation led those at the highest risk (due to their current behaviour) and the lowest motivation (i.e., who may not have previously acknowledged the health risk) to accept the severity of the health risk. This has positive implications for the use of self-affirmation as an intervention as it suggests that self-affirmation can influence appropriate responses. The Transtheoretical Model (Prochaska & Velicer, 1997) suggests that particular cognitions should be targeted, dependent upon the individual's level of motivation, in order to maximise the potential for health behaviour change. In the case of low motivational stages it is desirable to raise consciousness of the health risk rather than encourage preparation for change. If self-affirmation does influence motivationally appropriate responses, it will have higher utility as a health intervention as motivationally matched interventions and responses are more likely to be successful at changing health behaviour (Marcus et al., 1998).

Self-Related Affect as a Mediator

There was no effect of self-affirmation on positive self-related affect. This could be due to a number of factors: (a) The changes in self-related affect may not be available to conscious awareness, (b) self-affirmation may increase positive affect other than that related to the self or (c) a positive affective resource is not responsible for the effects of self-affirmation. In support of the first possibility, Sherman et al. (in press) found that self-affirmation decreased optimistic bias (i.e., a tendency to accept the health risk as genuine but falsely believe that you are not personally at risk) for a variety of health risks; but by just suggesting to the participants that the self-affirmation manipulation could influence the assessment of health risks the effect was eliminated. With regards to the second option, a recent study found that self-affirmation increased other-related positive feelings (e.g., love, feeling connected) and these emotions mediated the acceptance of an anti-smoking message (Crocker, Niiya & Mischkowski, 2008). With regards to the third option, Study 1 may not have sufficient power to detect differences between conditions on self-related affect. A sensitivity analysis indicated that the analysis for self-related affect was capable of detecting a large effect (Buchner et al., 2007; see Appendix 3); however, the findings from Sherman et al. (2000) found a medium effect of self-affirmation on self-regard. A further study examining the influence of self-affirmation on affect, in particular implicit self-related affect is necessary before ruling out self-related affect as a mediator of the effects of self-affirmation.

Behavioural Outcomes

Regarding behavioural outcomes, Study 1 did not find an effect of self-affirmation on the consumption of high salt foods. Unfortunately, a sensitivity analysis (see Appendix 3) indicated that only a large effect was capable of being detected by the analysis due to the

small number of participants who returned their follow-up questionnaire (Buchner et al., 2007). However, Study 1 indicated that high risk self-affirmed participants may start to make some initial behavioural changes in the week immediately after the experimental manipulation. However, the process of changing behaviour once accepting the need to address the health risk could be a lengthy process. The Transtheoretical Model (Prochaska & Velicer, 2007) acknowledges that people may plan behaviour change up to one month in advance; therefore, a longer follow-up period might detect any behavioural effects due to self-affirmation manipulations. Study 1 provided no evidence that self-affirmation activated higher order abstract goals or influenced compensatory health behaviour; however, the analysis was underpowered and had the capability of detecting only a large effect (Buchner et al., 2007; see Appendix 3).

Limitations of the Study

Study 1 found one main effect of self-affirmation (on negative self-evaluative threat-related affect); there were no other main effects on affective or cognitive predictors of behaviour change. Further studies could include implicit measures that may be more sensitive than self-reports and therefore more able to detect differences between the conditions. Study 1 did not produce robust findings indicating that motivation moderates the effect of self-affirmation on cognitive and affective predictors of health behaviour change. However, the measure of health motivation used in Study 1 could be improved. First, a multiple item measure would improve reliability. Second, an alternative measure may improve the distribution of scores on the motivation variable. For example, most people regard their health as important; for example, a health study conducted on a student population, revealed that performing health promoting activities and health per se were

regarded as personally important by the majority of the students in the sample[2] (Epton, 2007). Furthermore, the participants in Study 1, on average, regarded their health as at least somewhat important ($M = 3.83$).

Conclusion

Study 1 expanded the self-affirmation and health literature repertoire by testing the effect of self-affirmation on the consumption of high salt foods. Study 1 provided further evidence that self-affirmation can influence affective and cognitive predictors of health behaviour and can potentially influence long term health behaviour. Study 1 offered some tentative support for the argument that motivation and risk can moderate the effect of self-affirmation; however, the nature of the moderation was not fully determined.

[2] The survey was conducted (N = 145; 111 were females) on University of Sheffield undergraduates. Importance of health was assessed by 2 items (Cronbach's alpha = .72), measured on a 7-point scale (*0-6, not at all important – extremely important*): "How important is it to you to be healthy and free from disease?" and "How important is it to you to engage in activities to promote physical health and prevent illness?" The mean health importance was 5.17; 142 participants rated their importance as =>4.

CHAPTER THREE

Study 2

Self-Affirmation and Health: Implicit Affect as a Mediator, Motivation (Decisional Balance) and Risk as Moderators

Study 2 expanded on the aims of Study 1 by: (a) Measuring implicit affective predictors in addition to explicit affective and cognitive predictors of behavioural change, (b) testing longer term behavioural effects, (c) exploring motivation and risk as moderators of these effects and (d) examining implicit self-related affect as the mechanism behind the effects of self-affirmation.

Implicit Affective Predictors of Health Behaviour Change

The literature applying self-affirmation to health issues had to date explored only self-report measures of affective and cognitive predictors of health behaviour change despite validity issues with these measures. For example, self-report measures provide participants with the opportunity to deliberate over their responses that may affect the accuracy of responses; for example, if the participant is reluctant to report their true response (e.g., they may feel stupid if they reported feeling threatened by the health information) (Fazio & Olson, 2003). Explicit measures may also not capture differences between conditions either due to the lack of sensitivity of the scale or the lack of ability of the participants to adequately report their true thoughts and feelings (e.g., the participant may find it difficult to decide to what extent they are feeling a particular emotion). A measure of implicit affect may help to attenuate defensive responses and problems with sensitivity. Although there are some problems with implicit measures, such as low reliability and potential for measurement error (Fazio & Olson, 2003), these can be overcome by using a moderate number of trials (as reliability is poor due to participant

error if there are too few trials and too many trials may result in inaccurate measurement owing to boredom and fatigue).

Motivation as a Moderator

Study 1 did not provide strong evidence that motivation moderates the effect of self-affirmation on cognitive and affective predictors of health behaviour change. Study 1 used health importance as a measure of motivation. Study 2 examined the moderating effect of motivation further using a reliable multi-item measure of motivation.

In Study 2, decisional balance concerning alcohol use (that is, a balance of the pros and cons of drinking alcohol) was used to measure motivation to change alcohol consumption. Participants who have a higher ratio of cons to pros have a higher motivation to change their alcohol drinking than those with a higher ratio of pros to cons. It is a multiple-item scale that is likely to generate variation in scores in the sample as it reliably reflects all the stages of health behaviour change from being unaware of the health risk (i.e., pre-contemplation stage) to maintaining a recommended healthy behaviour (i.e., maintenance stage; Prochaska et al., 1994). The scale is also specific to the health behaviour targeted so it could provide stronger evidence regarding the ability of self-affirmation to influence motivationally appropriate responses.

The use of decisional balance also predicted a direction of the putative moderation effect. According to the Transtheoretical Model people with a high motivation to change their health behaviour, who are preparing to change their behaviour or who are attempting to maintain their behaviour after change (i.e., recognise a higher number of cons than pros of drinking alcohol), have already accepted that the targeted behaviour has negative health consequences (Prochaska & Velicer, 1997). Among people with a high motivation to change, self-affirmation manipulations will be less effective in promoting acceptance of the

health message as they are not likely to use defensive responses. However, people with low motivation to change, who do not acknowledge or are not aware that the targeted health behaviour is a risk to health (i.e., who acknowledge a higher number of pros of drinking alcohol than cons), would react defensively to health information therefore self-affirmation should be effective for these people.

Implicit Affect as a Resource

Study 1 found that explicit self-related positive affect was not increased by self-affirmation; however, implicit self-related affect had not been investigated as a mediator of self-affirmation. Tesser (2000) suggested that implicit affect may be the resource that allows "self-esteem" type mechanisms, including self-affirmation to be substitutable for one another. Social psychologists have identified numerous mechanisms (e.g., rationalisation, self-affirmation, self-serving attributions, social comparison and self-handicapping) that are used to protect psychological well-being; collectively these are manifestations of the "psychological immune system" (Gilbert & Wilson, 2000, p. 191) or the "self-zoo" (Tesser, Crepaz, Collins, Cornell & Beach, 2000, p. 1476). These mechanisms are substitutable for one another. For example, self-affirmation can reduce the use of self-serving attributions to protect self-worth (Sherman & Kim, 2005).

Substitutability suggests a common currency that Tesser (2000) suggests is affect. Evidence for this includes findings that: (a) Threats to self-esteem increase negative affect, (b) bolstering self-esteem increases positive affect and (c) arousal mediates self-regulatory processes such as social comparison (Tesser, 2000). Affect is transferred from one mechanism to another; this suggested that the positive affect from self-affirmation could reduce the negative impact of negative affect from a threat. Indeed, Koole et al. (1999) found that implicitly measured positive affect increased after a value affirmation that

reduced the amount of rumination after a threat (i.e., failure in an ostensible intelligence test). Furthermore, path analysis confirmed that the cessation of rumination was mediated by positive affect (Koole et al., 1999).

Tesser (2000) stated that the resource common to the self-protective mechanisms must be unconscious in order for the positive affect to be transferable to the threatening situation (a transfer of explicit affect would involve a conscious process that would preclude substitution). This could explain why Study 1 did not find an effect of self-affirmation on explicit self-related emotions. A measure of self-related implicit affect, taken directly after the self-affirmation manipulation, could reveal an increase in a positive affect resource that then is used to counter the threat from the health risk information.

The Current Study

Study 2 targeted alcohol consumption, as the level of risk could be easily quantified and the health message was relevant to the student population from which the sample was drawn. Implicit measures of affect were included in addition to explicit affective and cognitive predictors of health behaviour. Motivation, operationalised as decisional balance, as a moderator of the effects of self-affirmation was also examined. The follow-up was conducted at four weeks in order to allow the participants ample time to change their health behaviour. Study 2 also measured self-related affect, using an implicit measure, in order to further test whether self-related affect is the affirmational resource responsible for the effect of self-affirmation manipulations.

The hypotheses were that:

1. In comparison to a control group, self-affirmed participants would show an elevation in (a) implicit and explicit affective predictors and explicit

cognitive predictors of health behaviour and (b) a decrease in alcohol consumption at a four week follow-up

2. The effects of self-affirmation on those outcome measures (hypotheses 1a and 1b) would be moderated by risk and motivation
3. Self-affirmed participants would display greater implicit self-related positive affect.

Methods

Participants

Eighty females (age $M = 19.77$; range = 18 - 53) were recruited for a study regarding the communication and understanding of health risk information in return for course credit. The mean alcohol consumption was 9.68 units per week ($N = 49$ reported that the alcohol consumption recorded reflected their typical weekly consumption) which was above the mean consumption of 5.3 units per week for 19-24 year old females in the national population (FSA, 2004).

Materials

Pre-test interview. Participants were asked to list all the alcohol they had consumed during the previous seven days. An electronic version of the alcohol consumption component of the questionnaire formed the follow-up.

Motivation. The alcohol decisional balance questionnaire, used to measure motivation to change alcohol consumption, was included as part of the pre-test interview (see Appendix 5; Maddock, 1997). The participants were asked "How important to you are the following statements in your decisions about how much to drink or if not to drink at all?" The statements reflected the pros (e.g., "Drinking helps me have fun with friends") and cons (e.g., "Drinking could land me in trouble with the law") of consuming alcohol

(Cronbach's alpha = .76, 92, at baseline and follow-up, respectively). All responses were on 5-point scales (*1 = not at all important, 2 = not very important, 3 = somewhat important, 4 = very important, 5 = extremely important*). The motivation to change alcohol consumption was calculated by subtracting the decisional balance pros from the cons; a negative score indicated that participants had a low motivation to change, a score close to zero indicated that participants were ambivalent about behaviour change and a positive score indicated that participants had a high motivation to change (Velicer, Prochaska, Fava, Norman & Redding, 1998).

Self-affirmation manipulation. The experimental manipulation was a questionnaire that asked participants to reflect and write about 8 past acts of kindness (see Appendix 6). For example, they were asked, "Have you ever been considerate of another person's feelings?" and if they answered yes to give an example. The control manipulation asked participants to indicate their agreement with 8 trivial statements and the reasons for this (Reed & Aspinwall, 1998)[3].

Health message. Alcohol consumption was targeted as a health survey indicated that 92.79% of the population, from which the sample was drawn, drank alcohol with an average consumption of 14 units per week (Epton, 2007). The threat component of the health message, "Alcohol and breast cancer" described the increase in the risk of breast cancer from alcohol consumption and how this was of particular concern to 16-24 year old women (see Appendix 6). The article was based on that used by Harris and Napper (2005) but included additional information from more recent research (Collaborative Group on Hormonal Factors in Breast Cancer, 2002; Li, Baer, Friedman, Udaltsova & Klatsky, 2007; Tan, Barber & Shields, 2006), news reports (BBC News, 2002; BBC News, 2007) and UK

[3] Only 8 of the original 10 items used by Reed & Aspinwall were used in this study to allow participants to have sufficient opportunities to affirm in a limited time.

health organisations (Alcohol Concern, 2007; Breakthrough Breast Cancer, 2005; NHS Direct, 2007). The response component of the message listed strategies to sensibly manage alcohol consumption (adapted from Info Scotland, 2007).

Implicit affect task. The Go / No Go Association Task (GNAT; Nosek & Banaji, 2001) is a word classification task that measured implicit attitude towards a target category by recording the pattern of errors made when categorising words into two categories at once. Stimuli words (e.g., vodka) from a target category, a distracter category, and positive and negative affect words are randomly presented in the centre of a computer screen (for 850 ms) that has the target category (e.g., alcohol) and one of the affective categories displayed (e.g., positive feeling; see Figure 6); the target category and other affective category are displayed in a second block.

Figure 6. Computer display for the GNAT.

The participant is required to press a key (Go) to indicate that a presented stimulus fits into one of the displayed categories and is asked to refrain from pressing the key (No Go) when the presented stimulus does not fit into one of the displayed categories; a green "O" is displayed after correct responses and a red "X" is displayed after incorrect responses. When the affective category is congruent with the target category (i.e., reflects

participants attitudes), task performance should be facilitated. However, when the affective category is incongruent with the target category (i.e., does not reflect participants attitudes), task performance should be impaired. Comparison of signal detection measures (false positive, hit), determine the association between the displayed categories i.e., how positively or negatively the participant regards the target category.

Self GNAT. The target category for self-related affect was "self" (e.g., me), and the distracter category was "other" (e.g., they; adapted from the self-esteem Implicit Association Test; Pinter & Greenwald, 2005). The affective categories were "positive feelings" (e.g., proud) and "negative feelings" (e.g., dissatisfied; taken from the PANAS-X self-assurance and guilt scales; Watson & Clark, 1994). All target and distracter words used to measure self-related affect, were matched for Kucera-Francis (1967) written word frequency, $F(1,10) = 2.69$, $p = .132$, length, $F(1,10) < 1$, and number of syllables, $F(1,10) < 1$; the positive and negative feeling words also did not differ in word frequency, $F(1,10) = 1.77$, $p = .132$, length, $F(1,10) = 2.18$, $p = .170$, and number of syllables, $F(1,10) = 2.55$, $p = .141$ (Clark, 1997; see Appendix 6 for means and standard deviations for all categories). The "self" GNAT contained 6 words in each category (see Appendix 7 for a full list of words and their characteristics).

Alcohol GNAT. The target category for threat-related affect was "alcohol" (e.g., vodka); the distracter category was "soft drinks" (e.g., lemonade). The affective category words were items from fear arousal scales and their synonyms (Ruiter, Kok, Verplanken & Brug, 2001; Witte, 2007); the categories were "positive feelings" (e.g., relaxed) and "negative feelings" (e.g., nervous). All target and distracter words, used to measure threat-related affect, were matched for word frequency, $F(1,16) < 1$, length, $F(1,16) < 1$, and number of syllables, $F(1,16) < 1$; the positive and negative feeling words also did not differ

in word frequency, $F(1,16) < 1$, length, $F(1,16) = 1.01$, $p = .329$, and number of syllables, $F(1,16) < 1$ (see Appendix 6 for means and standard deviations for all categories). The "alcohol" GNAT contained 9 words in each category (see Appendix 7 for a full list of words and their characteristics).

Reduce alcohol GNAT. Response-related affect categories were "reduce alcohol" (e.g., drinking budget; selected from the tips given in the response message) and "other behaviours" (e.g., change clothes). The affective items were emotions associated with approach and avoidance of goals and their synonyms (Carver, 2001; Higgins, 1987); the categories were "positive feelings" (e.g., encouraged) and "negative feelings" (e.g., dejected). All target and distracter words used to measure response-related affect were matched for word frequency, $F(1,16) < 1$, length, $F(1,16) < 1$, and number of syllables, $F(1,16) < 1$; the positive and negative feeling words also did not differ in word frequency, $F(1,16) = 2.02$, $p = .174$, length, $F(1,16) < 1$, and number of syllables, $F(1,16) < 1$ (see Appendix 6 for means and standard deviations for all categories). The "reduce alcohol" GNAT contained 9 words in each category (see Appendix 7 for a full list of words and their characteristics).

Explicit emotions. Fear was measured using the full 6-item version of Witte's (2007) fear scale (Cronbach's alpha = .92) measured on the same 4-point scale used in Study 1 (see Appendix 4 for a comprehensive list of dependent variables). Negative self-evaluative affect related to the threat was measured using the full 8-item version of scale used in the Study 1 (Cronbach's alpha = .85). Response-related affect (affective attitudes) was measured using the affective attitude scale used in the Study 1 (Cronbach's alpha = .89).

Health questionnaire. The vulnerability, severity, response-efficacy, self-efficacy and intention items from Study 1 were adapted for use with alcohol consumption - all items were measured on 7-point scales. The reliability for all measures was high (all rs(79) = .60 - .85, *ps* < .001). A measure of instrumental attitudes was also included comprising 4 items on semantic differential scales (Cronbach's alpha = 89); e.g., "For me, reducing my alcohol consumption over the next 7 days would be *harmful – beneficial*?" (Courneya et al., 2006).

Procedure

Study 2 followed the same procedure as Study 1. However, participants completed a practice GNAT prior to the pre-test interview. The "self" GNAT was completed after the self-affirmation or control manipulation, the "alcohol" GNAT was completed after exposure to the threat message and the "reduce alcohol" GNAT was completed after the response message. Finally, participants were asked to complete the health questionnaire. Four weeks after attending the laboratory, participants were e-mailed the follow-up questionnaire.

Results

Manipulation Check

Participants who had provided responses to 5 or more of the self-affirmation manipulation questions were taken to be self-affirmed. One participant was removed therefore 97% of the self-affirmation condition was considered to be self-affirmed ($N = 39$).

Randomisation Check

The two conditions did not differ in the demographic variables of age, $F(1,77) < 1$, or university level (level two and above were collapsed into one category due to the low numbers of participants), $\chi^2(1, N = 78) = .09, p = 1.00$. The conditions did not differ significantly in the number of alcohol drinkers, $\chi^2(1, N = 79) = 1.87, p = 1.00$, baseline

alcohol consumption, $F(1,77) < 1$, or number of days alcohol was consumed, $F(1,77) < 1$. The conditions did not differ in number of participants who reported their reported consumption was typical, $\chi^2(1, N = 80) = .30, p = .647$; furthermore, there were no differences between conditions in the number of participants who reported typically drinking less alcohol than reported, $\chi^2(1, N = 29) = 1.66, p = .272$. The conditions did not differ in decisional balance pros or cons, $F(1,74) < 1$. Therefore, randomisation to condition appeared to be successful (see Table 9).

