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Motivational and behavioural consequences of self-affirmation interventions: A study of sunscreen use among women

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The reported study compared the efficacy of three self-affirmation manipulations in reducing defensive processing and instigating behaviour change in response to personally relevant information about the health risks of sunbathing. White female sunbathers ($N = 162$) were recruited on a beach in the south of England. Participants were randomly allocated to a 'values affirmation' condition, a 'kindness affirmation' condition, a 'positive traits affirmation' condition, or a no affirmation 'control' condition. In the 'positive traits affirmation' condition the self-affirmation task was incorporated into a leaflet presenting the health risk information. Findings supported the hypothesis that participants in the three self-affirmation conditions would engage in less-defensive processing of the health-risk information than those in the 'control' condition. For the behavioural measure, however, only those participants in the 'positive traits affirmation' condition were more likely to request a free sample of sunscreen than those in the control condition. The implications of these findings for self-affirmation theory and the development of effective health promotion campaigns are discussed.

Keywords: self-affirmation; defensive processing; health-risk information; health promotion; sunscreen use; sunbathing

Health-detrimental behaviours such as cigarette smoking and excessive alcohol consumption contribute to many leading causes of mortality and morbidity (Smith, Orleans, & Jenkins, 2004). Nonetheless, many people continue to engage in health-detrimental behaviours and, accordingly, much time and effort is expended designing health promotion campaigns to deter people from performing such behaviours. Campaigns frequently focus on making salient the health-risk afforded by the behaviour in question, the rationale being that the information will result in a perception of threat and a subsequent increased motivation to avoid the targeted behaviour. However, research evaluating such campaigns has yielded mixed results and reviews of the literature have questioned the efficacy of threatening recipients (Keller, 1999; Ruiter, Abraham, & Kok, 2001). More specifically, research findings suggest that people may engage in defensive processing of threatening health-risk information, particularly if it is

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personally relevant (e.g. Freeman, Hennessy, & Marzullo, 2001; Liberman & Chaiken, 1992; Reed & Aspinwall, 1998). Ironically, therefore, some studies have shown that those at whom such health promotion campaigns are aimed (i.e. those who engage in the health-detrimental behaviour in question) are the most likely to derogate the message (Freeman et al., 2001) and the least likely to be persuaded by it (Liberman & Chaiken, 1992).

The apparent tendency for people to process personally relevant health-risk information defensively can be explained from the perspective of self-affirmation theory (Steele, 1988). Self-affirmation theory contends that people are continually motivated to uphold their self-integrity, where the latter has been described as the belief that the self is 'adaptively and morally adequate, that is, competent, good, coherent, unitary, stable, capable of free choice, capable of controlling important outcomes . . .' (Steele, 1988, p. 262). Being informed that one's behaviour is detrimental to one's health may be construed as a threat to self-integrity, insofar as such information compromises one's ability to perceive oneself as an individual of worth and 'adaptive and moral adequacy' (Steele, 1988, p. 263). Accordingly, when people are faced with information detailing the health-detrimental consequences of their chosen behaviours, the need to protect their self-integrity may well engender biased and defensive processing of the message as a means of ameliorating the threat and restoring one's sense of self as a healthy and rational individual (Sherman & Cohen, 2006). Recipients of such information may thus continue to engage in the targeted behaviour, as making a behavioural change would require them to acknowledge that they have behaved in an unwise manner in the past.

Self-affirmation theory additionally contends, however, that 'the self-system is flexible' (Sherman & Cohen, 2006, p. 188), insofar as threats to self-integrity can be countered by affirming the self in a separate important domain (Steele, 1988). Accordingly, it follows that if individuals are given the opportunity to reflect on an alternative source of self-integrity, this will allow them to maintain their overall sense of self-integrity in the face of a personally relevant health-risk message (Steele, 1988). Consequently, they should be more willing to consider information criticising their health-detrimental behaviour, without needing to engage in defensive processing of such information (e.g. Reed & Aspinwall, 1988). Therefore, self-affirmation theory predicts that affirming the self, in a domain which is unrelated to the threatened domain, should allow individuals to respond to personally relevant health promotion campaigns in a more open and less-biased manner, rendering them more susceptible to persuasion and, ultimately, behaviour change (e.g. Sherman, Nelson, & Steele, 2000).

While much evidence has accumulated in support of the position that, in general, self-affirmations can reduce defensive responses to threats, the evidence regarding their ability to reduce biased processing and increase acceptance of personally relevant health-related information is mixed (Harris & Napper, 2005; McQueen & Klein, 2006). In one of the first tests of a self-affirmation manipulation in a health-related domain, Reed and Aspinwall (1988) affirmed participants prior to exposure to information about a link between caffeine consumption and fibrocystic breast disease (FBD), by asking them to give examples of occasions when they had engaged in a number of 'kindness' behaviours. It was hypothesised that higher risk participants who were affirmed would be less likely to engage in biased processing of the information than higher risk participants who were not affirmed. The results partially supported this hypothesis: for example, compared to their non-affirmed counterparts, higher risk affirmed participants rated risk-confirming information as more convincing than risk-disconfirming information. They also reported having higher perceptions of control over their ability to reduce their

caffeine consumption. However, a reduction in biased processing was not apparent for all outcome measures and, indeed, affirmed higher risk participants reported significantly lower intentions to reduce their caffeine consumption than did non-affirmed higher risk participants.

Two studies providing more compelling evidence that self-affirmation manipulations can reduce defensive processing and increase acceptance of personally relevant health-risk information are reported by Sherman et al. (2000). In their first study they affirmed participants after exposure to information about a link between caffeine and FBD, by asking them to complete a scale relating to their highest ranked value. They found that affirmed higher risk participants reported greater message acceptance and higher intentions to reduce their caffeine consumption compared to non-affirmed higher risk participants. In a second study they affirmed participants prior to exposure to health-risk information about AIDS, by asking them to write about their most important value. Their findings indicated that affirmed sexually active participants reported higher perceived likelihood of contracting HIV compared to their non-affirmed counterparts. They were also more likely to take away leaflets about HIV and purchase condoms at the end of the study.

Using a similar manipulation to Sherman et al. (2000, Study 2), Harris and Napper (2005) affirmed participants prior to exposure to information about the link between alcohol consumption and breast cancer. Harris and Napper (2005) predicted that affirmed higher risk participants would be more likely to accept the information compared to their non-affirmed counterparts. Their results provided some support for this hypothesis. Thus, affirmed higher risk participants reported greater fear arousal on reading the message, greater ease of imagining themselves developing breast cancer as a result of consuming alcohol, higher perceptions of risk of contracting this disease, and higher intentions to reduce their alcohol consumption. Furthermore, these effects appeared to be relatively stable, insofar as they were maintained at 1-week and 1-month follow-up. However, the authors found no evidence that self-affirmation influenced alcohol consumption over the subsequent month.

In further support of the ability of self-affirmation manipulations to reduce defensive processing and increase message acceptance in response to personally relevant health-risk information, Harris, Mayle, Mabbott and Napper (2007) demonstrated that self-affirmed smokers, who had been asked to list their desirable characteristics, reported less-defensive responses to graphic images of the health consequences of smoking on some, but not all, indices. Specifically, affirmed smokers perceived the images to be more threatening and personally relevant than did non-affirmed smokers. They also reported more negative thoughts and feelings about smoking, higher levels of control and self-efficacy regarding cutting back on the number of cigarettes smoked, and higher intentions to cut back. However, once again, the authors found no evidence that self-affirmation impacted on smoking behaviour as reported at 1-week follow-up.

Therefore, while there is some support for the prediction that self-affirmation manipulations can prompt reduced defensive processing and increased acceptance of personally relevant health-risk information, the evidence is mixed. Indeed, the findings of the studies presented above are amongst the most persuasive regarding the efficacy of self-affirmation manipulations in health-related domains, with other studies indicating that such manipulations can precipitate 'increased' defensive processing and 'reduced' acceptance of health-risk information among some recipients (e.g. Boney-McCoy, Gibbons, & Gerrard, 1999). Accordingly, there has been a call for further research to explore the effects of self-affirmations in health-related contexts (Harris & Napper, 2005).

Furthermore, a number of explicit limitations to our understanding of the effects of self-affirmation manipulations in health-related contexts can be identified (McQueen & Klein, 2006). First, only a handful of studies have explored the effects of self-affirmation manipulations on behavioural change following exposure to personally relevant health-risk information (Harris et al., 2007; Harris & Napper, 2005; Reed & Aspinwall, 1988; Sherman et al., 2000), and only one of these clearly demonstrated any behavioural effects (Sherman et al., 2000; cf Reed & Aspinwall, 1988). Given that the utility of self-affirmation manipulations from a health promotion perspective is likely to be contingent on their capacity to promote behavioural change, rather than a reduction in defensive processing *per se*, it is imperative that further research explores the ability of such manipulations to facilitate the cessation of health-detrimental behaviours or adoption of health-beneficial behaviours.

Second, the vast majority of self-affirmation research has been conducted using college or university student samples (McQueen & Klein, 2006), a limitation that applies to all of the health-related self-affirmation studies described above. Furthermore, self-affirmation manipulations are frequently complex and time-intensive to operationalise, and hence require motivated participants. Accordingly, it is not known whether such manipulations can be modified to be appropriate for 'real-world' contexts (McQueen & Klein, 2006). In the context of health promotion, it is unlikely that recipients of personally relevant health-risk information could be expected to complete relatively complicated and lengthy self-affirmation manipulations typical of those used in existing research. Certainly, such an approach is unlikely to be practicable within large-scale health promotion campaigns. Consequently, research is needed to explore whether simplified versions of existing self-affirmation manipulations might be both effective and able to be integrated into health promotion materials.

A third limitation to our understanding of self-affirmation is that little is known about how to operationalise it optimally (McQueen & Klein, 2006). It is apparent from the research presented above that various techniques have been utilised to induce self-affirmation in health-related domains, and – to date – little attention has been directed towards exploring which manipulations are most effective and/or why this might be the case. Indeed, as far as we are aware, no published research has compared the effects of different self-affirmation manipulations in a health-related domain.[1] Previous research findings could be taken as consistent with the suggestion that certain affirmation manipulations (e.g. the one employed by Sherman et al. [2000, Study 2]) may be more effective at reducing defensive processing and increasing message acceptance in the face of personally relevant health-risk information than others (e.g. the one used by Reed and Aspinwall [1988]). Furthermore, within health-related contexts, only one self-affirmation manipulation has been clearly associated with behavioural effects (Sherman et al., 2000, Study 2). In order to ascertain whether any differences in outcomes can be attributed to different manipulations *per se*, however, research is needed that directly explores the relative efficacy of different self-affirmation manipulations in a health-related context.