Table 9. *Baseline Characteristics of the Sample*

Variable		Non-affirmed ($n = 40$)	Self-affirmed ($n = 39$)	Full sample ($N = 79$)
Age	*M*	19.87	19.67	19.77
	SD	5.64	3.24	4.58
Alcohol consumption [a]	*M*	9.61	9.76	9.68
	SD	8.87	8.70	8.73
Days alcohol consumed	*M*	1.80	1.92	1.86
	SD	1.38	1.24	1.31
Decisional balance pros	*M*	18.08	19.16	18.62
	SD	8.52	6.99	7.76
Decisional balance cons	*M*	20.61	21.47	21.04
	SD	4.17	5.02	4.61
University level	*Level 1*	33	32	65
	Other	6	7	13
Alcohol drinkers	*Drinkers*	37	37	79
	Non-drinkers	3	2	5
Typical consumption	*Typical*	26	23	49
	Non-typical	14	16	30
Differences in typicality	*Less than usual*	6	10	16
	More than usual	8	5	13

[a] Alcohol consumption calculated using UK units. 1 unit: half pint of beer or cider, ½ small glass of wine, 1 shot of spirit; 1.5 units: bottles of mixers, bottle of beer / cider

Affective Predictors of Health Behaviour Change

Error rates for each block were examined to ensure that blocks with error rates of over 40% ($N = 3$) and data sets with 30% error rates overall ($N = 3$) were identified and removed, following recommendations in Nosek and Banaji (2001). For each GNAT block the proportion of hits (correctly responding "Go" to a target) and false alarms (incorrectly responding "Go" to a distracter) were calculated and transformed to standardised z scores.

A *d'* (d-prime) score was calculated by subtracting false alarms from hits, for each block (see Table 10). The *d'* score represented the strength of the relationship between the target category (e.g., self) and the affective category (e.g., positive or negative); therefore a high *d'* indicated a strong association.

A Chi Square test was performed for each experimental block with *d'* dichotomised (less than or equal to zero, greater than zero) to ensure that the conditions did not differ in the ability to perform the task (as a *d'* that is less than or equal to zero signifies a lack of ability to discriminate between signal and noise). There were no significant differences between the conditions in any of the blocks (see Table 11): Self positive block, $\chi^2(1, N = 74) = .05, p = 1.00$, self negative block, $\chi^2(1, N = 74) = 3.59, p = .097$, threat positive block, $\chi^2(1, N = 76) = .07, p = .821$, threat negative block, $\chi^2(1, N = 76) = 2.02, p = .173$, response positive block, $\chi^2(1, N = 75) = 3.13, p = .103$, response negative block, $\chi^2(1, N = 75) = .14, p = .807$.[4]

Table 10. *Mean D-Prime for Implicit Affective Predictors of Health Behaviour Change*

Dependent variable		Non-affirmed / low motivation (n = 12)	Non-affirmed / high motivation (n = 24)[a]	Self-affirmed / low motivation (n = 14)[b]	Self-affirmed / high motivation (n = 19)	Full sample (N = 69)
Threat-related affect						
positive	*M*	.15	1.40	.42	-.63	.06
	SD	1.41	1.49	1.35	2.03	1.56
negative	*M*	-.10	-.46	.69	.09	.42
	SD	1.21	1.13	1.86	1.85	1.85
Response-related affect[5]						
positive	*M*	-.04	.10	.47	.56	.25
	SD	1.39	1.64	1.46	1.52	1.47
negative	*M*	-.31	.80	.44	-.02	.17
	SD	1.66	1.49	1.17	1.68	1.53

[a] n = 22 for response-related affect, n = 13 for response-related affect

[4] The data from the practice session was also analysed with a one-way ANOVA to ensure that the conditions did not differ in the participants' ability to perform the GNAT, $F(1,72) < 1$.

[5] Analysis conducted on alcohol drinkers only

Table 11. *Ability to Perform GNAT*

Variable			Non-affirmed (n = 37)[a]	Self-affirmed (n = 37)	Full sample (N = 74)
Self block					
	Positive	*No discrimination*	17	18	35
		Discrimination	20	19	39
	Negative	*No discrimination*	19	11	30
		Discrimination	18	26	44
Threat block					
	Positive	*No discrimination*	18	16	34
		Discrimination	21	21	42
	Negative	*No discrimination*	20	13	33
		Discrimination	19	24	43
Response block					
	Positive	*No discrimination*	20	12	32
		Discrimination	18	25	43
	Negative	*No discrimination*	17	15	32
		Discrimination	21	22	43

[a] n = 39 for threat blocks; n = 38 for response blocks

In order to find out if self-affirmed participants experienced more implicit threat- or response-related affect than non-affirmed participants three-way repeated measure ANCOVAs were conducted, with condition and decisional balance as the independent variables, d' from the negative and positive block as the repeated measures dependent variable, and baseline units as a covariate (this was not included as an independent variable as this would leave a low number of participants in each condition). For these analyses, participants were categorised as either low (negative score) or high motivation (positive score; those participants with a score of zero, N = 4, were excluded from these analyses) using the scores from the decisional balance scale.

For threat-related affect, there were no significant within-participant effects, $F(1,64) = 3.43$, $p < .069$, nor main effects of self-affirmation or decisional balance, all Fs$(1,64) < 1$. There was a significant interaction between GNAT block and condition, $F(1,64) = 6.61$, $p = .012$ (see Figure 7). Simple main effects revealed that there were no significant differences between the positive and negative block in the non-affirmed group, $F(1,37) < 1$; however, this approached significance in the self-affirmed condition, $F(1,35) = 3.33$, $p = .077$. The

non-affirmed condition did not associate either negative or positive feelings with alcohol; however, the self-affirmed participants tended to associate alcohol with negative but not positive feelings. There were no significant main effects or interactions for implicit response-related affect[6].

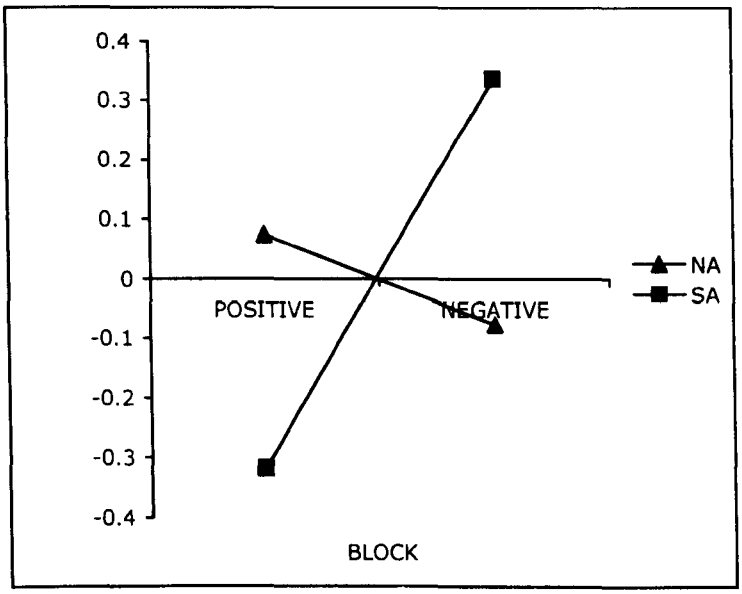

Figure 7. The effect of self-affirmation on implicitly measured threat-related affect.

For all of the following analyses three-step regression analyses were conducted to determine whether self-affirmation had an effect on explicit measures of threat- and response-related affect (affective attitudes) (see Table 12) and whether these effects were moderated by risk and decisional balance (see Table 13).

There were no main effects of self-affirmation condition on negative self-evaluative affect related to the threat, fear or response-related (affective attitudes) affect. The analyses revealed a main effect of decisional balance for response-related affect (affective attitudes),

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[6] The "reduce alcohol" GNAT used two-word phrases as the stimuli words that may have resulted in a spurious result. However, the results of this analysis are comparable to those of explicit response-related affect.

$\beta = .33, p = .050$. Those with high motivation (i.e., positive decisional balance, more cons than pros) reported more positive response-related affect. There was also a significant interaction between risk and decisional balance for self-evaluative negative affect related to the threat, $\beta = -.51, p = .003$; simple slopes revealed that risk moderated the effect of decisional balance at low, $\beta = .82, p < .001$ and moderate, $\beta = .36, p = .003$, but not at high levels of risk, $\beta = -.10, p = .496$. Motivation and negative self-evaluative affect positively correlated in those at low and moderate risk but not at high risk.

Table 12. *Mean Responses to Explicit Affective Predictors of Health Behaviour Change*

Dependent variable		Non-affirmed ($n = 40$)[a]	Self-affirmed ($n = 39$)[a]	Full sample ($N = 79$)	Effect size *d*
Fear	*M*	2.88	3.31	3.09	.33
	SD	1.32	1.47	1.40	
Self-evaluative related to threat[7]	*M*	2.31	2.07	2.19	-.21
	SD	1.17	.71	.97	
Response-related[7]	*M*	4.10	3.99	4.05	-.08
(affective attitudes)	*SD*	1.34	1.26	1.29	

[a] $n = 37$ for self-evaluative and response-related affect

[7] Analysis conducted on alcohol drinkers only

Table 13. *Summary of Moderated Regression Analyses for Condition x Risk x Decisional Balance to Predict Explicit Affective Predictors of Health Behaviour Change*

Variable	Step	Variable entered	β Step 1	β Step 2	β Step 3	R^2	Model F	R^2 Change	F Change
Fear	1	Risk	.12	.17	.17				
		Decisional balance	-.07	.14	.15				
		Cond	.09	.16	.15	.03	.80		
	2	Cond x D/bal		-.30	-.31				
		Cond x Risk		-.11	-.12				
		D/bal x Risk		-.00	.05	.07	.85	.04	.91
	3	Cond x D/bal x Risk			-.06	.07	.73	.00	.09
Self-evaluative related to threat	1	Risk	-.01	.12	-.12				
		Decisional balance	.27*	.41**	.40*				
		Cond	-.11	-.13	-.07	.09	2.37		
	2	Cond x D/bal		-.11	-.15				
		Cond x Risk		.12	.13				
		D/bal x Risk		-.36**	-.51**	.26	3.96**	.17	5.14**
	3	Cond x D/bal x Risk			.23	.28	3.65**	.01	1.57
Response-related (affective attitudes)	1	Risk	-.13	-.13	-.14				
		Decisional balance	.30*	.34*	.33*				
		Cond	-.03	-.00	.01	.13	3.60*		
	2	Cond x D/bal		-.05	-.09				
		Cond x Risk		.00	.00				
		D/bal x Risk		-.04	-.16	.14	1.79	.00	.11
	3	Cond x D/bal x Risk			.17	.15	1.64	.01	.76

*$p < .05$, ** $p < .01$

Cognitive Predictors of Health Behaviour Change and Behaviour at Follow-up

Three-step regressions were conducted to determine whether the self-affirmation manipulation had successfully promoted increased risk and efficacy cognitions (see Table 14) and whether this was moderated by risk level (i.e., units of alcohol consumed measured at baseline) and decisional balance (see Table 15). Baseline number of days drinking was controlled for in the relevant analysis by addition of this variable at the first step.

The follow-up survey was returned by 49.37% of participants (n = 17, n = 22 for SA and NA, respectively); there were no significant associations between condition and return rate, $\chi^2(1, N = 79) = 1.03, p = .371$.

Table 14. *Mean Responses to Cognitive Predictors of Behaviour Change and Behaviour at Follow-up*

Dependent variable		Non-affirmed (n = 40)[a]	Self-affirmed (n = 39)[b]	Full sample (N = 79)	Effect size d
Vulnerability	*M*	3.13	3.04	3.08	-.08
	SD	1.16	1.11	1.13	
Severity	*M*	6.50	6.53	6.52	.03
	SD	.88	.79	.83	
Self-efficacy[8]	*M*	5.54	5.46	5.50	-.05
	SD	1.50	1.45	1.47	
Response-efficacy	*M*	4.59	4.49	4.54	-.06
	SD	1.76	1.67	1.70	
Intentions[8]	*M*	4.08	3.66	3.87	-.23
	SD	1.84	1.56	1.71	
Instrumental attitudes[8]	*M*	4.96	4.83	4.90	-.08
	SD	1.54	1.49	1.51	
Units consumed (at one month)[8]	*M*	10.92	10.78	10.85	-.01
	SD	10.12	13.62	11.71	
Drinking days (at one month)[8]	*M*	2.28	1.88	2.09	-.24
	SD	1.67	1.36	1.52	

[a] n = 37 for self-efficacy, intentions and instrumental attitudes, n = 18 for follow-up behaviour
[b] n = 37 for self-efficacy, intentions and instrumental attitudes, n = 16 for follow-up behaviour

[8] Analyses conducted on alcohol drinkers only

Table 15. *Summary of Moderated Regression Analyses for Condition x Risk x Decisional Balance to Predict Cognitive Predictors of Health Behaviour Change and Behaviour at Follow-up*

Variable	Step	Variable entered	β			R^2	Model F	R^2 Change	F Change
			Step 1	Step 2	Step 3				
Vulnerability	1	Risk	.48***	.52**	.50**				
		Decisional balance	.12	.24	.21				
		Cond	-.06	-.01	.01	.21	6.17***		
	2	Cond x D/bal		-.16	-.14				
		Cond x Risk		-.06	-.04				
		D/bal x Risk		.07	-.04	.22	2.23**	.02	.43
	3	Cond x D/bal x Risk			.15	.23	2.84*	.01	.62
Severity	1	Risk	.17	.14	.15				
		Decisional balance	.28*	.40*	.41*				
		Cond	.01	-.01	-.02	.07	1.85		
	2	Cond x D/bal		-.18	-.19				
		Cond x Risk		.03	.02				
		D/bal x Risk		-.08	-.03	.10	1.23	.03	.64
	3	Cond x D/bal x Risk			-.06	.10	1.05	.00	.08
Self-efficacy	1	Risk	-.16	-.31	-.31				
		Decisional balance	.07	.04	.02				
		Cond	-.03	-.05	-.01	.04	.99		
	2	Cond x D/bal		.05	.01				
		Cond x Risk		.21	.21				
		D/bal x Risk		.01	-.13	.06	.70	.02	.44
	3	Cond x D/bal x Risk			.21	.07	.75	.01	1.02

Variable	Step	Variable entered	β			R^2	Model F	R^2 Change	F Change
			Step 1	Step 2	Step 3				
Response-efficacy	1	Risk	.05	.18	.18				
		Decisional balance	.21	.24	.25				
		Cond	-.05	.09	.08	.04	1.05		
	2	Cond x D/bal		-.03	-.04				
		Cond x Risk		-.22	-.22				
		D/bal x Risk		.08	.12	.06	.74	.02	.47
	3	Cond x D/bal x Risk			-.06	.06	.64	.00	.07
Instrumental attitudes	1	Risk	.33**	.34*	.34*				
		Decisional balance	.23	.43**	.41*				
		Cond	-.03	-.02	.05	.11	2.81*		
	2	Cond x D/bal		.28	-.34				
		Cond x Risk		-.04	-.03				
		D/bal x Risk		-.09	-.28	.17	2.25*	.06	1.61
	3	Cond x D/bal x Risk			.29	.20	2.29*	.03	2.27
Intentions	1	Risk	.14	.13	.12				
		Decisional balance	.18	.31	.31				
		Cond	-.12	-.12	-.10	.05	1.16		
	2	Cond x D/bal		-.18	-.19				1.04
		Cond x Risk		.00	.01				
		D/bal x Risk		-.12	-.16	.09	1.10	.04	
	3	Cond x D/bal x Risk			.06	.09	.94	.00	.09

Variable	Step	Variable entered	β			R^2	Model F	R^2 Change	F Change
			Step 1	Step 2	Step 3				
Units consumed (at one month)	1	Risk	.44*	.27	.27				
		Decisional balance	-.12	-.12	-.12				
		Cond	.16	.39	.46	.21	2.59		
	2	Cond x D/bal		.19	.26				
		Cond x Risk		.57*	.63*				
		D/bal x Risk		.13	.10	.36	2.49*	.15	2.11†
	3	Cond x D/bal x Risk			.11	.36	2.12	.01	.26
Drinking days (at one month)	2	Risk	.28	.26	.28				
		Decisional balance	-.23	-.17	-.18				
		Cond	.04	.06	.11	.38	4.35**		
	3	Cond x D/bal		-.08	-.02				
		Cond x Risk		.05	.10				
		D/bal x Risk		.07	.05	.39	2.37	.02	.21
	4	Cond x D/bal x Risk			.10	.39	2.03	.00	.18

† $p = .10$, *$p < .05$, ** $p < .01$, ***$p < .001$

There were no main effects of condition on any of the cognitive predictors of health behaviour change or actual behaviour reported at follow-up. There was an interaction between risk and condition on units at follow-up, $\beta = .63$, $p = .022$; simple slopes revealed this was significant at high levels of risk, $\beta = .93$, $p = .014$. The effect of condition on units at follow-up approached significance at moderate, $\beta = .37$, $p = .053$, but not at low, $\beta = -.20$, $p = .384$, levels of risk (see Figure 8)[9]. Those at high and moderate risk drank more alcohol one month post-manipulation in the self-affirmed condition in comparison to the non-affirmed condition. The main effect for condition also approached significance, $\beta = .46$, $p = .059$. In contrast to predictions, the self-affirmed condition reported drinking more alcohol one month post-manipulation than the non-affirmed condition.

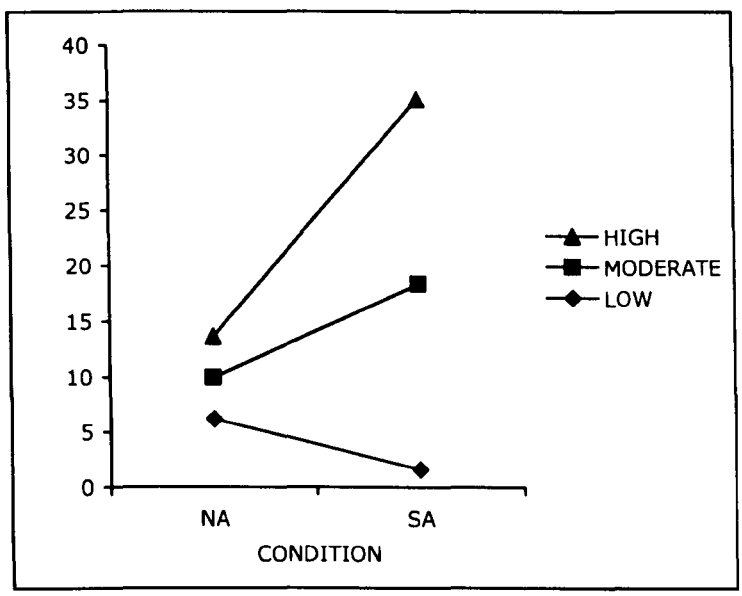

Figure 8. The effect of self-affirmation on units of alcohol consumed in one week reported one month after the manipulation as a function of risk: Simple slopes at three levels of risk.

[9] The analysis was repeated using only participants who had reported drinking at least one-unit at baseline (as the message was aimed at these people). The pattern of results were the same, with the condition and risk interaction approaching significance, $\beta = .45$, $p = .095$ (the lower significance level could be due to the lower number of participants, $N = 26$)

The main effect of risk was significant on vulnerability, $\beta = .51$, $p = .002$, and instrumental attitudes, $\beta = .55$, $p = .011$; participants at higher risk reported greater perceptions of vulnerability and more positive attitudes toward reducing alcohol. There was a main effect of decisional balance on severity, $\beta = .41$, $p = .031$, and instrumental attitudes, $\beta = .41$, $p = .012$; those with the highest motivation reported greater perceptions of severity and more positive attitudes toward reducing their alcohol consumption.