In light of these limitations, the current study had two main aims. The first of these was to compare the efficacy of three types of affirmation manipulation in terms of their ability to reduce defensive processing, increase message acceptance, and instigate behavioural change in response to personally relevant information about the health risks of sunbathing, using a non-student sample (sunbathers on a UK beach). The second aim of the study was to explore whether a simple affirmation manipulation could be integrated into the text of a health promotion leaflet to positive effect.

Sunbathing without protection is an important risk factor for skin cancer, which represents a serious contemporary health threat (Cancer Research UK, 2004; Jackson & Aiken, 2006). However, the implementation of relatively simple precautionary measures, such as using sun-protection factor 15 or greater (SPF 15+) on exposed skin, represents an effective means of preventing the onset of skin cancer (Cancer Research UK, 2004; Jackson & Aiken, 2006). Actively seeking a suntan is thought to be a predominantly female activity, and sunbathing behaviours are believed to involve different motivational processes for men and women (Jackson & Aiken, 2000). We, therefore, decided to focus on females in the current study.

The current study utilised two existing self-affirmation manipulations: a 'values affirmation' task based on that used by Sherman et al. (2000, Study 2) and Harris and Napper (2005) and a 'kindness affirmation' task based on that used by Reed and Aspinwall (1988). Our rationale for selecting these affirmation manipulations was two-fold. First, they have been shown to reduce defensive processing and increase message acceptance in the face of personally relevant health-risk information on at least some outcomes. Second, we considered them to be amenable for use with a real-world population, insofar as they were relatively brief and could be completed in a single sitting (i.e. they did not require participants to complete two separate questionnaires, the first of which would need to be analysed before the appropriate version of the second could be distributed, cf Sherman et al., 2000, Study 1).

The study additionally included a third self-affirmation manipulation, developed for the purpose of this study, which required participants to indicate whether each of a number of positively valenced traits were true of them. This 'positive traits affirmation' task was designed to be brief, able to be completed in a single sitting and – crucially – amenable for integration into a health-promotion leaflet.

In accordance with self-affirmation theory, it was hypothesised that sunbathers in the three affirmation conditions would engage in less defensive processing and greater acceptance of the information in a health promotion leaflet detailing the risks of sunbathing and the benefits of using sunscreen compared to controls. Specifically, it was predicted that affirmed participants would report less avoidance of the message, less derogation of the message, higher levels of response-efficacy and self-efficacy, more positive attitudes towards sunscreen use, and higher intentions to use sunscreen than would non-affirmed participants. It was additionally predicted that affirmed participants would report more negative affect on reading the leaflet and less positive self-feeling and mood in general than would non-affirmed participants, as such responses are consistent with acceptance of the health-risk information (Harris & Napper, 2005; cf Sherman et al., 2000). Furthermore, it was predicted that participants in the affirmation conditions would be more likely to take a free sample of sunscreen.[2]

Method

Participants

An opportunity sample of 169 female sunbathers on a beach in the south of England completed the Time 1 measures. Three participants in the 'values affirmation' condition did not complete the values affirmation task; one participant in the 'kindness affirmation' condition and two participants in the 'positive traits affirmation' condition responded positively to fewer than half of the affirmation items (see below). As these participants are unlikely to have been affirmed, they were removed from the

data analysis. All participants responded to the health-risk information check (refer 'Materials' section) in a manner consistent with their having read the health promotion leaflet. The final sample thus comprised 163 females, all of who indicated that White European or White Other best described their ethnicity. Participants' ages ranged from 18 to 82 years ($M = 33.33$; $SD = 13.97$). Seventy-four (45.40%) participants indicated that they were currently wearing sunscreen, 89 (54.60%) participants indicated that they were not.

Materials

Questionnaire 1

Demographic information. Participants were asked to indicate their age and ethnicity.

Past behaviour. Participants' past behaviour was measured by two items: 'In the past two weeks how often have you used sunscreen, Sun Protection Factor (SPF) 15 or above, on exposed skin when sunbathing?' ('never' [1] to 'every time' [9]) and 'I have used sunscreen (SPF 15 or above) on exposed skin each time I have sunbathed during the past two weeks' ('strongly disagree' [1] to 'strongly agree' [9]). These two items were highly correlated, $r(161) = 0.90$, $p < 0.001$, and a mean score was calculated for each participant, with higher scores indicating more frequent sunscreen use when sunbathing in the previous 2 weeks.

Current sunscreen use. Participants' current use of sunscreen was measured by the single item 'Are you currently wearing sunscreen (SPF 15 or above) on exposed skin?' ('yes'/'no').

Self-affirmation manipulations

Following Sherman et al. (2000, Study 2) and Harris & Napper (2005), participants in the 'values affirmation' condition were asked to choose their most important value and write a short statement about it, focussing on why the value was so important to them and how it had influenced their behaviour.

Following Reed and Aspinwall (1998), participants in the 'kindness affirmation' condition were asked to respond to 10 questions which required them to indicate whether they had performed each of 10 kindness behaviours. If they responded in the affirmative, a brief space was provided for them to give an example. An example question is 'Have you ever been considerate of another person's feelings?' (yes/no).

Participants in the 'positive traits affirmation' condition were asked to indicate whether they were 'enthusiastic', 'keen', 'conscientious', 'hardworking', 'intelligent', 'open-minded', 'responsible', and 'determined' by circling either 'yes' or 'no' for each trait. They were subsequently exposed to the following information 'If you have responded yes to any of the above then you would be an ideal candidate to take part in our 'Safety in the Sun 2006 Challenge' to use sunscreen (SPF 15 or above) when sunbathing for the rest of this year. What you decide to do today can alter the quality of the life that you will enjoy in the future. It's up to you. You are a unique and special person. Don't you deserve looking after?'.

Participants in the 'control' condition received no self-affirmation task and were given the health promotion leaflet directly after completing Questionnaire 1.

Health promotion leaflet

Participants were asked to read a health promotion leaflet entitled 'Skin Cancer and Sun Safety'. The leaflet (~200 words) was designed to be short and easy to read on the beach. It was printed on high-quality colour paper and imitated a typical health promotion leaflet in terms of size and layout. The leaflet presented five facts detailing the risks of skin cancer (e.g. 'Most causes of skin cancer are caused by over exposure to ultraviolet radiation from the sun'). Subsequently, the leaflet presented 'the good news', which detailed how 'most skin cancers are preventable by protecting ourselves from the sun's damaging rays'. The leaflet then presented facts highlighting the benefits of using sunscreen (e.g. 'using sunscreen [SPF 15 or above] is very effective and can block up to 96% of UV radiation'), and the ease with which sunscreen can be used (e.g. 'sunscreen is quite inexpensive, safe and easy to use and definitely helps provide safer tanning'). Participants were then invited to join the 'Safety in the Sun 2006 Challenge' to use sunscreen (SPF 15 or above) on exposed skin when sunbathing for the rest of the year and given some suggestions on how to use sunscreen effectively (e.g. 'Reapply every 2 hours'). All the information given in the leaflet was factually correct.

Questionnaire 2

After reading the health promotion leaflet, participants were asked to complete a further questionnaire, which included the following measures.

Health-risk information check. In order to confirm that participants had read the health promotion leaflet, they were asked to write down what the leaflet was about.

Prior knowledge. Participants were asked to respond to the item 'I already knew all the information presented in the leaflet' ('strongly disagree' [1] to 'strongly agree' [9]).

Negative affect. Participants were asked to what extent they felt (i) afraid, (ii) frightened, (iii) worried and (iv) uncomfortable while reading the leaflet ('not at all' [1] to 'very much' [9]; adapted from Ruiter, Verplanken, Kok, & Werrij, 2003). This scale was found to have a high level of internal reliability, $\alpha = 0.93$, and a mean score was calculated for each participant, with higher scores indicating greater negative affect.

Defensive avoidance. Defensive avoidance of the message was measured by the single item 'When I read the message about skin cancer my first reaction was that I did not want to think about skin cancer' ('totally disagree' [1] to 'totally agree' [9]; adapted from Ruiter et al., 2003).

Message derogation. Derogation of the message was assessed by four items. Participants were asked to what extent they felt the information about skin cancer (i) was overblown, (ii) was exaggerated, (iii) tried to manipulate their feelings and (iv) tried to strain the truth ('totally disagree' [1] to 'totally agree' [9]; adapted from Ruiter et al., 2003). This scale was found to have a high level of internal reliability, $\alpha = 0.88$, and a mean score was calculated for each participant, with higher scores indicating greater levels of message derogation.

Response-efficacy. Participants' beliefs in the effectiveness of using sunscreen on exposed skin when sunbathing in the next two weeks were measured by two items: 'If I use sunscreen (SPF 15 or above) on exposed skin when sunbathing in the next two weeks it will reduce my chances of getting skin cancer' and 'Using sunscreen (SPF 15 or above) on exposed skin when sunbathing in the next two weeks is an effective way to reduce my chances of getting skin cancer' ('totally disagree' [1] to 'totally agree' [9]; adapted from Ruiter et al., 2003). These two items were highly correlated, $r(160) = 0.81$, $p < 0.001$, and a mean score was calculated for each participant with higher scores representing higher levels of response-efficacy.

Self-efficacy. Participants' beliefs about their ability to use sunscreen on exposed skin when sunbathing in the next two weeks were measured by two items: 'If I wanted to, it would be easy for me to use sunscreen (SPF 15 or above) on exposed skin when I am next sunbathing' and 'Using sunscreen (SPF 15 or above) on exposed skin each time I sunbathe in the next two weeks will be very easy to do' ('totally disagree' [1] to 'totally agree' [9]; adapted from Ruiter et al., 2003). These two items were highly correlated, $r(160) = 0.69$, $p < 0.001$, and a mean score was calculated for each participant with higher scores representing higher levels of self-efficacy.