Reading Times

A three-step regression analysis was conducted with total reading time for the threat message as the dependent variable (see Table 16) to determine whether self-affirmation influenced reading time and whether this was moderated by risk (i.e., units of alcohol consumed measured at baseline) and decisional balance (see Table 17). There were no main effects or interactions for either of the message components.

Table 16. *Mean Reading Times of the Health Message (in seconds)*

Dependent variable		Non-affirmed (n = 40)	Self-affirmed (n = 39)	Full sample (N = 79)	Effect size d
Threat message	*M*	110730.60	98276.54	104582.40	-.43
	SD	28637.16	27932.14	28799.48	
Response message	*M*	63068.88	56973.59	60059.81	-.48
	SD	12822.84	16207.16	14818.46	

Implicit Self-Related Affect as a Mediator

To determine whether self-affirmation influenced implicit self-related affect a two-way repeated measures ANOVA was conducted for implicit self-related affect with condition as the independent variable and d' from the negative and positive block as the repeated measures dependent variable (see Table 18). There were no significant within-participant effects, $F(1,72) < 1$, no interaction between affect type and condition, $F(1,72) = 1.65$, $p = .204$ and no main effect of condition, $F(1,72) = 2.47$, $p = .120$.

Table 17. *Summary of Moderated Regression Analyses for Condition x Risk x Decisional Balance to Predict Reading Times*

Variable	Step	Variable entered	β			R^2	Model F	R^2 Change	F Change
			Step 1	Step 2	Step 3				
Threat message	1	Risk	-.05	-.04	-.02				
		Decisional balance	.15	.05	.09				
		Cond	-.19	-.17	-.20	.07	1.76		
	2	Cond x D/bal		.14	.11				
		Cond x Risk		-.03	-.05				
		D/bal x Risk		-.03	.11	.08	.98	.01	.26
	3	Cond x D/bal x Risk			-.17	.09	.93	.01	.66
Response message	1	Risk	-.09	-.09	-.07				
		Decisional balance	-.01	-.09	-.04				
		Cond	-.16	-.15	-.19	.03	.82		
	2	Cond x D/bal		.09	.05				
		Cond x Risk		-.02	-.05				
		D/bal x Risk		-.09	.09	.04	.53	.01	.27
	3	Cond x D/bal x Risk			-.23	.06	.64	.02	1.25

Table 18. *Mean Responses to Implicit Self-Related Affect Measure*

Dependent variable		Non-affirmed (n = 37)	Self-affirmed (n = 37)	Full sample (N = 74)
Positive Block	*M*	-.08	.08	.00
	SD	.16	1.60	.16
Negative Block	*M*	-.35	.35	.00
	SD	1.49	1.28	.14

Discussion

Study 2 examined the effect of self-affirmation on (a) implicit and explicit predictors of health behaviour change, (b) long term behavioural effects and (c) the moderating effect of risk and motivation on these variables. Study 2 also compared a self- and non-affirmed condition on their implicit affective responses to the control or self-affirmation task. Study 2 found that self-affirmed participants experienced higher implicit negative threat-related affect, than non-affirmed participants. Study 2 also found that high risk, self-affirmed participants reported higher alcohol consumption one month after the manipulation in comparison to the non-affirmed condition.

Implicit Threat-Related Affect

After reading the threat message, the self-affirmed condition felt negatively about alcohol. This could suggest that the self-affirmed condition had accepted that alcohol did have negative health consequences; in contrast, the non-affirmed condition did not display negative feelings about alcohol. However, given the subsequent increased alcohol consumption in the self-affirmed condition, the elevated threat-related affect may have reflected an extremely high level of fear that elicited a strong fear control response resulting in increased alcohol consumption (this will be discussed further in the next section).

Long Term Behaviour

In contrast to predictions, self-affirmation led to higher reports of alcohol consumption four weeks after the manipulation especially in those at the highest risk, in comparison to no affirmation. Comparison of the follow-up with the baseline measures of alcohol consumption for each level of risk indicated that alcohol consumption increased

after the manipulation, in the moderate and high risk self-affirmed groups[10] (a statistical analysis could not be conducted because of the small number of participants in each category). The effect of self-affirmation on increasing the detrimental health risk behaviour of those who are most at risk is in contrast to the findings in the published literature which had indicated that self-affirmation had positive effects on risk perceptions, intentions (see Reed & Aspinwall, 1998 for an exception) and in-situ preparatory behaviour even if this was not translated into adaptive long term health behaviour change. Study 1 also indicated that self-affirmation showed promising effects on reducing unhealthy behaviours up to one week after the manipulation in those at the highest risk.

Study 2 differed from previous research in two ways: (a) The threat level of the health risk (i.e., the breast cancer from alcohol consumption message was designed to be particularly threatening to young women who consumed even low levels of alcohol) and (b) the follow-up behaviour was measured after one month (most studies had included only a one week follow up). With consideration of these differences, there were several plausible explanations for the effects shown in Study 2: (a) The self-affirmation manipulation may not have been effective, (b) self-affirmation manipulations may backfire over longer time periods or (c) self-affirmation manipulations are ineffective on high self-threats. Each of these explanations was explored.

Self-affirmation manipulation failure. In the absence of manipulation checks that specifically determine whether the self-affirmation task has been effective in making central and positive aspects of the self salient (Napper et al., 2009), thus boosting self-integrity, it is difficult to determine if the manipulation was successful. As differences in

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[10]High risk: NA pre-manipulation = 19.16, post-manipulation = 13.64; SA pre-manipulation = 18.91, post-manipulation = 35.13.
Moderate risk: NA pre-manipulation = 10.39, post-manipulation = 9.92; SA pre-manipulation = 10.28, post-manipulation = 18.38

conditions were only apparent on a small number of the variables measured it is possible that the manipulation failed and the differences between conditions on alcohol consumption at one month could be due to a type I error (i.e., the null hypothesis was erroneously rejected when in fact self-affirmation did not actually influence health behaviour change).

Self-Affirmation Theory stated that the aspect of the self-concept that is affirmed should be at least as important as the threatened component of the self-concept (Steele, 1988). In an unpublished study, 90% of participants ($N = 40$) indicated that kindness was important to them – the related humanitarian values of love, generosity, compassion and forgiveness were also rated by a majority of the sample – 95%, 87.5%, 90% and 80%, respectively (Epton, 2006). However, given the drinking culture that is prevalent amongst undergraduates in the UK, the health message may not just have threatened their self-integrity through their health-related self-concept but may also have threatened their social-related self-concept. Therefore, the value of kindness used in Study 2 may not have been of sufficient personal importance to the participants to counteract the high threat.

The failure of Study 2 to find an effect on self-related affect could also indicate that the manipulation was ineffective. However, the manipulation had been used effectively in previous studies (Armitage, Harris, Napper & Hepton, 2008; Reed & Aspinwall, 1998).

Limited duration of self-affirmation effects. Study 2 measured alcohol consumption one month after the experimental procedure compared to the typical one week follow-up (e.g., Harris et al., 2007; Harris & Napper, 2005; Reed & Aspinwall, 1998). It could be possible that self-affirmation is not effective over longer durations. For example, when disconfirmation of the self-affirmed value occurs a reversal of the effects may take place; after receipt of negative feedback on the affirmed value, rationalisation from a dissonance manipulation was reinstated (Galinsky et al., 2000). During the course of one month, there

would be sufficient opportunity for the value of kindness, that was affirmed, to be disconfirmed.

However, the explanation seemed to lack plausibility as, although it is feasible that initial attempts to change health behaviour could diminish over time, due to loss of motivation, lack of efficacy, lack of preparation or the reassertion of old habits, it is hard to explain why self-affirmed participants would then increase the very behaviour that they originally tried to control as they deemed it unhealthy. With regards to lack of preparation, self-affirmation is associated with increased preparatory behaviours such as taking information leaflets and purchasing condoms after an AIDS awareness video (Sherman et al., 2000, Study 2). Recent studies have verified the robustness of this preparatory effect as self-affirmation increased taking information leaflets on how to quit smoking (Armitage et al., 2008), requesting a free sample of sunscreen (Jessop, Simmonds & Sparks, 2009) and clicking on a link to take a type 2 diabetes test (van Koningsbruggen & Das, 2009).

Moreover, the self-affirmed participants in Harris and Napper's (2005) study did not increase their alcohol consumption one month after the experimental manipulation. The effect on academic performance in Cohen et al.'s (2006) study was over the duration of an academic term, although a second manipulation was used at some point, the dependent variables were measured prior to this at one month. These findings suggest that self-affirmation does not backfire after one month so the increase in alcohol consumption found in Study 2 is more likely to be due to an alternative explanation.

Self-Affirmation is ineffective with high threats. The final explanation is that self-affirmation as an intervention may be ineffective when the threat to the self is too high. The message was based on the one used in the Harris and Napper (2005) study that was specifically tailored to a young female audience (e.g., mentioned that 16-24 year olds are

particularly at risk due to their above average alcohol consumption); however, it had been amended to be more threatening (e.g., a graph was included that depicted increased risk even at relatively low levels of alcohol consumption) and included more studies that may have emphasised the credibility of the claim that alcohol was a risk factor for breast cancer.

The threat level of the message seemed to interact with the self-affirmation to produce a psychological reactance response (i.e., an effort to restore personal control after a freedom has been threatened); in this instance the pressure to drastically reduce alcohol consumption could be perceived as a threat to freedom (Ringold, 2002) especially in those who were at the highest risk (Bensley & Wu, 1991). Furthermore, the psychological reactance manifested itself as a "boomerang" effect, i.e., increased the alcohol consumption that the message was intended to reduce.

The EPPM stated that a boomerang effect can occur when a critical point is reached where the threat outweighs beliefs about efficacy leading to a high level of fear (Witte, 1992); this fear control process may well have occurred in the self-affirmed group (although initial reports of efficacy are high). The arousal of psychological reactance in the self-affirmed group may be associated with the increased implicit threat-related affect they experienced as a result of reading the threat component of the health message. Furthermore, the literature on psychological reactance suggested that this response can occur in reaction to messages that recommend abstinence rather than moderation (Bensley & Wu, 1991) and the boomerang effect may occur when a health message induces high emotional arousal that is not alleviated (e.g., by an achievable action recommendation) (Feingold & Knapp, 1977; Hovland, Janis & Kelley, 1953). The self-affirmed participants may have initially processed the threat message in an unbiased fashion and thus experienced a high level of negative affect as they realised that they were at risk of breast cancer from their alcohol

consumption. However, although the explicit recommendation was to reduce alcohol, the self-affirmed participants may have picked up on the recommendation implicit in the threat message, i.e., that even small amounts of alcohol are risky therefore only abstinence or occasional alcohol use would substantially reduce the risk. The high level of implicit negative affect and the recognition of the implicit recommendation of abstinence could have eventually led to reinterpretation of the health message using defensive biases and subsequent reactance leading to increased alcohol consumption.

Motivation as a Moderator

Study 2 did not indicate that motivation was a moderator of the effects of self-affirmation as decisional balance did not interact with self-affirmation condition on any of the variables measured. The moderation effect of motivation in Study 2 may have been precluded due to the strong reaction to the highly threatening message in the self-affirmed participants. Furthermore, the results of Study 1 suggest that self-affirmation may be most effective for those who are least motivated to change their health behaviour (i.e., who regard their health as least important and are at higher risk) therefore other measures of motivation and lower threat health messages may find that motivation moderates the effect of self-affirmation .

Risk as a Moderator

The results of Study 2 indicated that risk can moderate the effects of self-affirmation. However, in contrast to previous studies, self-affirmation had a negative effect on those at the highest risk as shown by reports of increased alcohol consumption one month after the manipulation. Self-affirmed participants who were at the highest risk may have experienced the highest level of threat due to the perceived large impact that taking up

the recommendations would have on them, hence they may have had the most extreme psychological reactance.

Self-Related Affect as a Mediator

Studies 1 and 2 suggested that explicit and implicit self-related affect do not mediate the effect of self-affirmation. A sensitivity analysis indicated that the analysis used in Study 2 was capable of detecting a medium effect (Buchner et al., 2007; see Appendix 3). Koole et al.'s (1999) findings suggested that self-affirmation produced a medium effect on implicit affect. This suggested that self-related affect may not be the affirmational resource behind the effects of self-affirmation. On first glance, this conclusion may seem to conflict with the evidence cited in Chapter 2 that affect does mediate the effect of self-affirmation. However, the cited research suggested that the type of affect that mediates the effect of self-affirmation is other-related affect (such as feelings of love and connectedness) rather than self-related affect (Crocker et al., 2008).

Conclusion

Study 2 found that, in comparison to the non-affirmation condition, the self-affirmation condition displayed higher implicit threat-related affect and a subsequent increase in alcohol consumption after one month in those at the highest risk. The unpredicted results of Study 2 could indicate a failure of the self-affirmation manipulation, a limit to the duration of self-affirmation effects or an ineffectiveness of the manipulation on high threat health messages.

CHAPTER FOUR

Study 3

Self-Affirmation and Health: Risk and Threat Level as Moderators

In line with published studies, Study 1 indicated that self-affirmation has a positive effect on health-related cognitions and affect. However, the findings of Study 2 question the effectiveness of self-affirmation when high threat health messages are used. Study 3 manipulated the threat level of the message and directly compared the effect of self-affirmation on risk-related cognitions, affect and long term behaviour after exposure to either a high threat or a lower threat health message.

Study 2 found that a self-affirmation manipulation increased implicit fear and subsequent alcohol consumption after reading a health message that detailed the increased risk of breast cancer from regular alcohol consumption even at low levels. These findings suggested that self-affirmation may be detrimental at high levels of threat. Although other self-affirmation studies had targeted health behaviours that have severe consequences such as AIDS from unprotected sex (Sherman et al., 2000) and premature death from smoking (Harris et al., 2007), these may not elicit the same degree of affective response as the breast cancer from alcohol consumption message. The negative health consequences of unprotected sex and cigarette smoking are well known, as are the recommendations to always use a condom and to quit cigarette smoking. In contrast, the risk of breast cancer from alcohol is a relatively unknown health risk. The recommendation implied by the message, that even women who regularly drink low levels of alcohol should reduce their alcohol consumption, is more constrained than the typical recommendations that allow a moderate amount of alcohol to be consumed. This type of health message may have had a greater affective impact on the participants, than more familiar health risks and behavioural

recommendations, as the participants will not be able to draw upon habitually used defensive justifications for their behaviour.

As mentioned in Chapter 1, there was also empirical evidence to support the argument that self-affirmation may be ineffective when the threat is high. Fry and Prentice-Dunn (2005) found that those who found the health information regarding breast cancer particularly threatening (i.e., those who had previous vicarious experience of breast cancer) reported a greater degree of maladaptive coping. Although the findings of Study 2 suggested that the threat level of the health message may moderate the effect of self-affirmation there were also two other alternative explanations of the results: (a) The manipulation could have failed and the results could be due to type I error or (b) the effect of self-affirmation could expire over longer time periods. Study 3 sought to rule out these alternative explanations.

The Current Study

For self-affirmation to maintain self-integrity in the face of severe health threat information, the affirmed aspect of self must be of equal importance to the threatened aspect of the self-concept (Steele, 1988). It is possible that an affirmation that allows the selection of idiographic values, rather than a pre-selected value, would provide the strongest boost to self-integrity. The value essay affirmation had been widely used (McQueen & Klein, 2006). The value essay manipulation asks self-affirmed participants to write an essay about their most important value, including examples of how they use the value in their everyday life. The value essay's strength is that it not only allows the participants to select their own value but it maximises the opportunity for self-affirmation due to the time taken to write the essay (this is relatively long compared to the time taken to complete questionnaire based value affirmations). Furthermore, the value essay

manipulation can overcome the problems with manipulation checks. Instead of asking explicit questions to determine the effectiveness of the manipulation, that could negate the effect of the self-affirmation (Sherman & Cohen, 2006), the content of the essays can be scored for level of positive self-reflection (see Harris & Napper, 2005).

In order to more accurately determine whether the threat level of the health message moderated the effect of self-affirmation on predictors of health behaviour change and actual health behaviour a study that manipulated and compared two levels of threat was needed. By manipulating and comparing two levels of threat in a single study (using health messages that target the same behaviour) more robust conclusions regarding the moderating effect of threat level could be drawn from Study 3 than the inferences made from the findings of Study 2.

The literature on threat-related health messages highlighted several ways of varying the threat level of health messages. Messages may vary in: (a) The severity of consequences, (b) susceptibility to threat, (c) vividness of the message, (d) use of personalised language (e.g., YOU are at risk), (e) response-efficacy and (f) self-efficacy (Witte & Allen, 2000). It was likely that the message in Study 2 was regarded as high threat, at least in part, due to the severity of breast cancer as the participants rated this as very high (see Table 14). Therefore, a lower threat message should include lower severity consequences and keep the other factors (e.g., susceptibility) equal in order to be comparable. In other words for both messages, the participants should feel they are susceptible to the health risk at the same level of alcohol consumption. A health message was designed that described less severe consequences of alcohol consumption (i.e., minor accidental injuries) but that young females were susceptible to even at low levels of alcohol consumption (e.g., even one unit can cause impairment and increase the risk of an

accidental injury). To determine whether the effects of self-affirmation decrease over time, participants were sent a follow-up questionnaire measuring drinking behaviour at one week and one month after the manipulation.

The hypotheses were that, in comparison to the control condition, self-affirmation would be associated with:

1. An increase in cognitive and affective predictors of health behaviour change and a reduction in alcohol consumption in the lower threat message condition
2. A change in cognitive and affective predictors of health behaviour change and increased alcohol consumption in the high threat message condition.

Method

Participants

One hundred and two females (age $M = 19.39$; range = 18-29) were recruited for two consecutive studies – a study into student values and a study regarding the communication and understanding of health information. The mean alcohol consumption was 13.28 units per week ($N = 61$ reported that their alcohol consumption recorded at baseline reflected their typical weekly consumption).

Materials

Pre-test interview. This was the same as the pre-test interview used in Study 2.

Self-affirmation manipulation. A value essay manipulation was used (Harris & Napper, 2005; See Appendix 9). Participants in the self-affirmation condition were asked to note down the value that was most important to them (a definition of values was given and examples of values used by other students were given although participants were assured they did not have to select a value from the list). Participants in the control condition were

asked to note down their least important value. The participants were then asked to write a short statement about why this principle or standard was important to them (or another student, in the control condition), how this value had influenced their (another student's) past behaviours or attitudes and how they used this value in their everyday life (another student would use this value in their everyday life) including specific occasions on which this value determined what they did (another student would do).

Health messages. The health message from Study 2 was used as the high threat message. The lower threat message concerned alcohol-related accidental injuries (see Appendix 10). The lower threat message was designed to match the high threat message in format as much as possible. For example, the same number of paragraphs, quotations and figures were used; although all information was based on evidence in both conditions. The threat component of the health message, "Alcohol and accidents" described the increase in the risk of accidental injury with alcohol consumption and how this was of particular concern to 16-24 year old women. The article was based on government, health service and charity group reports (Alcohol Concern, 2001, 2007; Australian National Health & Medical Research Council, 2001; NHS Direct, 2007; Washington Safety Traffic Commission, 1998) and research papers (Borges, Cherpitel & Mittleman, 2004; Gmel et al., 2006; Waller, Thom, Harris & Kelly, 1998; Watt, Purdie, Roche & McClure, 2004, 2005). The response component of the message listed strategies to sensibly manage alcohol consumption (adapted from Info Scotland, 2007) in addition to information regarding the effectiveness with which reducing alcohol prevents accidents (Johnston & McGovern, 2004).