Attitude. Participants' attitudes towards using sunscreen (SPF 15 or above) on exposed skin when sunbathing in the next two weeks were assessed by asking them to rate this behaviour on four pairs of semantic differentials ('bad' [1] to 'good' [9], 'negative' [1] to 'positive' [9], 'foolish' [1] to 'wise' [9], and 'unpleasant' [1] to 'pleasant' [9]). This scale was found to have a high level of internal reliability, $\alpha = 0.90$, and a mean score was calculated for each participant with higher scores indicating more positive attitudes.

Intention. Participants' intentions to use sunscreen on exposed skin when sunbathing in the next two weeks were measured by two items: 'I intend to use sunscreen (SPF 15 or above) on exposed skin every time I sunbathe in the next two weeks' ('totally disagree' [1] to 'totally agree' [9]) and 'Do you intend to use sunscreen (SPF 15 or above) on exposed skin when sunbathing in the next two weeks?' ('not at all' [1] to 'always' [9]). The correlation between these two items was high, $r(159) = 0.90$, $p < 0.001$, and a mean score was calculated for each participant, with higher scores indicating higher intentions.

Self-feelings. Following Sherman et al. (2000), participants' self-feelings were assessed by the item: 'How do you currently feel about yourself?' ('extremely bad' [1] to 'extremely good' [9]).

Mood. Following Sherman et al. (2000), participants' mood was assessed by the item: 'What is your current mood?' ('extremely sad' [1] to 'extremely happy' [9]).

Prior history of skin cancer. Participants were asked to indicate whether they had ever been diagnosed with skin cancer ('yes'/'no'); whether there was a family history of skin cancer ('yes'/'no') and whether any of their friends had been diagnosed as having skin cancer ('yes'/'no').

Positive mood induction. To overcome any possible negative mood induced by thoughts of skin cancer, all participants were asked to write down something they were looking forward to in the coming year and indicate why they were looking forward to it.

Behavioural measure

Participants were asked to respond to the written question 'Would you like a free sample of sunscreen (SPF15+)?' ('yes'/'no'). If they responded in the affirmative they were given a free sample of sunscreen by the researcher.

Procedure

Participants were approached while sunbathing on a beach in the south of England during a heatwave in July 2006 and asked if they would be willing to take part in a study exploring women's beliefs about sunbathing. The researcher was a White female in her mid-30s.

Participants were sequentially allocated to one of the four conditions: 'values affirmation' ($n = 43$), 'kindness affirmation' ($n = 40$),' positive traits affirmation' ($n = 38$) and 'control' ($n = 42$). For participants in the 'values affirmation' and 'kindness affirmation' conditions, the corresponding affirmation task was appended to Questionnaire 1. For participants in the 'positive traits' condition, the affirmation task was incorporated into the first page of the health promotion leaflet (the first page of the leaflet given to participants in the other conditions solely presented the title 'Skin Cancer and Sun Safety'). Participants completed the different parts of the study in their own time in the order described above and returned the materials to the researcher upon completion. Participants took, on average, between 10 and 15 minutes to complete the study.

In order to ensure informed consent, participants were informed at the start of Questionnaire 1 that the study would ask for their beliefs about sunbathing and that the aim of the study was to explore the effectiveness of health promotion campaigns related to sunbathing. Participants were additionally informed that their responses were confidential and that they could withdraw from the study at any time, but none chose to do so. Participants were fully debriefed on completion of the study. The study was approved by the University of Sussex Department of Psychology Ethics Committee.

Results

Preliminary analyses

One-way ANOVAs revealed no difference between conditions in terms of participants' age, past behaviour or prior knowledge of the information included in the health promotion leaflet (all ps > 0.48). Chi-square analyses similarly revealed no differences between conditions in terms of current use of sunscreen, personal history of skin cancer, family history of skin cancer or knowledge of a friend with skin cancer (all ps > 0.38).

Self-affirmation and defensive processing/message acceptance

Overview of analytic strategy

A series of one-way ANOVAs was conducted to establish whether condition influenced negative affect, defensive avoidance, message derogation, response-efficacy, self-efficacy,

Table 1. Summary of one-way ANOVAs comparing participants in the self-affirmation and control conditions on indicators of defensive processing and message acceptance.

Indicator	Control *M* (SD)	Values affirmation *M* (SD)	Kindness affirmation *M* (SD)	Positive traits affirmation *M* (SD)	*F*
Negative affect	2.98 (1.56)	4.32 (2.65)	3.70 (2.09)	4.07 (2.19)	3.07*
Defensive avoidance	4.83 (2.86)	5.05 (2.89)	4.35 (2.98)	5.58 (2.88)	1.23
Message derogation	3.97 (2.11)	3.25 (1.75)	3.17 (1.77)	3.78 (1.82)	1.84
Response-efficacy	6.93 (2.19)	8.33 (1.10)	8.00 (1.35)	8.17 (1.32)	6.90***
Self-efficacy	6.71 (2.41)	8.43 (0.96)	7.73 (1.27)	7.80 (1.68)	7.62***
Attitude	7.21 (1.91)	8.11 (1.44)	8.26 (0.96)	7.74 (1.72)	3.72*
Intention	6.48 (2.52)	7.30 (2.64)	7.40 (1.89)	7.59 (1.79)	1.95
Self-feelings	7.62 (1.58)	6.34 (2.19)	6.80 (2.16)	7.21 (1.82)	3.25*
Mood	7.33 (1.69)	6.85 (2.02)	7.35 (1.93)	7.42 (1.88)	0.77

Note: *$p < 0.05$; ***$p < 0.001$.

attitude, intention, self-feeling, and mood. *Post hoc* tests were used to identify any mean differences. The relevant means and standard deviations are given in Table 1.[3]

In order to directly address the *a priori* hypothesis that participants in the three affirmation conditions would engage in less defensive processing and more message acceptance than those in the 'control' condition, planned contrasts (two-tailed) were conducted for each dependent variable to test whether the 'control' condition differed significantly from the other three conditions combined.

Levene's test of homogeneity of variance was significant for negative affect, response-efficacy, self-efficacy, attitude and intentions. Equal variances can thus not be assumed for these dependent variables and Games–Howell *post hoc* tests and planned contrasts which do not assume equal variances are reported accordingly.

We did not divide the sample into higher and lower relevance participants (cf Sherman et al., 2000) on the basis of current sunscreen use since all participants were recruited whilst sunbathing and since it was felt that the health-risk information contained within the health promotion leaflet would be relevant for all recipients. Specifically, the leaflet emphasised the risks of sunbathing and the fact that 'there is no such thing as a safe tan'. Nonetheless, it is noteworthy that analyses conducted using current sunscreen use as an additional factor did not alter the pattern of results reported here. Furthermore, the interaction between condition and current sunscreen use was only significant for one dependent variable, response-efficacy, reflecting the fact that the effect of condition on this variable was only apparent for those who were not currently wearing sunscreen.

Negative affect

There was a significant effect of condition on negative affect, $F(3, 159) = 3.07$, $p < 0.05$, $\eta_p^2 = 0.05$. Games–Howell *post hoc* tests demonstrated that those in the 'control' condition reported (marginally) lower levels of negative affect when reading the leaflet than those in the 'values affirmation' ($p < 0.05$) and 'positive traits affirmation' ($p < 0.07$) conditions (*M*s 2.98, 4.32 and 4.07, respectively). The planned contrast demonstrated that participants in the three affirmation conditions reported higher levels of negative affect than those in the 'control' condition, $t(105.87) = 3.30$, $p \leq 0.001$, $d = 0.49$.

Defensive avoidance

There was no effect of condition on defensive avoidance of the message, $F(3, 159) = 1.23$, $p = 0.30$, $\eta_p^2 = 0.02$ and the planned contrast was not significant, $t(159) = 0.31$, $p = 0.76$, $d = 0.01$.

Message derogation

There was no effect of condition on message derogation, $F(3, 159) = 1.84$, $p = 0.14$, $\eta_p^2 = 0.03$. The planned contrast, however, revealed a marginally significant trend for those in the three affirmation conditions to report less derogation of the message compared to those in the 'control' condition, $t(159) = -1.71$, $p < 0.09$, $d = 0.31$.

Response-efficacy

There was a significant effect of condition on response-efficacy, $F(3, 158) = 6.90$, $p < 0.001$, $\eta_p^2 = 0.12$. Games–Howell *post hoc* tests demonstrated that those in the 'control' condition reported lower levels of response-efficacy than those in the 'values affirmation' ($p < 0.001$), 'kindness affirmation' ($p < 0.05$), and 'positive traits affirmation' ($p < 0.01$) conditions (*M*s 6.93, 8.33, 8.00 and 8.17, respectively). The planned contrast demonstrated that participants in the three affirmation conditions reported higher levels of response-efficacy than those in the 'control' condition, $t(49.41) = 3.44$, $p = 0.001$, $d = 0.80$.

Self-efficacy

There was a significant effect of condition on self-efficacy, $F(3, 159) = 7.62$, $p < 0.001$, $\eta_p^2 = 0.13$. Games–Howell *post hoc* tests demonstrated that those in the 'control' condition reported (marginally) lower levels of self-efficacy than those in the 'values affirmation' ($p < 0.001$), 'kindness affirmation' ($p < 0.09$) and 'positive traits affirmation' ($p < 0.10$) conditions (*M*s 6.71, 8.43, 7.73 and 7.80, respectively). Participants in the 'values affirmation' condition reported higher levels of self-efficacy than those in the 'kindness affirmation' condition ($p < 0.05$). The planned contrast demonstrated that participants in the three affirmation conditions reported higher levels of self-efficacy than those in the 'control' condition, $t(50.15) = 3.24$, $p < 0.01$, $d = 0.76$.

Attitude towards using sunscreen

There was a significant effect of condition on attitude, $F(3, 159) = 3.72$, $p < 0.05$, $\eta_p^2 = 0.07$. Games–Howell *post hoc* tests demonstrated that those in the 'control' condition reported (marginally) less-positive attitudes towards sunscreen use than those in the 'kindness affirmation' ($p < 0.05$) and 'values affirmation' ($p < 0.08$) conditions (*M*s 7.21, 8.26 and 8.11, respectively). The planned contrast demonstrated that participants in the three affirmation conditions reported more positive attitudes compared to those in the 'control' condition, $t(57.13) = 2.55$, $p < 0.05$, $d = 0.53$.