A pilot study was conducted to ensure that the health messages differed in level of threat (using a fear scale, Witte, 2007) and severity but not in other factors that may alter their effectiveness (see Appendix 11). All items were measured on a 5-point scale (*1 = not*

at all, 2 = somewhat, 3 = moderately, 4 = very, 5 = extremely). A series of one-way within participant ANOVAs were conducted with type of health message as the within participants variable. The messages differed significantly in level of threat, $F(1,15) = 11.50$, $p = .004$, and severity of consequences, $F(1,15) = 10.00$, $p = .006$. Specifically, the high threat message was rated as more threatening[11] and the health consequences more severe[12] than was the lower threat message. The health messages did not differ in how controllable participants thought their alcohol consumption[13] was after reading the message, $F(1,15) < 1$, or how believable[14], $F(1,15) = 1.67$, $p = .216$, or how ambiguous they thought that the health message was[15], $F(1,15) < 1$.

Explicit emotion questionnaire. Fear (Cronbach's alpha = .93), self-evaluative negative affect related to threat (Cronbach's alpha = .82) and worry (Cronbach's alpha = .85) were measured on 7-point scales (*not at all – very much*) using the items listed in Studies 1 and 2. Response-related affect (i.e., affective attitude) was measured on 7-point semantic differential scales as described in Studies 1 and 2 (Cronbach's alpha = .89).

Health questionnaire. Severity, vulnerability, response-efficacy, self-efficacy and intentions were measured using the items from Study 2 (see Appendix 5). The reliability for all measures was high (rs (102) = .58 - .79, $ps < .001$).

Procedure

The participants were tested following the procedure outlined in the introduction. Participants were contacted one week and one month after the experiment to complete a follow-up survey regarding their alcohol consumption.

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[11] $M_{LOW} = 1.95$, $SD = .68$; $M_{HIGH} = 2.43$, $SD = .64$
[12] $M_{LOW} = 3.00$, $SD = .89$; $M_{HIGH} = 4.00$, $SD = .97$
[13] $M_{LOW} = 3.44$, $SD = 1.09$; $M_{HIGH} = 3.56$, $SD = .89$
[14] $M_{LOW} = 3.18$, $SD = .75$; $M_{HIGH} = 3.44$, $SD = .73$
[15] $M_{LOW} = 2.31$, $SD = 1.01$; $M_{HIGH} = 2.19$, $SD = .75$

Results

Manipulation Check

The values essays were rated on several variables by an independent rater, who was unaware of the hypotheses of the study (cf., Harris & Napper, 2005). Essays produced by the participants in the self-affirmed condition, in comparison to the essays produced by participants in the control condition, were rated significantly higher on how positive they were about themselves in the essay[16], $F(1,100) = 451.34, p < .001$, how important the value appeared to be to them[17], $F(1,100) = 709.43, p < .001$, how much they wrote about why the value was important to them[18], $F(1,100) = 324.62, p < .001$ and how self-affirmed they appeared to be after writing the passage[19], $F(1,100) = 59.11, p < .001$. The conditions did not differ the amount they had written[20], $\chi^2(1, N = 102) = .07, p = .738$. In short, the manipulation appeared to be successful.

Randomisation Check

For the purposes of the randomisation check only, the conditions were coded into four conditions (i.e., NA-lower threat, NA-high threat, SA-lower threat, SA-high threat) and a series of one-way between participants ANOVAs were conducted. Participants in the four conditions did not differ in age, $F(3,98) = 1.17, p = .326$[21]. The conditions did not differ significantly in baseline alcohol consumption, $F(3,98) < 1$, or number of days alcohol was consumed, $F(3, 98) < 1$. The conditions also did not differ in number of participants

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[16] $M_{NA} = .06$, $SD = .42$; $M_{SA} = 4.42$, $SD = 1.39$ (7-point scale, *0 - 6 not at all – a great deal*)
[17] $M_{NA} = .06$, $SD = .42$; $M_{SA} = 4.94$, $SD = 1.23$ (7-point scale, *0 - 6 not at all – very*)
[18] $M_{NA} = .10$, $SD = .51$; $M_{SA} = 4.08$, $SD = 1.48$ (7-point scale, *0 - 6 not at all – a great deal*)
[19] $M_{NA} = 2.46$, $SD = 1.09$; $M_{SA} = 4.25$, $SD = 1.25$ (7-point scale, *0 - 6 not at all – very*)
[20] Not a lot: $N_{NA} = 17$, $N_{SA} = 19$. Moderate / a lot: $N_{NA} = 33$, $N_{SA} = 33$.
[21] It was not possible to statistically test if the conditions differed significantly in University level or if the participants were alcohol drinkers due to the low numbers of non-level 1 participants (all groups contained a majority of level one participants) and non-drinkers (there were only 6 non-drinkers in the sample).

who reported their reported consumption was typical, $\chi^2(3, N = 101) = 3.36, p = .342$[22]. Therefore, randomisation to condition appeared to be successful (see Table 19).

Table 19. *Baseline Characteristics of Sample*

Variable		Non-affirmed / lower threat ($n = 25$)	Non-affirmed / high threat ($n = 25$)	Self-affirmed / lower threat ($n = 26$)	Self-affirmed / high threat ($n = 26$)	Full sample ($N = 102$)
Age	*M*	19.04	19.24	19.92	19.35	19.39
	SD	1.70	1.39	2.19	1.72	1.78
Alcohol consumption [a]	*M*	15.08	14.02	13.77	10.37	13.28
	SD	14.30	11.84	11.44	8.72	11.67
Days alcohol consumed	*M*	3.12	2.58	2.27	1.98	2.48
	SD	5.21	2.37	2.51	1.97	3.24
University level	*Level 1*	24	23	21	21	89
	Other	1	2	5	5	13
Alcohol drinkers	*Drinkers*	25	23	24	23	95
	Non-drinkers	0	1	2	3	6
Typical consumption	*Typical*	15	12	19	15	61
	Non-typical	10	13	7	10	40
Differences in typicality	*Less than usual*	5	10	3	6	24
	More than usual	5	3	4	4	16

[a] Alcohol consumption calculated using UK units. 1 unit: half pint of beer or cider, ½ small glass of wine, 1 shot of spirit; 1.5 units: bottles of mixers, bottle of beer / cider

Cognitive Predictors of Health Behaviour Change and Behaviour at Follow-up

For all of the following variables a series of three-step regressions were conducted to determine whether the self-affirmation manipulation influenced risk and efficacy cognitions and behaviour change (see Table 20), and whether this was moderated by the threat level of the health message and risk (i.e., units of alcohol consumed measured at baseline; see Table 21).

[22] For those participants who reported their drinking was atypical, it was not possible to analyse if there were differences between conditions in the number of participants who if they usually drank less or more due to the low numbers of participants in each cell.

Table 20. *Mean Responses to Cognitive Predictors of Health Behaviour Change and Behaviour at Follow-up*

Dependent variable		Non-affirmed / lower threat (n = 25)[a]	Non-affirmed / high threat (n = 25)[b]	Self-affirmed / lower threat (n = 26)[c]	Self-affirmed / high threat (n = 26)[d]	Full sample (N = 102)
Vulnerability	*M*	3.26	3.40	3.73	2.73	3.27
	SD	1.21	1.55	1.56	1.15	1.41
Severity	*M*	4.48	6.52	5.00	5.63	5.57
	SD	.87	.77	1.50	1.44	1.38
Self-efficacy[23]	*M*	5.30	5.20	5.33	5.30	5.28
	SD	1.49	1.66	1.59	1.42	1.52
Response-efficacy	*M*	4.22	5.08	5.46	4.94	4.93
	SD	1.44	1.44	1.37	1.41	1.46
Intentions[23]	*M*	3.50	4.39	3.88	4.15	3.97
	SD	1.55	1.51	2.08	1.43	1.68
Units consumed (at one week)[23]	*M*	9.65	13.5	12.92	16.20	12.36
	SD	6.98	5.31	10.38	10.18	8.24
Drinking days (at one week)[23]	*M*	1.80	2.50	2.17	1.80	2.00
	SD	1.48	1.29	1.94	.84	1.41
Units consumed (at one month)[23]	*M*	17.69	20.08	25.38	10.00	17.90
	SD	28.77	15.76	20.79	9.14	19.81
Drinking days (at one month)[23]	*M*	2.00	2.67	3.38	1.56	2.33
	SD	1.51	1.97	2.33	1.01	1.80

[a] n = 10 for one week follow-up, n = 8 for one month follow-up, [b] n = 6 for one week follow-up, n = 8 for one month follow-up, [c] n = 4 for one week follow-up, n = 6 for one month follow-up, [d] n = 5 for one week follow-up, n = 9 for one month follow-up

[23] Analysis conducted on alcohol drinkers only

Table 21. *Summary of Moderated Regression Analyses for Self-Affirmation x Threat x Risk to Predict Cognitive Predictors of Health Behaviour Change and Behaviour at Follow-up*

Variable	Step	Variable entered	β			R^2	Model F	R^2 Change	F Change
			Step 1	Step 2	Step 3				
Vulnerability	1	Risk	.46***	.35*	.31*				
		Threat	-.11	.06	.06				
		SA	.01	.19	.18	.23	9.77***		
	2	SA x Threat		-.29	-.29				
		SA x Risk		.08	.13				
		Threat x Risk		.09	.14	.27	5.88***	.04	1.75†
	3	SA x Th x Risk			-.08	.27	5.05***	.00	.32
Severity	1	Risk	.11	.05	-.04				
		Threat	.59***	.75***	.74***				
		SA	.04	.20	.19	.38	19.67***		
	2	SA x Threat		-.30*	-.31*				
		SA x Risk		-.29**	-.16**				
		Threat x Risk		.02	.15	.45	12.75***	.07	4.02*
	3	SA x Th x Risk			-.21	.46	11.53***	.02	2.76
Self-efficacy	1	Risk	-.34***	-.27	-.37*				
		Threat	-.05	-.03	-.04				
		SA	-.00	-.01	-.01	.12	3.96**		
	2	SA x Threat		-.02	.01				
		SA x Risk		-.03	.13				
		Threat x Risk		-.09	.06	.12	2.02	.01	.18
	3	SA x Th x Risk			-.25	.15	2.15*	.03	2.70

Variable	Step	Variable entered	β			R^2	Model F	Variable	Step
			Step 1	Step 2	Step 3				
Response-efficacy	1	Risk	--.20*	-.11	-.17				
		Threat	.04	.29*	.28*				
		SA	.17	.43**	.42**	.08	2.72*		
	2	SA x Threat		-.45**	-.46**				
		SA x Risk		-.22	-.13				
		Threat x Risk		.07	.16	.17	3.26**	.09	3.28*
	3	SA x Th x Risk			-.15	.18	2.92**	.01	.90
Intentions	1	Risk	-.26*	-.23	-.20				
		Threat	.16	.12	.12				
		SA	.00	.04	.04	.10	3.26*		
	2	SA x Threat		-.12	-.13				
		SA x Risk		-.19	-.24				
		Threat x Risk		.12	.07	.14	2.38*	.04	1.44
	3	SA x Th x Risk			.08	.14	2.06	.00	.27

†$p = .10$,
*$p < .05$, **$p < .01$, **$p < .001$

The main effect of self-affirmation, $\beta = .42$, $p = .002$, was significant for response-efficacy. Response-efficacy was higher among participants in the self-affirmed than the non-affirmed condition. There was an interaction between self-affirmation and the threat level of the message for response-efficacy, $\beta = -.27$, $p = .006$ (see Figure 9). Simple slopes revealed that self-affirmation did not significantly affect response-efficacy when a high threat message was used, $\beta = -.05$, $p = .729$; however, self-affirmation significantly increased response-efficacy when a lower threat message was used, $\beta = .43$, $p = .002$.

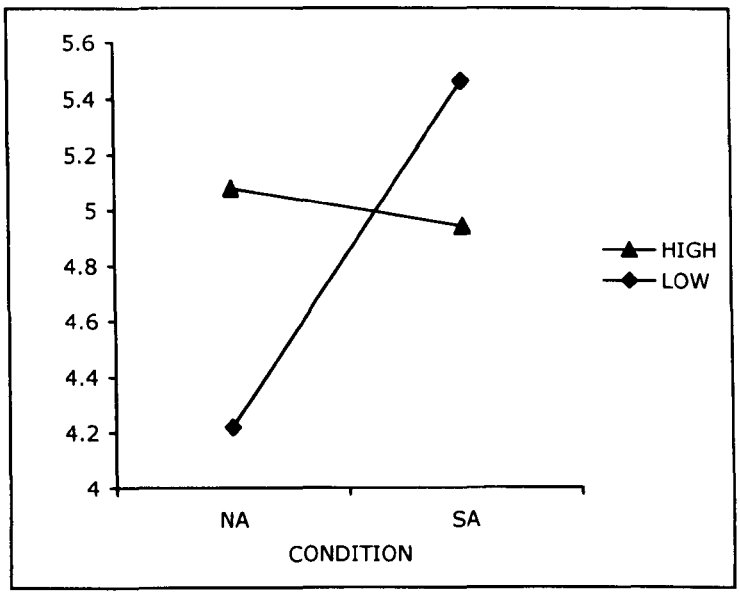

Figure 9. The effect of self-affirmation on response-efficacy as a function of threat.

The main effect of self-affirmation also approached significance for severity, $\beta = .19$, $p = .076$. There was also an interaction between self-affirmation and the threat level of the health message for severity, $\beta = -.31$, $p = .024$ (see Figure 10). Simple slopes revealed that self-affirmation did not significantly affect severity when a high threat message was used, $\beta = -.09$, $p = .414$; however, this approached significance when a lower threat message was used, $\beta = .19$, $p = .093$. Self-affirmation increased severity in the lower threat condition.

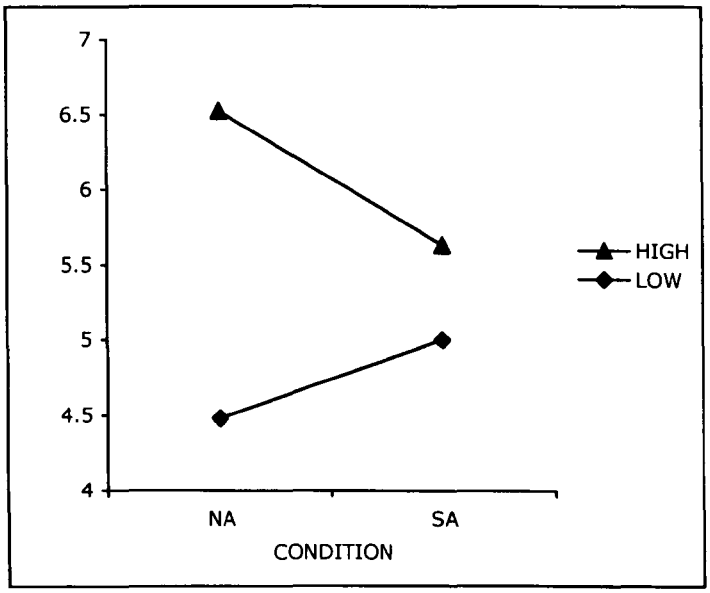

Figure 10. The effect of self-affirmation on severity as a function of threat.

The interaction between self-affirmation and the threat level of the message also approached significance for vulnerability, $\beta = -.29$, $p = .062$ (Figure 11). Simple slopes analysis revealed that self-affirmation did not significantly affect vulnerability when a lower threat message was used, $\beta = .17$, $p = .226$; however, the effect of self-affirmation on vulnerability approached significance when a high threat message was used, $\beta = -.24$, $p = .087$. Self-affirmation decreased vulnerability with a high threat message.

As expected the main effect of threat level of the health message on severity was significant, $\beta = .74$, $p < .001$, there was also a main effect for threat level of the health message on response-efficacy, $\beta = .28$, $p = .040$; the higher threat level was related to higher perceived severity and response-efficacy. There was a main effect of risk on self-efficacy, $\beta = -.37$, $p = .023$, and vulnerability, $\beta = .31$, $p = .037$; self-efficacy was highest and vulnerability was lowest in those least at risk. There were no other significant main effects or interactions on cognitive predictors of health behaviour change.

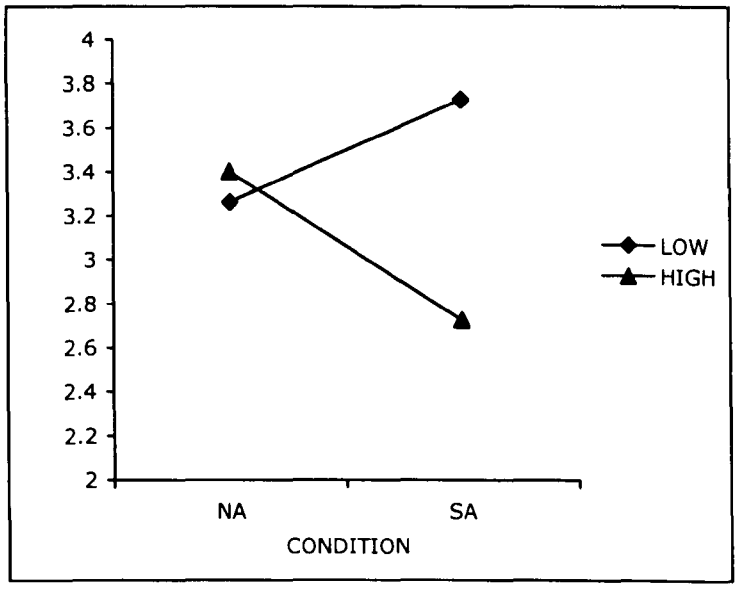

Figure 11. The effect of self-affirmation on vulnerability as a function of threat.

The one week follow-up survey was returned by 27.45% of participants; there were no significant associations between conditions and return rate[24], $\chi^2(3, N = 102) = 2.93, p = .403$. The one month follow-up survey was returned by 32.35% of participants, there were no significant associations between condition and return rate, $\chi^2(3, N = 102) = 1.30, p = .729$.

Due to the low response rate regression analyses were precluded. A series of two-way ANCOVAs, with threat level of the health message and self-affirmation condition as independent variables and risk (and baseline days drinking where appropriate) as a covariate, were used to investigate whether self-affirmation and the threat level of the health message interacted to change drinking behaviour. There was an interaction between the threat level of the health message and self-affirmation for days drinking at one month, $F(5, 25) = 4.61, p = .042$ (see Figure 12). Simple main effects revealed that there were no

[24] The conditions were coded into four conditions (i.e., NA-lower threat, NA-high threat, SA-lower threat, SA-high threat) for the analysis of return rate only.

significant differences between the affirmed and non-affirmed group after exposure to a high threat health-message, $F(3, 12) < 1$; however, the effect of self-affirmation on days drinking approached significance in the lower threat condition, $F(3, 11) = 3.79, p = .075$. The trend was that self-affirmation was related to more days drinking at one month in those who read the lower threat message and less days drinking in those who read the high threat message compared to the non-affirmed group. There were no other main effects or interactions on behaviour at follow-up.

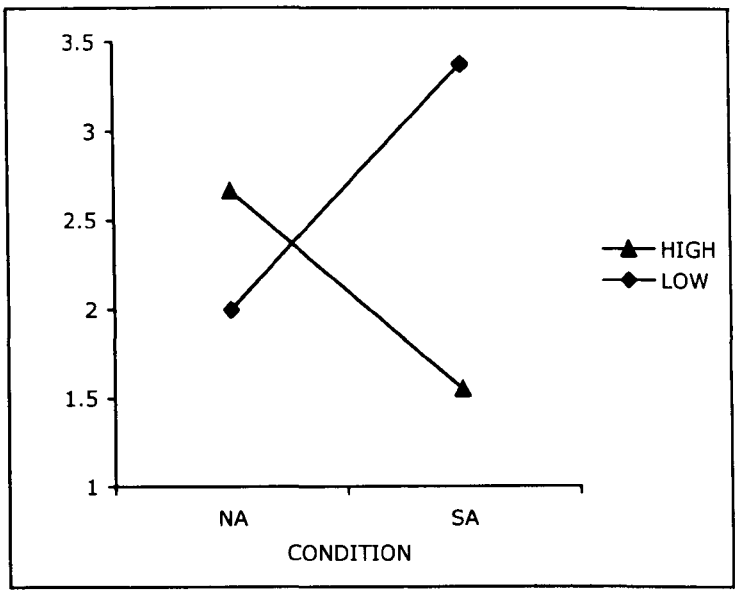

Figure 12. The effect of self-affirmation on days drinking at one month as a function of threat.