Intention to use sunscreen

There was no effect of condition on intentions to use sunscreen, $F(3, 158) = 1.95$, $p = 0.12$, $\eta_p^2 = 0.04$. The planned contrast demonstrated, however, that those in the three

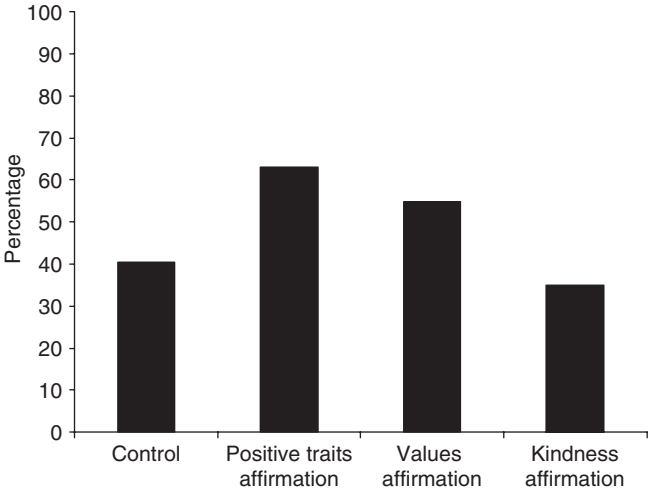

Figure 1. Percentage of participants taking a free sample of sunscreen by condition.

affirmation conditions reported higher intentions compared to those in the 'control' condition, $t(62.46) = 2.19$, $p < 0.05$, $d = 0.42$.

Self-feelings

There was a significant effect of condition on self-feelings, $F(3, 157) = 3.25$, $p < 0.05$, $\eta_p^2 = 0.06$. Tukey's HSD *post hoc* tests demonstrated that those in the 'control' condition reported more positive self-feelings than those in the 'values affirmation' condition ($p < 0.05$; *M*s 7.62 and 6.34, respectively). The planned contrast demonstrated that participants in the three affirmation conditions reported fewer positive self-feelings compared to those in the 'control' condition, $t(157) = -2.38$, $p < 0.05$, $d = 0.43$.

Mood

There was no effect of condition on mood, $F(3, 157) = 0.77$, $p = 0.51$, $\eta_p^2 = 0.01$, and the planned contrast was not significant, $t(157) = -0.37$, $p = 0.71$, $d = 0.06$.

Behaviour: taking a free sample of sunscreen

Chi-square analysis revealed a significant difference between conditions in terms of whether they indicated that they would like a free sample of sunscreen, $\chi^2(3, N = 162) = 7.92$, $p < 0.05$, Cramer's $V = 0.22$. As shown in Figure 1, 40.48% of participants in the 'control' condition requested a free sample compared to 63.16% of participants in the 'positive traits affirmation' condition, 54.76% of participants in the 'values affirmation' condition, and 35.00% of participants in the 'kindness affirmation' condition.

In order to explore further the impact of condition on behaviour, we conducted binary logistic multiple regression. Because preliminary analysis revealed that the impact of condition on behaviour was not moderated by current sunscreen use ($p = 0.76$), we conducted one regression analysis for all participants. Condition was dummy coded for

this analysis, such that the first dummy variable (D_1) compared the 'kindness affirmation' condition (allocated a value of 1) to the control condition (allocated a value of 0), the second dummy variable (D_2) compared the 'values affirmation' condition (1) to the control condition (0), and the third dummy variable (D_3) compared the 'positive traits affirmation' condition (1) to the 'control' condition (0). The dependent variable was whether participants requested a free sample of sunscreen (1) or not (0).

The resultant model significantly predicted whether or not participants requested a free sample of sunscreen, $\chi^2(3) = 8.01$, $p < 0.05$, with 60.5% of responses correctly classified, $R_L^2 = 0.04$. Inspection of the β-weights revealed that D_3 was the only significant predictor ($\beta = 0.92$, $p < 0.05$), demonstrating that the 'positive traits affirmation' condition was the only condition to differ significantly from the 'control' condition, with those in the 'positive traits affirmation' condition being more likely to request a free sample of sunscreen. This effect remained significant when we controlled for each of the measures of defensive processing and message acceptance in turn, indicating that none of these measures mediated the influence of condition on behaviour.

Discussion

The first aim of the current study was to compare the efficacy of three different affirmation manipulations. In accordance with self-affirmation theory (Steele, 1988), we hypothesized that affirmed participants would be less likely to defensively process and more likely to accept personally relevant health-risk information about sunbathing and skin cancer compared to controls. The findings of the current study are highly congruent with this hypothesis, insofar as planned contrasts demonstrated that participants in the three affirmation conditions reported more negative affect on reading the information, marginally less derogation of the message, higher levels of response- and self-efficacy, more positive attitudes towards sunscreen use, higher intentions to use sunscreen, and less-positive self-feeling compared to their counterparts in the control condition.