Affective Predictors of Health Behaviour Change

Three-step regression analyses were conducted to investigate whether self-affirmation influenced explicit emotions (see Table 22) or whether these were moderated by the threat level of the health message or risk (i.e., units of alcohol consumed measured at baseline; see Table 23). There were no main effects of self-affirmation on threat- and response-related affect. There was a main effect of risk on response-related affect, $\beta = -.37$,

$p = .017$; those at the highest risk reported more positive feelings towards reducing their alcohol. There were no other significant main effects or interactions on affective predictors of health behaviour change.

Table 22. *Mean Responses to Affective Predictors of Health Behaviour Change*

Dependent variable [a]		Non-affirmed / lower threat ($n = 25$)	Non-affirmed / high threat ($n = 25$)	Self-affirmed / lower threat ($n = 26$)	Self-affirmed / high threat ($n = 26$)	Full sample ($N = 102$)
Fear	*M*	2.43	3.35	2.65	2.99	2.86
	SD	.99	1.62	1.39	1.35	1.38
Self-evaluative related to threat[25]	*M*	2.39	2.89	2.46	2.42	2.54
	SD	.85	1.06	1.07	.96	.99
Worry[25]	*M*	3.43	3.86	3.15	3.24	3.42
	SD	1.50	1.46	1.40	1.35	1.43
Response-related[25] (affective attitude)	*M*	4.11	4.03	3.81	4.02	3.99
	SD	1.15	1.20	1.41	.88	1.16

[25] Analysis conducted on alcohol drinkers only

Table 23. *Summary of Moderated Regression Analyses for Self-Affirmation Condition x Threat Condition x Risk to Predict Affective Predictors of Health Behaviour Change*

Variable	Step	Variable entered	β			R^2	Model F	R^2 Change	F Change
			Step 1	Step 2	Step 3				
Fear	1	Risk	.07	-.06	-.06				
		Threat	.18	.30*	.30*				
		SA	-.03	.07	.07	.04	1.25		
	2	SA x Threat		-.18	-.18				
		SA x Risk		.16	.16				
		Threat x Risk		.04	.03	.07	1.15	.03	1.06
	3	SA x Th x Risk			.01	.07	.98	.00	.01
Self-evaluative related to threat	1	Risk	.06	-.05	.03				
		Threat	.12	.09	.09				
		SA	-.09	-.09	-.08	.03	.80		
	2	SA x Threat		-.12	-.15				
		SA x Risk		.01	-.12				
		Threat x Risk		.15	.02	.06	.89	.03	.98
	3	SA x Th x Risk			.22	.08	1.03	.02	1.84
Worry	1	Risk	.05	-.04	.03				
		Threat	.10	.04	.04				
		SA	-.15	-.11	-.11	.04	1.10		
	2	SA x Threat		-.04	-.07				
		SA x Risk		-.13	-.24				
		Threat x Risk		.27	.15	.09	1.47	.06	1.82
	3	SA x Th x Risk			.19	.11	1.48	.02	1.44

Variable	Step	Variable entered	β			R^2	Model F	R^2 Change	F Change
			Step 1	Step 2	Step 3				
Response-related (affective attitudes)	1	Risk	-.46***	-.41**	-.37*				
		Threat	-.00	-.00	.00				
		SA	-.10	-.09	-.09	.21	8.12***		
	2	SA x Threat		.02	.01				
		SA x Risk		-.06	-.13				
		Threat x Risk		-.01	-.09	.21	4.00***	.00	.11
	3	SA x Th x Risk			.12	.22	3.50***	.01	.64

*$p < .05$, ** $p < .01$, ***$p < .001$

Reading Times

A three-step regression analysis was conducted with total reading time for the threat message as the dependent variable to investigate the effect of self-affirmation (see Table 24) and whether risk (i.e., units of alcohol consumed measured at baseline) or the threat level of the message were moderating factors (see Table 25). There was no main effect of self-affirmation on reading time of the threat message. There was a main effect of risk, $\beta = -.33$, $p = .027$, and the threat level of the health message, $\beta = -.37$, $p = .003$, with faster reading times in those at lowest risk and those in the lower threat condition, respectively. There were no significant interactions for reading time of threat message.

Table 24. *Mean Reading Times for Health Message*

Dependent variable		Non-affirmed / lower threat ($n = 25$)	Non-affirmed / high threat ($n = 25$)	Self-affirmed / lower threat ($n = 26$)	Self-affirmed / high threat ($n = 26$)	Full sample ($N = 102$)
Threat message	*M*	139460.64	112226.84	136078.31	98119.04	121385.50
	SD	46258.26	36426.81	29579.75	18528.79	37708.04
Response message	*M*	67932.96	59617.12	67013.08	52778.27	61797.32
	SD	17992.27	19692.45	13312.10	14122.24	17341.88

The analysis was repeated for total reading time for the response message. There was no main effect of self-affirmation for reading time of the response message. There was a main effect risk, $\beta = -.32$, $p = .043$, such that those at the highest risk spent the least time reading the message. The main effect of threat level of the message approached significance, $\beta = -.26$, $p = .058$; those who read the high threat message spent less time reading than those who read the lower threat message.

Table 25. *Summary of Moderated Regression Analyses for Self-Affirmation Condition x Threat Condition x Risk to Predict Reading Times*

Variable	Step	Variable entered	β Step 1	β Step 2	β Step 3	R^2	Model F	R^2 Change	F Change
Threat message	1	Risk	-.27**	-.37**	-.33*				
		Threat	-.46***	-.38**	-.38**				
		SA	-.15	-.07	-.07	.27	12.27***		
	2	SA x Threat		-.13	-.12				
		SA x Risk		.15	.09				
		Threat x Risk		.00	-.06	.29	6.57***	.02	.91
	3	SA x Th x Risk			.10	.30	5.67***	.00	.48
Response message	1	Risk	-.22*	-.31*	-.32*				
		Threat	-.35***	-.25	-.26				
		SA	-.14	-.05	-.05	.17	6.62***		
	2	SA x Threat		-.15	-.15				
		SA x Risk		.17	.17				
		Threat x Risk		-.02	-.02	.20	3.83**	.03	1.03
	3	SA x Th x Risk			-.01	.20	3.25**	.00	.00

*$p < .05$, ** $p < .01$, ***$p < .001$

Discussion

Study 3 compared the effect of self-affirmation on risk-related cognitions, affect and long term behaviour and the moderating effect of risk and threat. Study 3 used an experimental design to compare groups that differed in level of affirmation (self- or non-affirmation) on affective, cognitive and behavioural responses, after exposure to a lower or high threat health message regarding alcohol consumption. Study 3 found a main effect of self-affirmation on response-efficacy that was qualified by an interaction with the threat level of the health message. Self-affirmation successfully increased response-efficacy and severity, after exposure to a lower threat but not a high threat message. Self-affirmation prior to exposure to a high threat message had a detrimental effect by reducing perceptions of vulnerability, albeit marginally. Self-affirmation was also related to an increase in the number of days participants reported consuming alcohol one month after exposure to a lower threat health message. However, it should also be acknowledged that the sample size for follow-up was relatively small so caution is warranted in drawing conclusions from this.

The idea that the results of Study 2 were due to self-affirmation manipulation failure seems unlikely as a stringent manipulation check was carried out in Study 3. The limited duration explanation also seems improbable as the current study found that self-affirmation was ineffective for those in the high threat condition immediately after the manipulation.

Threat as a Moderator

Study 3 found that the threat level of the health message moderated the effect of self-affirmation on response-efficacy, severity and vulnerability. It seemed that with lower threat health messages, self-affirmation manipulations effectively increase risk and efficacy perceptions. Recent unpublished research also suggested that level of threat, albeit from risk level rather than the content of the health message, moderates the effect of self-

affirmation. Participants who experienced high threat, due to a manipulated perception of high vulnerability, reported a less positive attitude towards a health message after self-affirming. Furthermore, self-affirmed participants who experienced high threat displayed less processing of the health message in comparison to the non-affirmed participants, as they did not differentiate between strong and weak arguments; however, the self-affirmation manipulation was successful at increasing processing in those who perceived themselves as moderately vulnerable and thus experienced less threat (van Koningsbruggen & Das, 2009[a]). Klein and Harris (in press) also suggested that self-affirmation leads to an attentional bias that is moderated by level of threat derived from the level of risk; self-affirmation resulted in an attentional bias towards threat words in a health message in contrast to an attentional bias away from these words in the non-affirmed condition. However, these effects only occurred in those participants who experienced lower threat due to their lower risk.

It is worrying that self-affirmation in combination with a high threat health message is not always merely ineffective it can also lead to detrimental cognitions and behaviour. For example, there was a trend for self-affirmation to decrease perceived vulnerability in Study 3 and increase alcohol consumption in Study 2 after exposure to a high threat health message (also see van Koningsbruggen & Das, 2009[a]). Van Koningsbruggen and Das (2009[a]) suggested that under conditions of high threat, the information is regarded as highly threatening and because self-affirmation has put the self-system "on-line" (i.e., attention is directed to the self-system), it makes the whole self-system vulnerable to the threat resulting in strong defensive responses. Under these conditions, the most adaptive response is to decrease attention to and processing of the information in order to avoid the threat.

This suggests that it may only be appropriate to use self-affirmation interventions in conjunction with lower threat health messages.

Days Drinking

Self-affirmation led to an increase in days drinking one month after reading the lower threat health message. It is hard to interpret this result as increased days drinking initially seems detrimental to health and seemed to contradict the pattern of results found in Study 3 especially as the units of alcohol consumed at one month were also high in the self-affirmed lower threat condition. However, these results should be interpreted with caution as the self-affirmed / lower threat condition participants did not report an increase the amount of alcohol that they consumed at one week after the manipulation, there was a large amount of variability in reported alcohol consumption and the analyses were based on a small sample size so the result may be specious.

Limitations of Study

A potential limitation of Study 3 is that the health risks were not matched on all factors. The health messages had been closely matched in terms of susceptibility threshold; however, the health risk of breast cancer and accidental injury differed with regard to the cumulative effects of alcohol. The lower and high threat message both suggested that the health risk was dose-dependent. However, the risk of breast cancer increases with the total alcohol consumed over time, whereas the risk of accidental injury accumulated only over a single drinking session. The moderating effect may have been due to the participant's level of perceived control, as reducing drinking over each session seems more manageable than reducing drinking over a lifetime. However, the potential confound of controllability seems unlikely given that the pilot study found no differences between the messages in terms of how controllable the participants thought their alcohol consumption was.

A further limitation of Study 3 was that the estimates of alcohol consumption were not as accurate they could have been, as units consumed were based on the units for the average alcoholic beverage of that type; the brand of alcohol was not taken into account, despite brand differences in alcoholic content. Furthermore, the follow-up questionnaire was a measure of retrospective alcohol consumption therefore the self-reports of alcohol consumption may have lacked accuracy.

Conclusion

Study 3 found that the threat level of the health message moderated the effect of self-affirmation on risk and efficacy cognitions and suggested that self-affirmation manipulations may be most effective in conjunction with lower threat health messages.

CHAPTER FIVE

Study 4

Self-Affirmation and Health:

Risk and Motivation (Prevention Focus) as Moderators

Previous research (including some studies in this thesis) indicated that self-affirmation manipulations can influence cognitive and affective predictors of health behaviour change. The literature had also shown that self-affirmation manipulations may be capable of motivating long-tem behaviour change. However, recent studies (including Study 3 of this thesis) suggested that self-affirmation is most effective when the threat level is low to moderate. Study 4 tried to maximise the potential of self-affirmation to effect a behavioural change by ensuring that participants experienced only low to moderate levels of threat by using a health message that encouraged a health promoting behaviour. Study 4 also measured an alternative affective predictor of health behaviour change - self-discrepancy related affect - and examined the moderating effect of implicitly measured motivation using prevention focus.

Lower Threat Health Messages

To date the literature on self-affirmation and health had (a) largely targeted unhealthy behaviours (e.g., unprotected sex, caffeine consumption, alcohol consumption, and cigarette smoking) that recommend a reduction or cessation of the behaviour in order to improve health and (b) used negatively framed messages (i.e., they detailed the negative health consequences of not following the recommendation).[26] Most of these types of health

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[26]Two studies had also targeted screening behaviours (e.g., breast self-examination, diabetes screening) that (a) used negatively framed messages (i.e., they gave details of the negative health consequences of the disease) and (b) recommended performing a behaviour that could lead to detection of the disease (Fry & Prentice-Dunn, 2005; van Koningsbruggen & Das, 2009[b]).

messages included recommendations that a particular behaviour is reduced rather than a recommendation that a particular behaviour is increasedThe effect of self-affirmation on health promoting behaviours that use a positive frame and recommend performing a particular behaviour have been under researched; only one study used that type of health message (promoting sun-screen use, Jessop et al., 2009).

The use of lower threat health messages should maximise the potential of self-affirmation to effect a long term change in behaviour (see Study 3). A positively framed health message should be perceived as less threatening than a negatively framed health message but will still have the potential to elicit defensive responding (Cox & Cox, 2001). For example, positively framed health messages regarding exercise were rated as having less severe consequence than health messages that framed the same health consequences in negative terms (Robberson & Rogers, 1988). Additionally, performing health-promoting behaviours (such as eating more fruit and vegetables) may be perceived as less threatening than reducing unhealthy behaviours or screening behaviours; for example, reducing the consumption of alcohol, caffeine or cigarettes could lead to unpleasant withdrawal effects and screening behaviours could lead to discovery of a disease. Study 4 used a positively framed health message that focused on the health promoting and disease preventing positive effects of eating fruit; the message also included a behavioural recommendation to increase a particular behaviour (i.e., eat more fruit and vegetables).

Affective Predictors of Health Behaviour Change: Self-Discrepancy Related Affect

Self-Discrepancy Theory (Higgins, 1987) suggests that people have a fundamental motivation to match their current self-concept with a desired self-concept (i.e., a self guide they ideally aspire to or feel they ought to be, termed ideal or ought self, respectively). When a personally salient self-guide is activated (e.g., the ideal or ought self of "being

healthy" could be activated when exposed to relevant health risk information) the type of emotion experienced acts as a signal that indicates the state of the current self, in comparison to the activated standard. Positive affect such as cheerfulness (e.g., feeling upbeat) and quiescence-related affect (e.g., calm) indicate that the current self matches a self-guide. Negative affect such as dejection-related (e.g., discouragement) and agitation-related affect (e.g., uneasy) signifies that the current self-concept falls short of the self-guide standard. According to the theory, the presence of negative emotion motivates action to reduce the self-discrepancy in order to attain the activated standard.

As self-affirmation is related to greater acknowledgement of the risk and perceived vulnerability to the risk (Harris et al., 2007; Harris & Napper, 2005; Sherman et al., 2000) self-affirmed participants might acknowledge a greater discrepancy between their current health-related self-concept and an ideal or ought self. Therefore, it would be expected that self-affirmed participants would experience greater negative self-discrepancy related affect[27] (e.g., dejection and agitation) as a result of acknowledging their self-discrepancy than control participants, would be less likely to accept their discrepant behaviour.

It is difficult to predict the effect of self-affirmation on positive self-discrepancy related affect as self-affirming could activate standards that are unrelated to health (e.g., the goal of being kind may be activated after completing a value questionnaire regarding kindness). Self-Discrepancy Theory would suggest that recognising a health-related self-discrepancy would lead to less cheerfulness and quiescence as the goal of "being healthy" has not been achieved. However, self-affirmation could increase positive affect as the act of self-affirming emphasises other aspects of the self-concept in which the participant is non-

[27] Self-discrepancy related affect differs from the self-related affect discussed in Studies 1 and 2. Self-related affect in Studies 1 and 2 referred to how participants felt about themselves (e.g., proud); self-discrepancy related affect refers to affect related to achieving or not achieving a self-standard (e.g., cheerful because a self-standard is met).

discrepant (e.g., reflecting on past acts of kindness would indicate that the person had achieved their standard of kindness and thus would feel more cheerful or quiescent). Furthermore, Carver and Scheier's Control Theory (1990) suggests that positive affect is experienced upon achievement of a goal (e.g., being a kind person) that subsequently facilitates the pursuit of another goal (e.g., maintaining health; Carver, 2003; Louro, Pieters & Zeelenberg, 2007). Therefore, positive self-discrepancy related affect may be increased or decreased by self-affirmation.

Motivation as a Moderator

Study 1 explored motivation, as a moderator of self-affirmation, using a generic explicit measure of health-related motivation, importance of health. Study 2 used an explicit health-related motivation measure of decisional balance specifically related to the targeted behaviour. Study 4 examined the moderating effect of a generic motivational predisposition, prevention regulatory focus, measured implicitly.

Regulatory Focus Theory (Higgins, 1996) is an extension of Self-Discrepancy Theory which suggests that individuals differ in the type of self-guides that they use as standards. Prevention regulatory focus is a motivational predisposition that originates from techniques that emphasise safety (e.g., prudence and punishment) used by significant others (e.g., parents, partners, friends, employers) to encourage the attainment of standards that ought to be met (Higgins, 1996, 1999). Those with a high prevention focus have a motivational predisposition to attend to safety concerns derived from their predilection for security. In contrast, those with a low prevention focus lack this vigilance for safety (Higgins, 1996). For example, high prevention focus was associated with a preference for products that are advertised with an emphasis on safety features rather than luxury features (Werth & Forster, 2007). Furthermore, high prevention focus enhanced the effect of fear

and worry elicited by health information leaflets by leading to an increased readiness to engage in cancer screening (Uskul, Keller & Oyserman, 2008). These findings suggested that level of prevention focus may moderate the effect of self-affirmation. In line with the trend shown in Study 1, self-affirmation should encourage those least motivated (low prevention focus) to accept the health risk information.

The Current Study

Study 4 attempted to maximise the potential of self-affirmation manipulations to influence risk and efficacy cognitions and subsequent health behaviour change. An alternative affective predictor of health behaviour change, self-discrepancy related affect, was explored in order to extend the repertoire of outcome measures used in self-affirmation studies regarding health. Motivation to attend to health risk information was also explored as a moderator, measured using implicit prevention focus. Study 4 also used a validated behavioural follow-up measure.

The hypotheses were that, compared to non-affirmed participants, self-affirmed participants would report:

1. Higher levels of affective and cognitive predictors of health behaviour change that would be moderated by risk and prevention focus
2. A larger increase in subsequent fruit and vegetable consumption.

Method

Participants

Ninety-three female under- and post-graduates (age $M = 21.48$; range 18-46 years) were recruited for a study regarding the communication and understanding of health information. Participants were remunerated for their time with course credit or £5. The

mean reported level of fruit and vegetable consumption prior to the experiment was 4.69 portions per day.

Materials

24 hr recall interview. The interview procedure detailed in Study 1 was used. As reported and estimated consumption correlated significantly, $r(90) = .57$, $p < .001$, the mean was used to form a combined fruit and vegetable score that was used in all further analyses.

Self-affirmation manipulation. The experimental and control manipulations were the kindness manipulation and trivial opinion questionnaires (Reed & Aspinwall, 1998) used in Study 2.

Health message. The article, *'5 A Day'* (Department of Health, 2003) described the health promoting and disease prevention benefits of eating at least 5 portions of fruit and vegetables each day (see Appendix 12). The message was positively framed; e.g., "It has been estimated that increasing your consumption of fruit and vegetables can significantly reduce the risk of many chronic diseases, such as heart disease, stroke and cancer by up to 20%" and "There are many advantages to increasing fruit and vegetable consumption, including enhancing the immune system and improving bowel function. It can also aid the management of diabetes" (taken from the disease prevention and health promotion sections, respectively). The message also included an explanation regarding how the positive benefits of eating fruit and vegetables occur, an explicit recommendation to eat 5 portions each day and suggestions on how to achieve this (from Cox et al., 1997).

Explicit emotion questionnaire. Participants were asked to rate their current feelings on 14 emotion adjectives (taken from Crowe & Higgins, 1997) on 5-point scales (*not at all – very*). The emotion adjectives were dejection-related e.g., discouraged (Cronbach's alpha

= .70), cheerfulness-related e.g., happy (Cronbach's alpha = .75), agitation-related e.g., uneasy (Cronbach's alpha = .71) and quiescence-related e.g., calm (Cronbach's alpha = .77). Additionally, fear, threat and shame-related affect e.g., ashamed ($r(90) = .77, p < .001$) were also included (see Appendix 13 for a full list of dependent variables).

Health questionnaire. Severity was measured using 1 item adapted from the one used in the previous studies. Vulnerability was measured using 2 items on 7-point scales (*not at all likely – very likely*). The health-framed item was "How likely is it that you will experience good health from your current intake of fruit and vegetables?" and the illness-framed item was "How likely is it that you will experience poor health, in the future, from your current intake of fruit and vegetables?" As the items showed low correlation they were used as separate items in the statistical analysis.

Self-efficacy was measured using 4 items (Cronbach's alpha = .78) on 4-point scales (*not at all true, barely true, moderately true, exactly true*); e.g., "I know for sure that I could adhere to eating at least 5 portions of fruit and vegetables each day" (adapted from Fuchs, Leppin, Schwarzer & Wegner, 1993). Response-efficacy was measured using 6 items (Cronbach's alpha = .71) measured on 7-point scales (*strongly disagree – strongly agree*); e.g., 'Eating at least 5 portions of fruit and vegetables each day will reduce my risk of heart disease and some cancers'. Post-message intentions were measured using 2 items ($r(90) = .86, p < .001$) adapted from the previous studies.

Regulatory focus. After Higgins, Shah and Friedman (1997), the strength of regulatory focus was determined by recording the time taken for the participant to list 4 attributes that they would ideally like to possess and 4 attributes that they thought they ought to possess (presented in a ostensibly random order). This was followed by a rating of the perceived importance of the attribute (i.e., how much the participant ideally would /

ought to possess the attribute) and the respondent's rating of their current standing on the attribute. Prevention focus was calculated by summing the response time taken for listing the first 3 ought attributes and the time taken to rate the importance and standing on these attributes. Promotion focus (i.e., a motivational predisposition to attend to accomplishments and innovations) was calculated in the same manner but using the ideal attributes and ratings. Promotion focus was measured in order to control for overall strength of regulatory focus in the statistical analyses. Using the first 3 self-guides ensured that the guides were chronically accessible and therefore improved the accuracy of the measure of strength of regulatory focus (Higgins et al., 1997).

Follow-up. Participants were instructed to keep a record of the number of portions of fruit and vegetables eaten in the 7 days after the manipulation using the same method as detailed in Study 1.

Procedure

The procedure was similar to that detailed in Chapter 1 with the addition of the regulatory focus task performed after the outcome measures. Participants were asked to keep a food diary for the following seven days and mail this to the department one week later.

Results

Manipulation Check

Participants who had provided responses to 5 or more of the self-affirmation manipulation questions were taken to be self-affirmed. Three participants, who completed fewer than 5 items, were removed from the sample, leaving a sample size of 90. 93.75% of the self-affirmation condition was considered to be self-affirmed.

Randomisation

There were no differences between conditions in age, $F(1, 88) < 1$, type of accommodation, $\chi^2(1, N = 90) = 2.31, p = .204$, or university level, $\chi^2(2, N = 90) = .08, p = .960$ (see Table 26).

Table 26. *Baseline Characteristics of the Sample*

Variable		Non-affirmed ($n = 45$)	Self-affirmed ($n = 45$)	Full sample ($N = 90$)
Age (years)	*M*	21.71	21.24	21.48
	SD	5.04	4.13	4.59
Actual consumption (portions)	*M*	5.27	5.24	5.26
	SD	2.38	3.03	2.71
Estimated consumption (portions)	*M*	3.94	4.31	4.13
	SD	1.53	1.56	1.55
Combined consumption (portions)	*M*	4.61	4.78	4.69
	SD	1.72	2.09	1.91
Difference in actual and estimated consumption (portions)	*M*	1.33	.93	1.13
	SD	2.02	2.40	2.22
Promotion focus (response time)	*M*	10814	10368	10591
	SD	6376	5236	5805
Prevention focus (response time)	*M*	10953	10586	10769
	SD	5895	5062	5467
Type of accommodation	*Self catered*	32	38	70
	Catered	13	7	20

The conditions also did not differ in reported fruit and vegetable consumption, $F(1, 88) < 1$, estimated fruit and vegetable consumption, $F(1, 88) = 1.26, p = .264$, difference in reported and estimated fruit and vegetable consumption, $F(1, 88) < 1$, or the combined fruit and vegetable consumption measure, $F(1,88) < 1$. The conditions did not differ in prevention focus, $F(1, 88) < 1$, or promotion focus, $F(1, 88) < 1$. These results indicated that randomisation to condition was successful (see Table 26).

Cognitive Predictors of Health Behaviour Change

A series of four-step regressions were conducted to determine whether the self-affirmation manipulation successfully promoted increased risk and efficacy cognitions (see

Table 27) and whether this was moderated by prevention focus and risk (i.e., portions of fruit and vegetables consumed at baseline; see Table 28). In order to ensure that the results were due to level of prevention focus, rather than strength of overall regulatory focus, promotion focus was entered at step one.

There were main effects of self-affirmation on self-efficacy, $\beta = .24$, $p = .012$, response-efficacy, $\beta = .23$, $p = .034$, and fruit and vegetable consumption at one week follow-up, $\beta = .14$, $p = .028$ (see Figure 13). Self-affirmed participants reported greater self-efficacy, response-efficacy and fruit and vegetable consumption at one week follow-up than non-affirmed participants.

Table 27. *Mean Responses to Cognitive Predictors of Health Behaviour Change*

Dependent variable		Non-affirmed ($n = 45$)[a]	Self-affirmed ($n = 45$)[b]	Full Sample ($N = 90$)	Effect size *d*
Vulnerability (illness focused)	*M*	3.44	3.24	3.34	-.15
	SD	1.31	1.37	1.33	
Vulnerability (health focused)	*M*	3.29	2.93	5.68	-.27
	SD	1.34	1.19	1.39	
Severity	*M*	5.20	5.25	5.22	.04
	SD	1.18	1.25	1.21	
Self-efficacy	*M*	3.73	3.99	5.64	.40
	SD	.65	.51	.68	
Response-efficacy	*M*	5.25	5.64	5.44	.44
	SD	.89	.68	.81	
Intentions	*M*	5.19	5.68	5.43	.31
	SD	1.59	1.39	1.51	
Mean consumption at follow-up	*M*	4.28	5.05	4.68	.45
	SD	1.71	1.92	1.86	

[a] for behaviour $n = 41$, [b] for behaviour $n = 44$

Table 28. *Summary of Moderated Regression Analyses for Condition x Risk x Prevention Focus to Predict Cognitive Predictors of Health Behaviour Change and Behaviour at Follow-up*

Variable	Step	Variable entered	β			R^2	Model F	R^2 Change	F Change
			Step 2	Step 3	Step 4				
Vulnerability (illness focused)	2	Risk	-.39***	-.46**	-.15**				
		Prev focus	.03	.13	.24				
		Cond	-.06	-.08	-.07	.15	3.77**		
	3	Cond x Prev focus		-.15	-.20				
		Cond x Risk		.11	.11				
		Prev focus x Risk		.09	.25	.17	2.34*	.02	.51
	4	Cond x Prev x Risk			-.19	.18	2.22*	.01	1.31
Vulnerability (health focused)	2	Risk	-.59***	-.66***	-.65***				
		Prev focus	.09	.18	.19				
		Cond	-.12	-.12	-.12	.36	11.98***		
	3	Cond x Prev focus		-.13	-.13				
		Cond x Risk		.10	.10				
		Prev focus x Risk		.04	.04	.37	6.92***	.01	.47
	4	Cond x Prev x Risk			-.01	.37	5.98***	.00	.00
Severity	2	Risk	.27*	.30	.31				
		Prev focus	-.02	-.02	.08				
		Cond	.01	-.01	-.01	.07	1.61		
	3	Cond x Prev focus		.02	-.03				
		Cond x Risk		-.06	-.06				
		Prev focus x Risk		.08	.25	.08	.99	.01	.23
	4	Cond x Prev x Risk			-.19	.09	1.02	.01	1.21

Variable	Step	Variable entered	β			R^2	Model F	R^2 Change	F Change
			Step 2	Step 3	Step 4				
Self-efficacy	2	Risk	.45***	.62***	.61***				
		Prev focus	.22	.26	.21				
		Cond	.21*	.24*	.24*	.30	9.28***		
	3	Cond x Prev focus		-.01	.01				
		Cond x Risk		-.21	-.21				
		Prev focus x Risk		-.15	-.23	.34	6.10***	.04	1.60
	4	Cond x Prev x Risk			.08	.35	5.34***	.00	.34
Response-efficacy	2	Risk	.19	.09	.09				
		Prev focus	.13	.04	.10				
		Cond	.24*	.23*	.23*	.12	2.83*		
	3	Cond x Prev focus		.09	.06				
		Cond x Risk		.12	.12				
		Prev focus x Risk		.07	.16	.14	1.83	.02	.56
	4	Cond x Prev x Risk			-.10	.14	1.64	.00	.38
Intentions	2	Risk	.56***	.71***	.72***				
		Prev focus	-.05	-.18	-.04				
		Cond	.14	.15	.15	.33	10.39***		
	3	Cond x Prev focus		.20	.13				
		Cond x Risk		-.22	-.22				
		Prev focus x Risk		-.08	.13	.37	6.74***	.04	1.59
	4	Cond x Prev x Risk			-.24	.39	6.41***	.02	2.96
Consumption (at one week)	2	Risk	.78***	.88***	.88***				
		Prev focus	.14	.14	.14				
		Cond	.17**	.14*	.14*	.67	40.76***		
	3	Cond x Prev focus		.04	.04				
		Cond x Risk		-.15	-.15				
		Prev focus x Risk		.19	.19	.71	27.47***	.04	3.88*
	4	Cond x Prev x Risk			.00	.71	23.72***	.00	.00

*$p < .05$, ** $p < .01$, ***$p < .001$

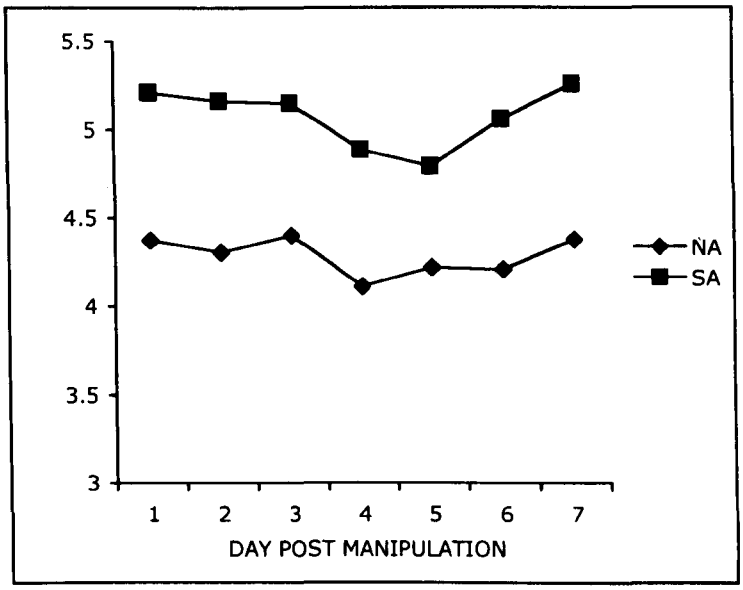

Figure 13. Reported fruit and vegetable consumption in the days following the manipulation by condition.

There were main effects of risk on illness-framed vulnerability, $\beta = -.45, p = .007$, health-framed vulnerability, $\beta = -.65, p < .001$, self-efficacy, $\beta = .61, p < .001$, intentions, $\beta = .72, p < .001$ and fruit and vegetable consumption at follow-up, $\beta = .88, p < .001$. Lower risk (i.e., high fruit and vegetable consumption) was related to lower perceptions of illness and health-framed vulnerability, and higher self-efficacy, intentions and fruit and vegetable consumption.

Mediation

In order to test whether self-efficacy or response-efficacy mediated the effect of self-affirmation on behavior change, analyses were conducted using the procedures developed by Preacher and Hayes (2007). Condition (dummy coded) was entered along with both potential mediators simultaneously and baseline fruit and vegetable consumption as a covariate. Mediation is shown if the path between two variables is reduced to zero (or close to zero) when a third variable related to both is statistically controlled (Baron &

Kenny, 1986). The paths from condition to self-efficacy, $B = .24$, $SE = .11$, $p = .026$, and to response-efficacy were significant, $B = .38$, $SE = .17$, $p = .026$. Response-efficacy had a direct effect on post manipulation consumption, $B = .49$, $SE = .15$, $p = .001$; however self-efficacy did not, $B = .14$, $SE = .23$, $p = .559$. The significant effect of condition on post-manipulation fruit and vegetable consumption, $B = .59$, $SE = .24$, $p = .015$, was reduced to non-significance when self- and response-efficacy were controlled, $B = .37$, $SE = .24$, $p = .120$, indicating mediation. Using bootstrapping procedures, the total mediated effect of condition on post-manipulation consumption was significant, $B = .22$, $SE = .12$, $CI = .026$ to .535. Examination of the individual variables indicated that response-efficacy significantly mediated the relationship between condition and post-manipulation consumption, $B = .18$, $SE = .10$, $CI = .041$ to .462, but self-efficacy did not, $B = .03$, $SE = .07$, $CI = -.073$ to .230.

Affective Predictors of Health Behaviour Change

A series of four-step regressions were conducted to determine whether the self-affirmation manipulation increased negative self-discrepancy related affect and threat-related affect and influenced positive self-discrepancy related affect (see Table 29) and whether this was moderated by level of prevention focus and risk (i.e., amount of fruit and vegetables consumed at baseline; see Table 30).

There were no main effects of condition on threat-related affect or self-discrepancy related affect. There was a significant interaction between condition and prevention focus on fear, $\beta = .50$, $p = .004$ (see Figure 14). Simple slopes revealed that condition did not significantly affect fear at high, $\beta = -.19$, $p = .212$, or moderate, $\beta = .05$, $p = .610$, levels of prevention focus but condition had a marginally significant effect on fear at low levels of

prevention focus, β = .29, p = .052. Low prevention focus participants who were self-affirmed reported more fear than did their non-affirmed counterparts.

Table 29. *Mean Response to Affective Predictors of Health Behaviour Change*

Dependent variable		Non-affirmed (n = 45)	Self-affirmed (n = 45)	Full sample (N = 90)	Effect size d
Cheerfulness	*M*	2.21	2.59	2.40	2.92
	SD	.13	.12	.85	
Dejection	*M*	.58	.52	.55	-.60
	SD	.10	.11	.67	
Quiescence	*M*	2.77	2.92	2.84	1.36
	SD	.11	.12	.78	
Agitation	*M*	.88	.79	.84	-.75
	SD	.12	.12	.81	
Afraid	*M*	.33	.40	.37	.64
	SD	.11	.09	.68	
Threatened	*M*	.13	.22	.18	1.50
	SD	.06	.09	.51	
Shame	*M*	.50	.52	.51	.12
	SD	.17	.12	.79	

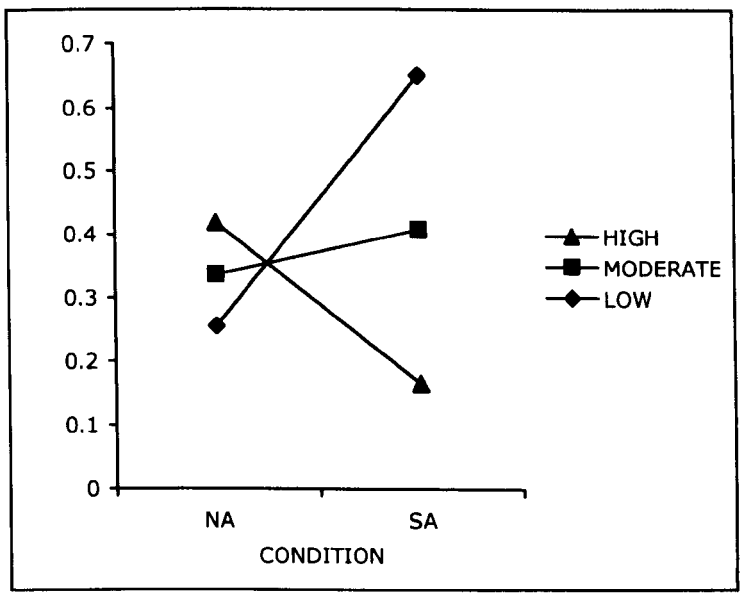

Figure 14. The effect of self-affirmation on fear as a function of prevention focus: Simple slopes at three levels of prevention focus.