We additionally predicted that participants in the three affirmation conditions would be more likely to take a free sample of sunscreen. While condition was found to be associated with whether or not participants took a free sample of sunscreen, the nature of this relationship was contingent on the type of affirmation manipulation. Logistic multiple regression analysis revealed that the 'positive traits affirmation' condition was the only affirmation condition to differ significantly from the 'control' condition, with participants in the 'positive traits affirmation' condition being more likely to request a free sample of sunscreen than those in the 'control' condition.

The fact that the three affirmation manipulations did not uniformly influence behaviour provides support for the concern voiced by McQueen and Klein (2006) that research is needed to compare the impact of various affirmation manipulations on outcomes, including behavioural measures. It is not possible to discern from the current study what it was about the three affirmation manipulations that resulted in their differential impact on behaviour. The manipulations differed in both content and format. Participants in the 'values affirmation' condition were asked to write a short statement about their most important value. This affirmation was thus ideographic in nature, as it allowed participants to choose the dimension on which they affirmed. Participants in the 'kindness affirmation' condition were asked to respond to 10 questions and give examples of kindness behaviours which they had performed, and participants in the 'positive traits affirmation' condition were simply asked to indicate whether a number of positive traits

were descriptive of them. Furthermore, for those in the 'positive traits affirmation' condition, the manipulation was integrated into the health promotion leaflet and followed by additional encouragement to take part in the 'Safety in the Sun 2006 Challenge'. Given that the aims of our study were to (i) compare existing affirmation manipulations and (ii) determine whether a brief affirmation manipulation could be integrated into health promotion materials with positive effect, the use of such varied affirmation manipulations was a necessary and integral part of our research design. Nonetheless, future research is needed to identify the key features of such affirmation manipulations that are responsible for their success (or otherwise).

One possible reason why the 'positive traits affirmation' condition was the only condition to differ significantly from the 'control' condition in terms of its impact on behaviour is that it potentially affirmed participants on several dimensions, whereas the 'values affirmation' and 'kindness affirmation' conditions most probably each affirmed participants on one dimension only.

Alternatively, the 'positive traits affirmation' task may have represented a more subtle manipulation than either the 'values affirmation' or the 'kindness affirmation' manipulations in two key respects. First, it was not presented as a separate task but rather was integrated into the health promotion leaflet. Second, it presumably did not require the same level of explicit reflection and processing as was necessitated by the written affirmation tasks. It has been suggested that the subtlety of self-affirmation manipulations may represent an important pre-requisite to their success (Sherman and Cohen, 2006).

As noted in the introduction, only one previous published study has clearly demonstrated the desired effects of a self-affirmation manipulation on a behavioural outcome following exposure to personally relevant health-risk information (Sherman et al., 2000, Study 2). The current study thus provides further support for the potential utility of self-affirmation manipulations in promoting behaviour change.

It is noteworthy that both the above-mentioned Sherman et al. (2000) research and the current study measured behaviour soon after the self-affirmation manipulation. It is thus possible that any effects of self-affirmation manipulations on behavioural outcomes may be fairly short-lived. In addition, as the behavioural measures in these studies involved performing a behaviour rather than avoiding a behaviour, it is possible that action is more easily instigated by self-affirmation manipulations than is desistence from a behaviour. Moreover, while the behaviours of purchasing condoms and requesting free samples of sunscreen are consistent with the directly health-beneficial behaviours of condom use and sunscreen use, respectively, they do not guarantee that participants actually engaged in these latter behaviours. Indeed, it is not possible to discount the potential influence of demand characteristics in both studies – participants may have been aware that their behaviour was being assessed and may have adjusted their responses accordingly. Further research is needed to establish the effects of various self-affirmation manipulations on behaviours which have direct health-beneficial effects and on longer-term behavioural outcomes.

The second aim of the current study was to explore whether a simple affirmation manipulation (viz. the 'positive trait affirmation' manipulation) could be successfully integrated into the text of a health promotion leaflet. Importantly, the results demonstrated that the 'positive traits affirmation' task allowed participants to respond to the personally relevant health-risk information with less defensive processing and rendered them more susceptible to persuasion and behaviour change. These findings suggest that a brief self-affirmation task is amenable to integration into health promotion materials with positive effects. Accordingly, manipulations such as the 'positive traits

affirmation' task may prove to be of value in a real-world context. This is the first study to demonstrate that an integrated affirmation task can be effective at reducing defensive processing and instigating behaviour change. Further research is required to determine whether the success of this relatively simple intervention can be replicated and generalised across different populations and behavioural domains.

Notes

1. Indeed, McQueen and Klein (2006) identified only one published study which directly compared the effects of different self-affirmation manipulations, and this was in a non-health-related domain. Specifically, Schimel, Arndt, Banko and Cook (2004) demonstrated intrinsic self-affirmations to be more effective than extrinsic self-affirmations.
2. We had additionally hypothesised that affirmed participants would be more likely to report having used sunscreen on exposed skin when sunbathing at two-week follow-up compared to non-affirmed participants. However, too few participants completed the follow-up questionnaire to allow this analysis to be conducted; therefore, the Time 2 materials and data are not described further.
3. Tables summarising bi-variate correlations between the various measures of defensive processing and the message acceptance by condition are available from the authors on request.

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