Table 30. *Summary of Moderation Regression Analyses for Condition x Risk x Prevention Focus to Predict Affective Predictors of Health Behaviour Change*

Variable	Step	Variable entered	β			R^2	Model F	R^2 Change	F Change
			Step 2	Step 3	Step 4				
Cheerful	2	Risk	.26*	.15	.16				
		Prev focus	-.08	-.01	.11				
		Cond	.21*	.20	.20	.12	2.75*		
	3	Cond x Prev focus		-.12	-.18				
		Cond x Risk		.16	.16				
		Prev focus x Risk		.06	.24	.13	1.77	.02	.52
	4	Cond x Prev x Risk			-.21	.15	1.76	.02	1.59
Dejection	2	Risk	-.32**	-.40*	-.41*				
		Prev focus	.07	-.20	-.28				
		Cond	-.04	-.03	-.03	.10	2.46		
	3	Cond x Prev focus		.30	.34*				
		Cond x Risk		.07	.07				
		Prev focus x Risk		-.06	-.17	.15	1.99	.04	1.33
	4	Cond x Prev x Risk			.14	.15	1.82	.01	.68
Quiescence	2	Risk	.24*	.09	.12				
		Prev focus	.07	.25	.53*				
		Cond	.09	.07	.07	.08	1.84		
	3	Cond x Prev focus		-.27	-.41*				
		Cond x Risk		.23	.23				
		Prev focus x Risk		.11	.52**	.13	1.80	.05	1.68
	4	Cond x Prev x Risk			-.47**	.22	2.85**	.09	8.99**

Variable	Step	Variable entered	β			R^2	Model F	R^2 Change	F Change
			Step 2	Step 3	Step 4				
Agitation	2	Risk	-.01	.00	-.02				
		Prev focus	.15	.03	-.17				
		Cond	-.05	-.03	-.03	.03	.60		
	3	Cond x Prev focus		.15	.25				
		Cond x Risk		-.03	-.03				
		Prev focus x Risk		-.10	-.40*	.04	.48	.01	.35
	4	Cond x Prev x Risk			.34*	.08	.93	.04	3.91*
Fear	2	Risk	-.06	-.02	-.02				
		Prev focus	.02	-.39*	-.36				
		Cond	.06	.09	.09	.02	.43		
	3	Cond x Prev focus		.51**	.50**				
		Cond x Risk		-.11	-.11				
		Prev focus x Risk		-.21	-.17	.14	1.87	.12	3.74*
	4	Cond x Prev x Risk			-.05	.14	1.63	.00	.08
Threat	2	Risk	-.17	-.20	-.19				
		Prev focus	.06	-.05	.05				
		Cond	.09	.11	.11	.04	.84		
	3	Cond x Prev focus		.12	.07				
		Cond x Risk		.03	.03				
		Prev focus x Risk		-.10	.05	.05	.58	.01	.27
	4	Cond x Prev x Risk			-.17	.06	.63	.01	.96
Shame	2	Risk	-.23	-.34*	-.33*				
		Prev focus	.16	-.12	-.02				
		Cond	.03	.05	.05	.06	1.44		
	3	Cond x Prev focus		-.30	.25				
		Cond x Risk		.11	.11				
		Prev focus x Risk		-.13	.02	.11	1.38	.04	1.29
	4	Cond x Prev x Risk			-.17	.12	1.33	.01	.98

*$p < .05$, ** $p < .01$

There was a three-way interaction between risk, prevention focus and condition on quiescence, $\beta = -.47$, $p = .004$. Simple slopes were conducted for low, moderate and high levels of prevention focus at three levels of risk (determined by a tertile split). For low risk participants there was no effect of condition for low prevention focus, $\beta = -.34$, $p = .133$, but this approached significance for moderate prevention focus, $\beta = .27$, $p = .076$, and was significant for high levels of prevention focus, $\beta = .89$, $p = .001$ (see Figure 15). For participants at low risk and moderate and high prevention focus, self-affirmation led to higher reported levels of quiescence in comparison to similar participants in the control condition. For moderate risk participants (see Figure 16) there was no effect of condition on quiescence for low, $\beta = -.12$, $p = .678$, or moderate levels of prevention focus, $\beta = .14$, $p = .457$. However, at high levels of prevention focus, $\beta = .40$, $p = .135$, there was a non-significant trend for self-affirmation to increase quiescence. For high risk participants (see Figure 17) there was no effect of condition for high levels of prevention focus, $\beta = -.02$, $p = .949$. There was a non-significant trend for self-affirmation to decrease quiescence at low, $\beta = -.59$, $p = .239$, and moderate levels of prevention focus, $\beta = -.31$, $p = .215$.

There were main effects of risk on dejection, $\beta = -.41$, $p = .015$, and shame, $\beta = -.33$, $p = .051$; higher risk (i.e., lower fruit and vegetable consumption) was associated with higher dejection. There were main effects of prevention focus on quiescence, $\beta = .53$, $p = .011$; with lower prevention focus related to higher quiescence.

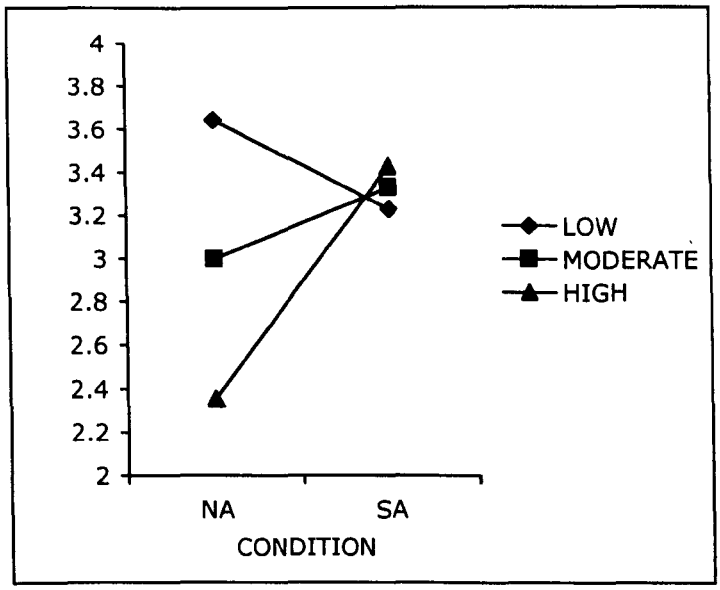

Figure 15. The effect of self-affirmation on quiescence as a function of prevention focus for participants at low risk: Simple slopes at three levels of prevention focus.

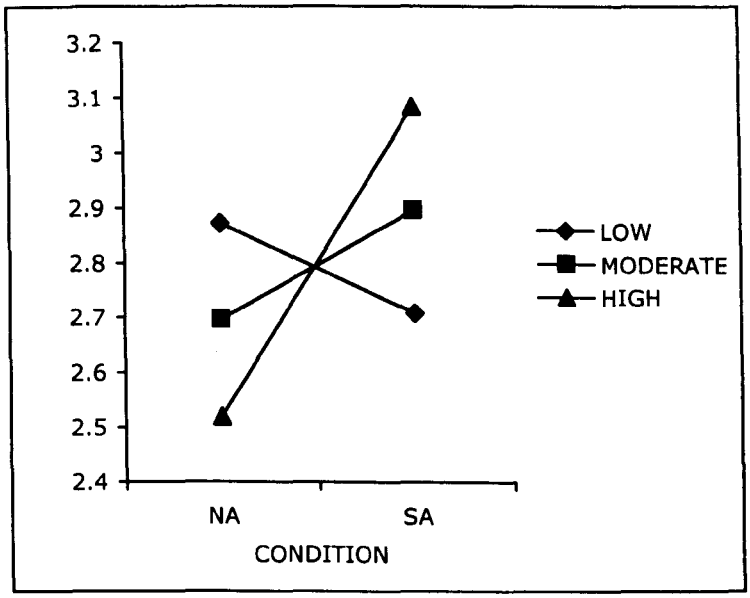

Figure 16. The effect of self-affirmation on quiescence as a function of prevention focus for participants at moderate risk: Simple slopes at three levels of prevention focus.

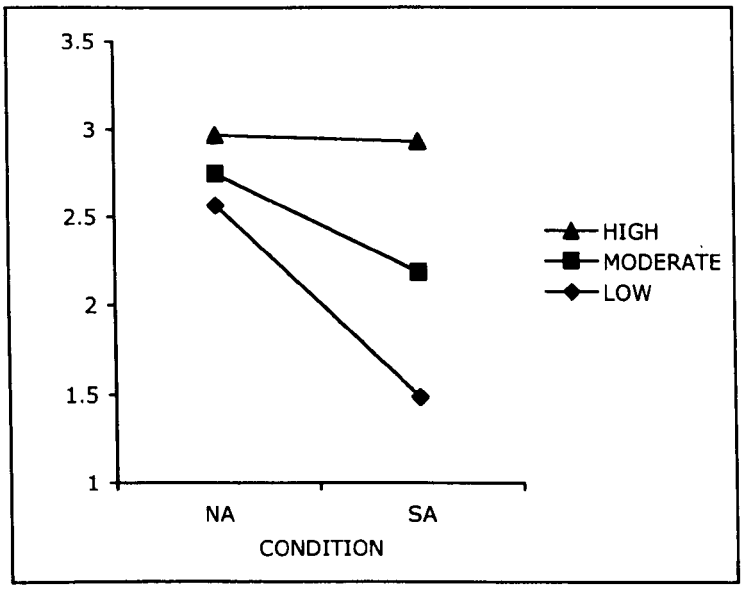

Figure 17. The effect of self-affirmation on quiescence as a function of prevention focus for participants at high risk: Simple slopes at three levels of prevention focus.

Reading Times

Two four-step regression analyses were conducted to determine whether self-affirmation influenced the reading time of the threat and response components of the health message (see Table 31) and whether this was moderated by risk (i.e., amount of fruit and vegetables consumed at baseline) and prevention focus (see Table 32).

Table 31. *Mean Reading Times for Health Message*

Dependent variable		Non-affirmed (n = 45)	Self-affirmed (n = 45)	Full sample (N = 90)	Effect size d
Threat message	*M*	108703.89	106239.89	107471.89	-.05
	SD	49913.24	71300.37	61208.78	
Response message	*M*	105535.30	102612.00	104073.70	-.07
	SD	40610.79	34525.79	37507.75	

There were no main effects of condition on reading times of either the threat or the response component of the health message. However, there was an interaction between condition and risk on the reading time of the threat component of the health message, β = -

.33, p = .049; simple slopes revealed that self-affirmation decreased reading time at low levels of risk, β = -.20, p = .202 and increased reading times at high levels of risk, β = .14, p = .342. There was no effect at moderate levels of risk, β = .03, p = .801 (see Figure 18). The Beta weights did not achieve significance.

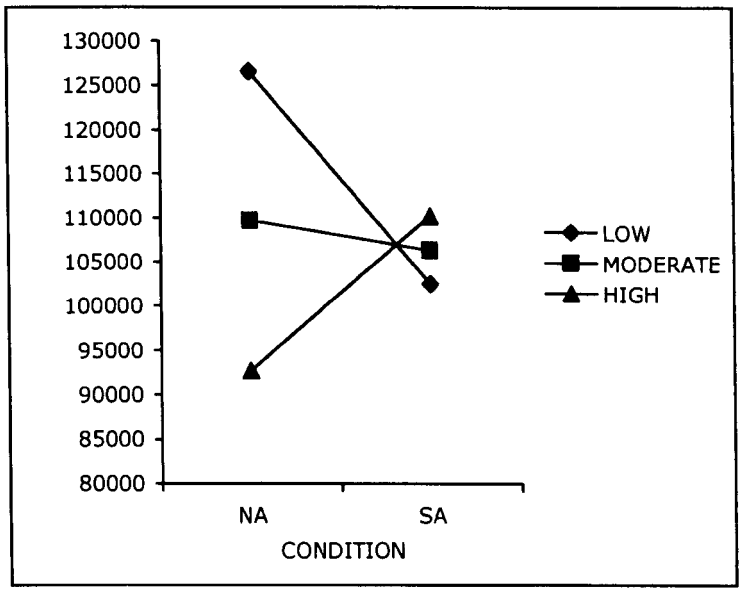

Figure 18. The effect of self-affirmation on reading time of the threat message as a function of risk: Simple slopes at three levels of risk.

Table 32. *Summary of Moderated Regression Analysis for Condition x Risk x Prevention Focus to Predict Reading Times*

Variable	Step	Variable entered	β			R^2	Model F	R^2 Change	F Change
			Step 2	Step 3	Step 4				
Reading time threat	2	Risk	.10	.32*	.33*				
		Prev focus	.16	.05	.18				
		Cond	-.01	-.00	-.00	.10	2.40		
	3	Cond x Prev focus		.20	.13				
		Cond x Risk		-.33*	-.33*				
		Prev focus x Risk		-.05	.15	.16	2.25*	.06	1.94†
	4	Cond x Prev x Risk			-.23	.18	2.24*	.02	1.96
Reading time response	2	Risk	-.02	.117	.19				
		Prev focus	.08	.21	.46*				
		Cond	-.02	-.16	-.06	.20	5.42***		
	3	Cond x Prev focus		-.09	-.21				
		Cond x Risk		-.25	-.25				
		Prev focus x Risk		.21	.58***	.26	4.03***	.05	1.93
	4	Cond x Prev x Risk			-.41***	.32	4.82***	.07	7.97**

† $p = .10$, * $p < .05$, ** $p < .01$, *** $p < .001$

There was a three-way interaction between prevention focus, risk and condition on response information reading times, $\beta = -.41$, $p = .006$. For low risk participants, simple slopes revealed that there was an effect of self-affirmation at low prevention focus, $\beta = -.77$, $p = .002$, but not at moderate, $\beta = -.26$, $p = .090$, or high levels of prevention focus, $\beta = .25$, $p = .293$ (see Figure 19). Among low risk self-affirmed participants reading time was reduced in those with low prevention focus, in comparison to their non-affirmed counterparts. This same trend was also apparent, albeit non-significantly, in those with moderate prevention focus. For moderate risk, simple slopes revealed no effect of condition at low, $\beta = .15$, $p = .482$, moderate, $\beta = -.08$, $p = .580$ or high levels, $\beta = -.31$, $p = .121$, of prevention focus (see Figure 20). For high risk participants, there was no effect of self-affirmation on response information reading time for low, $\beta = .55$, $p = .271$, moderate, $\beta = -.23$, $p = .345$ or high levels, $\beta = -.09$, $p = .795$, of prevention focus (see Figure 21).

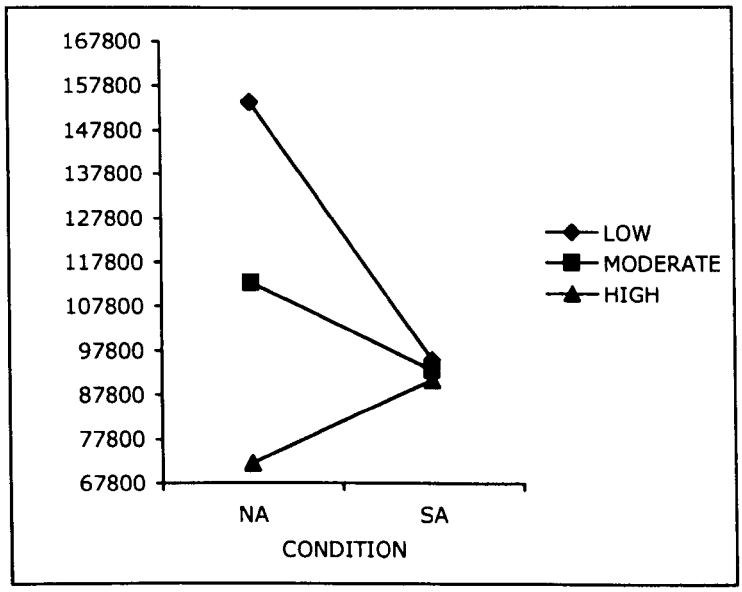

Figure 19. The effect of self-affirmation on reading time of the response as a function of prevention focus for participants at low risk: Simple slopes at three levels of prevention focus.

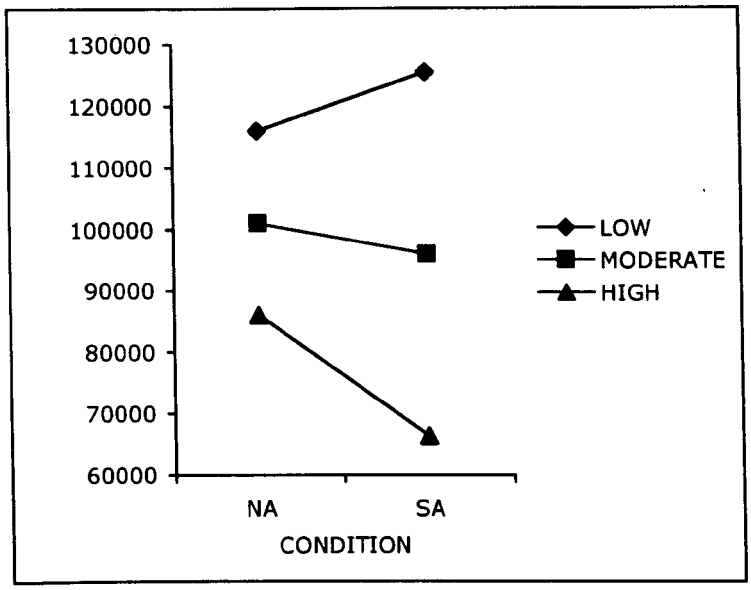

Figure 20. The effect of self-affirmation on reading time of the response as a function of prevention focus for participants at moderate risk: Simple slopes at three levels of prevention focus.

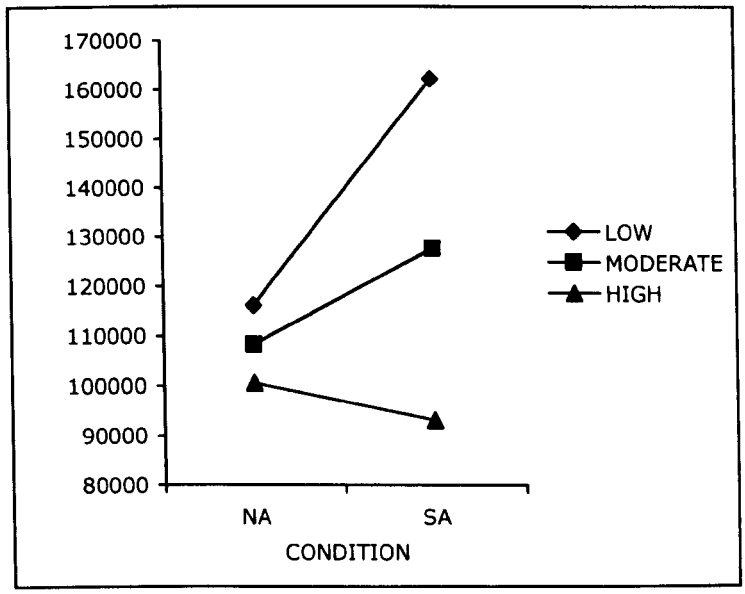

Figure 21. The effect of self-affirmation on reading time of the response as a function of prevention focus for participants at high risk: Simple slopes at three levels of prevention focus.

All of the above analyses were repeated with promotion focus as the moderator and controlling for prevention focus. There were no main effects of promotion focus or interactions between promotion focus and condition on any of the dependent variables; this suggested that the effects found are due to strength of prevention focus rather than strength of overall regulatory focus.

Discussion

Study 4 examined the influence of self-affirmation on predictors of health behaviour change and actual behaviour change and the moderating effect of implicitly measured motivation. Study 4 aimed to maximise the potential of self-affirmation manipulations to effect a behavioural change by using a low threat health message that was positively framed and recommended an increase in performing a health behaviour. Study 4 used an experimental design to compare a self- and non-affirmed group on their affective, cognitive and behavioural responses to a health message regarding fruit and vegetable consumption.

Study 4 found that, compared to non-affirmed participants, self-affirmed participants reported higher levels of self- and response-efficacy. Furthermore, the increased response-efficacy translated into an increase in fruit and vegetable consumption during the week after the manipulation. Study 4 also indicated that self-affirmation is most effective in those with low motivation as those with the lowest prevention focus (i.e., those least concerned with safety issues) displayed a trend to report greater levels of fear. Self-affirmation also reduced reading times of the response message for those with a low prevention focus that were also at the lowest risk.

Cognitive Predictors of Health Behaviour Change and Behaviour at Follow-up

Self-affirmation can have a positive effect on long term behaviour and subsequent health, as the self-affirmed participants increased their fruit and vegetable consumption by

almost five and a half portions per week. This increase, of an extra days worth of fruit and vegetables, has the potential to make an important contribution to health. For instance, it has been found that each increase of one portion of fruit and vegetables per day lowered the risk of coronary heart disease by 4% and the risk of stroke by 6% (Joshipura et al., 2001). The positive effects of self-affirmation found in Study 4 may be due to the low threat health-message that was positively framed and targeted an increase in a healthy behaviour.

Study 4 also found that self-affirmation increased self- and response-efficacy ratings. The increase in response-efficacy may occur as denigrating the response-efficacy of a health message recommendation is a strategy that can be used to defensively avoid considering behavioural change; e.g., smokers rated the health benefits of quitting as less than non- and ex-smokers (Boney-McCoy et al., 1992). The reduction of the defence (i.e., denigrating response-efficacy) was responsible for the impact of self-affirmation on actual behaviour as, in comparison to non-affirmed participants, self-affirmed participants reported elevated fruit and vegetable consumption at follow-up, which was mediated by response-efficacy. This finding suggested that the effects of self-affirmation on health outcomes can be explained by effects on constructs that have been identified by health behaviour models to motivate heath behaviour change.

Self-efficacy did not mediate the effect of self-affirmation on behaviour. One explanation for this finding is that self-affirmation could result in increased confidence in the self through self-validation from the manipulation. Inflated self-efficacy through this mechanism (rather than a genuine belief that the recommended behaviour could be conducted) would not, however, lead to the behavioural changes observed in Study 4. An alternative, more plausible, explanation, is proposed by models such as Social Cognitive Theory (SCT; Bandura, 2004). SCT suggests that self-efficacy is important only in

determining if a goal will be pursued. If so, then response-efficacy is the factor that determines health behaviour. In Study 4, self-efficacy was high for both conditions hence it was the expectation that eating more fruit and vegetables reduces the risk of ill health (i.e., response-efficacy) that determined the pursuit of the recommended health goal.

In contrast to previous research, Study 4 found no effects of self-affirmation on risk-related cognitions. As mentioned in Chapter 1, it is possible that the nature of the health message influenced where self-affirmation had an effect. Published studies that emphasised the threat component of the message resulted in changed risk-related cognitions (e.g., Sherman et al., 2000, Study 2); Study 4 emphasised the efficacy component of the message and efficacy cognitions were altered. Additionally, the health message in Study 4 was mainly positively-framed (i.e., it emphasised the health benefits of eating fruit and vegetables rather than the health risks of not eating sufficient fruit and vegetables) whereas health messages used in previous studies have been negatively-framed (i.e., emphasising the health risks of not adhering to recommendations). This could place the emphasis on the recommendation or the health risk, respectively.

Motivation as a Moderator

Study 4 found a non-significant trend that self-affirmation increased reports of fear in those with low motivation, in comparison to non-affirmed low motivation participants. These findings were consistent with those of Study 1 that found a trend that self-affirmation was most effective in those who were most vulnerable (i.e., low motivation and moderate to high risk) indicated by increased reports of severity, in comparison to their non-affirmed counterparts.

Study 4 also showed that, after self-affirming, there was trend that highly motivated participants (i.e., those with high prevention focus) participants reported lower levels of

fear. There was also a non-significant trend that self-affirmation was related to higher reports of quiescence among the moderate and high motivation participants who were also at the lowest risk. The results of Study 4 offer support to the argument that self-affirmation may be detrimental to those who have high pre-test levels of motivation. It has been suggested that self-affirming prior to a persuasive message leads to greater confidence in ones own opinions hence these participants may have been less likely to process the information accurately and are subsequently less persuaded (Brinol, Petty, Gallardo & DeMarree, 2007). As the increase in quiescence was particularly pronounced in the low risk group, this supports Brinol et al.'s (2007) argument that self-affirmation prior to a persuasive message can increase confidence in prior beliefs (in this case, the belief that they are already achieving their goal of maintaining their health) so they do not believe they need to change their health behaviour.

Risk as a Moderator

Risk interacted with self-affirmation for the reading time of threat component of the health message. As mentioned in Study 1, the interpretation of reading times is difficult as it is unclear what a decrease in reading time would signify unless accompanied by further evidence. In the absence of additional evidence, a decrease in reading time could indicate that participants had (a) a lack of interest in the content of the health message or (b) sufficient interest but an ability to process the information more efficiently.

The first argument that a decrease in reading time signified a lack of interest in the content of the health message initially seems supported by the evidence. Study 4 found a trend that low risk participants who received a self-affirmation manipulation spent less time reading and the high risk spent more time reading the threat information than their non-affirmed counterparts. It may seem intuitive that those people who ate the most fruit and

vegetables (i.e., at low risk) do so because they were already aware of the health benefits and would therefore have less interest and spend less time reading than those at high risk who may not have been aware of the benefits and would find the information interesting and spend longer reading. Study 4 also found an interaction between self-affirmation, risk and prevention focus for reading times of the response message. The lower motivation low risk participants who were also self-affirmed spent less time reading the response message than low risk and low motivation non-affirmed participants. It may also seem intuitive that low risk participants would be less interested in the recommendations and tips on how to increase fruit and vegetable consumption than high risk participants, as those who were at low risk were presumably more aware of how to include fruit and vegetables into their diet and therefore spent less time reading than those who ate less fruit and vegetables. Furthermore, van Koningsbruggen and Das (2009[a]) found evidence to support the argument that low risk self-affirmed participants may be less interested in the health message; low risk self-affirmed participants displayed less processing whilst reading a health message, as their ability to discriminate between strong and weak arguments was lower than that of their non-affirmed counterparts.

However, in Study 4 there was evidence that indicated that even low risk and low motivation self-affirmed participants were interested in changing their health behaviour. In Study 4, low risk and low motivation self-affirmed participants still reported increased self-efficacy, response-efficacy and fruit and vegetable consumption, in comparison to their non-affirmed counterparts, regardless of the time spent reading the health message. Furthermore, in Study 1 it was the high-risk participants, not the low risk, who had self-affirmed that displayed the lower reading times; according to the above argument these participants should have spent longer reading the response information.

Additionally, recent research offered indirect support to the second argument that the decreased reading times after self-affirmation might indicate more efficient processing. Wakslak and Trope (in press) proposed that self-affirmation is associated with an increased ability to extract the gist from information i.e., more efficient processing. Self-affirmation manipulations prime the participants to distinguish central from peripheral components i.e., to extract the gist regarding the bigger picture rather than focus on peripheral details (Wakslak and Trope, in press). For example, self-affirmed participants showed evidence at looking at the bigger picture as they chose behavioural descriptions that reflected higher level goals, more often than non-affirmed participants; e.g., they described locking a door as securing the house rather than turning a key (Wakslak & Trope, in press, Study 2). In a further study, self-affirmed participants, in contrast to non-affirmed participants, based an evaluation of a product on its key features rather than secondary features (Wakslak & Trope, in press, Study 3). These findings would suggest that self-affirmation could increase the ability of participants to extract the gist of a health message quickly, therefore processing the information more efficiently leading to shorter reading times than non-affirmed participants.

Risk did not act as a moderator for any other variable. In this instance, the lack of moderation effects of risk may be due to actual fruit and vegetable consumption being a poor index of risk. Only people who eat five or more portions of fruit and vegetables every day receive the health benefits and avoid the health risks (WHO, 2003). Therefore, participants who eat four portions of fruit and vegetables each day would be as unlikely to receive the health benefits as participants who ate two portions.

Conclusions

Study 4 showed that self-affirmation can influence efficacy cognitions and subsequently motivate behavioural change. These findings suggested that traditional models of health behaviour change can explain the positive effects of self-affirmation. Study 4 also highlighted the potential of self-affirmation to be used as a health intervention.

CHAPTER SIX

Discussion

Self-Affirmation Theory (Steele, 1988) can be used to address a fundamental problem in health promotion by proposing a theory-based strategy to overcome peoples' resistance to uncongenial health risk information. Self-Affirmation Theory postulates that boosting self-integrity through self-affirming allows people to respond in a non-defensive manner to the content of a health message, that leads to changes in risk-related and efficacy cognitions and subsequent health behaviour. At the start of the programme of research, included in this thesis, the published literature had shown that self-affirmation manipulations could be successful at changing some risk-related and efficacy cognitions and stimulating preparatory behaviours. However, effects on long term health behaviour had not been achieved despite long term behaviour effects from self-affirmation manipulations in other areas of research. Several factors (e.g., message content, type of health behaviour targeted) were addressed in this research that had been identified in the literature review as a potential influence on the lack of behavioural change.

The research in this thesis had both applied and theoretical purposes. The primary aim was to determine if self-affirmation manipulations were suitable for use as a health intervention by (a) examining whether self-affirmation manipulations were capable of influencing health behaviour change, (b) determining the conditions under which self-affirmation was most effective by exploring risk, motivation and threat as moderators and (c) extending the repertoire of health behaviours targeted. The secondary aim was to explore mediators of the effects of self-affirmation. This included distal mechanisms such as explicit and implicit self-related affect as an affirmational resource. The thesis also extended the range of affective (e.g., threat-related affect, response-related affect, self-

discrepancy related affect) and cognitive (e.g., severity, response-efficacy) predictors of health behaviour change in order to explore proximal mediators of the effect of self-affirmation on health behaviour.

Summary of Findings From Thesis and Recent Literature

Main effects of self-affirmation. The key finding in the thesis was that self-affirmation manipulations have the potential to influence long term health behaviour. Study 4 showed that the self-affirmed participants reported greater fruit and vegetable consumption by almost five and a half portions per week, in comparison to the control condition. Recently published literature has confirmed that self-affirmation can increase intentions to quit smoking (Armitage et al., 2008), to use sunscreen (Jessop et al., 2009) and to reduce caffeine consumption (van Koningsbruggen et al., in press) and can even increase in-situ behaviours such taking leaflets (Armitage et al., 2008) and sunscreen samples (Jessop et al., 2009). However, this thesis contains the first study to indicate that self-affirmation is capable of influencing long term health behaviour and consequently that self-affirmation manipulations may be suitable for use as health interventions.

This thesis also contributed to the existing literature as it explored the effect of self-affirmation on under-researched cognitive and affective predictors of health behaviour change. Studies 3 and 4 found that self-affirmation could elevate response-efficacy, in comparison to the control condition; this replicated the result of a recent study that found that self-affirmation resulted in elevated response-efficacy for sunscreen to reduce the risk of skin cancer (Jessop et al., 2009). Study 4 confirmed that self-affirmation affected self-efficacy that was also replicated in recent studies (Jessop et al., 2009; see Armitage et al., 2008 for an exception) and Study 3 found a marginally significant increase in severity, compared to the non-affirmed condition. Study 1 found that participants who self-affirmed

reported higher levels of explicit negative threat-related self-evaluative affect after reading a message regarding the health risks of salt consumption; similarly, Jessop et al. (2009) recently found that self-affirmation increased explicit threat-related affect after exposure to a health message regarding the health benefits of sunscreen use. Study 2 found that self-affirmation also increased implicit threat-related affect after participants read about the risk of breast cancer from alcohol consumption.

Moderators of self-affirmation. The thesis explored threat, risk and motivation as moderators of the effect of self-affirmation. The findings from this thesis suggest that self-affirmation has the most beneficial effect on health outcomes when used with lower threat health messages. Study 3 found self-affirmation increased response-efficacy and marginally increased perceptions of severity after exposure to a lower threat health message but not a high threat message. However, further research is needed to explore the moderating effect of threat on self-affirmation as the effect of self-affirmation on days drinking at one month in Study 3, could indicate that even with lower threat health messages self-affirmation can have detrimental effects on drinking behaviours.

The findings from this thesis also indicated that high threat health messages can have a detrimental effect. Study 2 found that self-affirmation had detrimental effects on alcohol use one month after the manipulation when a high threat health message was used; self-affirmed participants, in particular those at moderate and high risk, reported greater alcohol consumption than their non-affirmed counterparts. The argument that self-affirmation can lead to detrimental consequences when a high threat message is used received further support as the self-affirmed participants in Study 3 displayed a trend to report lower perceptions of vulnerability after reading the high threat health message in comparison to those self-affirmed participants who read the lower threat health message.

Although this thesis had not explored explanations for the detrimental effect of self-affirmation manipulations with high threat health messages the findings support van Koningsbruggen and Das' (2009[a]) argument that under conditions of high self-threat, self-affirmation results in strong defensive responses. The self-integrity boosting properties of the self-affirmation are insufficient to deal with very high threats and the defensive response is exacerbated as the act of self-affirming primes the self and makes the whole self-system vulnerable to the threat (van Koningsbruggen & Das, 2009[a]).

The findings from this thesis tentatively suggest that self-affirmation manipulations may be most effective for populations who are most vulnerable; that is, populations at higher levels of risk or with lower levels of motivation. Study 1 found a trend for the most vulnerable self-affirmed participants (i.e., those at the highest risk) to decrease their consumption of restaurant and take-away food one week after the manipulation. Study 4 found a trend for those with the lowest motivation who self-affirmed, in comparison to low motivation non-affirmed participants, to report more fear, suggesting they acknowledged they were not achieving their health-related goals. Additionally in Study 1, there was a trend that those participants who were at higher levels of risk and low to moderate motivation and who completed a self-affirmation manipulation reported greater perceptions of severity than their non-affirmed counterparts.

Although, the findings from this thesis were inconclusive regarding the benefits of self-affirmation for high risk and low motivation participants recent literature supports the argument that self-affirmation is most effective for those most at risk. Self-affirmed participants, in comparison to non-affirmed participants, who were at high risk reported greater general message acceptance (Armitage et al., 2008; Crocker et al., 2008), less

message derogation (van Koningsbruggen & Das, 2009[b]), greater intentions and more willingness to take a diagnostic test (van Koningsbruggen & Das, 2009[b]).

The thesis contained some evidence that self-affirmation manipulations can be detrimental to those at the lowest risk and those with the highest level of motivation. In low risk participants, self-affirmation resulted in a trend to increase consumption of restaurant and take-away food (Study 1) and increased quiescence for those who also had higher levels of motivation in addition to a low level of risk (Study 4), in comparison to their non-affirmed counterparts. Self-affirmed participants who had high levels of motivation showed a trend to report less fear (Study 4)than high motivation non-affirmed participants. Study 1 also found a trend that those self-affirmed participants with high motivation reported lower perceptions of severity than their non-affirmed counterparts (but only in participants who were also at high risk).

Taken together the findings from this thesis suggest that self-affirmation may be most effective as a health intervention if high risk or low motivation groups are targeted and low threat health messages are used. However, it is important to note that in Study 4, neither motivation nor risk moderated the effect of self-affirmation on health behaviour; the manipulation had a positive effect on subsequent consumption of fruit and vegetables in self-affirmed participants regardless of their initial levels of risk and motivation. It is possible that lower threat health messages may remove the detrimental effects of self-affirmation in low risk and high motivation participants.

Mediators of self-affirmation. Studies 1 and 2 in this thesis failed to find an effect of self-affirmation on explicit (Study 1) or implicit (Study 2) self-related affect. Study 1 may not have detected an effect of self-affirmation as the sensitivity analysis suggested it was underpowered. However, Study 2 had sufficient power to detect differences in implicit

affect. There have been no further studies since undertaking this programme of research that indicate that self-affirmation increases self-related affect; indeed, a recent study that measured self-related affect found that positive self-related affect was significantly lower in the affirmation conditions than the control condition (Jessop et al., 2009). The recent literature has indicated that affect does mediate the effect of self-affirmation but this is other-related affect (Crocker et al., 2008) rather than self-related affect.

Study 4 found that it was a health specific construct, response-efficacy, that mediated the effect of self-affirmation on health behaviour. Additionally, Armitage et al. (2008) found that message acceptance of health information regarding the negative health consequences of smoking mediated the self-affirmation and intention relationship and subsequently intention mediated the self-affirmation and leaflet taking relationship. Sherman and Kim (2005) suggested that the mediator of self-affirmation effects may depend on the context as they found that collective self-esteem partially mediated the effect of self-affirmation on unbiased judgements about their in-group in a situation that emphasised in-group membership. Therefore, in self-affirmation studies involving exposure to a health message the mediator is likely to be a health-related construct such as response-efficacy (Study 4) or message acceptance (Armitage et al., 2008).

Limitations of Research and Future Research Directions

One limitation of the research in this thesis was that the studies may have been underpowered and therefore this may explain why the studies only showed trends that risk and motivation moderated the effects of self-affirmation rather than providing more conclusive results. Furthermore, the studies included in this thesis did not investigate reasons why self-affirmation would have a detrimental effect on low risk and high motivation participants. Further research is needed to replicate the positive effects of self-

affirmation with vulnerable participants and the negative effects with low risk and high motivation participants and determine the cause of these effects.

A second limitation of the thesis was that it used reading time as an indirect measure of attention to the health message. This was problematic as a decrease in reading time could indicate (a) a lack of interest in the content of the health message or (b) sufficient interest but an ability to process the information more efficiently. Reading time differences between conditions are typically interpreted with reference to additional evidence from the study (see Reed & Aspinwall, 1998); however, Studies 1 and 4 (the two studies that found differences in reading times) did not find clear indications that decreased reading times were associated with interest in the message content (ability to process the information was not tested). Furthermore, any interpretation was further complicated as Studies 1 and 4 produced inconsistent results regarding the moderation of reading times by risk. Risk moderated the effect of self-affirmation on reading time in both Study 1 and 2; however, in Study 1 self-affirmation reduced reading time for the high risk self-affirmed participants and in Study 4 the low risk self-affirmed participants showed a reduced reading time after self-affirming, particularly in those who also had low motivation. To determine whether self-affirmation leads to more efficient processing of health information, future research could use more effective measures of attention and processing than reading time, such as comparing self-affirmed and non-affirmed participants' ability to extract the gist of a health message under time pressure.

A third limitation is that all the studies used self-report measures of health behaviour at follow-up. It is therefore possible that self-affirmation manipulations could lead to greater demand effects leading to false reports of positive behavioural changes (e.g., the self-affirmed participants may have falsely reported increased fruit and vegetable

consumption in Study 4). However, it is equally possible that self-affirmation could lead to more honest reporting (e.g., the self-affirmed participants may have felt more able to report greater alcohol consumption in Study 2). Non self-report measures, such as breath tests to measure alcohol consumption would rule out these explanations.

A further limitation is that the moderators were measured at the same time as the experimental manipulation. Reporting their current health behaviour and health motivation may have primed the participants and thus influenced their performance on the tasks and self-reports. Baseline measures of health behaviour and motivation taken in an session prior to taking part in the experiment would prevent such effects.

Implications for Self-Affirmation as a Health Intervention

This thesis indicated that self-affirmation was capable of changing health behaviour and therefore offered preliminary support to the argument that self-affirmation manipulations have the potential to be developed as health interventions. The thesis also offered tentative support to the claim that one particular benefit of using self-affirmation manipulations as a health intervention is that self-affirmation is most effective for those who are the most vulnerable (i.e., at high risk or low motivation). However, before developing a self-affirmation health intervention further research would be advisable to (a) replicate the effect of self-affirmation on a health promoting behaviour, (b) explore the effect of self-affirmation on unhealthy behaviours using lower threat health messages (that also include response- and self-efficacy information), (c) extend these effects to non-student populations and (d) explore methods of delivering self-affirmation interventions.

The thesis also highlighted some caveats regarding the use of self-affirmation health interventions. The thesis found tentative evidence that self-affirmation manipulations had detrimental effects on low risk and high motivation participants and strong evidence that

self-affirmation was detrimental when high threat health messages were used. This suggests that practitioners, who develop self-affirmation interventions, should pilot the intervention to ensure that it is low threat and take care to ensure only at risk audiences are targeted.

Concluding Remarks

This thesis addressed an issue in health promotion that despite the large quantity of health risk information some people still lead unhealthy lifestyles. It tested a theory-based strategy, that is postulated to reduce the tendency to reject uncongenial health information, and therefore has the potential to change health behaviour. The findings from this thesis suggested that self-affirmation manipulations can change long term health behaviour and have the potential for use as a health intervention. The thesis also explored risk, motivation and threat as moderators of self-affirmation for a range of health behaviours in order to determine under which conditions and in which populations self-affirmation interventions would be suitable for use. Although, the findings were inconclusive for risk and motivation the thesis found that self-affirmation was most effective when lower threat health messages were used. The thesis also explored putative mediators of self-affirmation, such as self-related affect and health-related constructs, and found that response-efficacy mediated the effect of self-affirmation on fruit and vegetable consumption. The research in this thesis has contribute to applied health psychology by showing that self-affirmation manipulations can influence long term health behaviour and by suggesting circumstances under which self-affirmation manipulations are most effective. The research has also contributed to Self-Affirmation Theory by providing further evidence that context specific variables can mediate the effect of self-affirmation.

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