Psychology & Health

ISSN: (Print) (Online) Journal homepage: www.tandfonline.com/journals/gpsh20

Effects of a self-affirmation intervention on responses to bowel cancer screening information

Elizabeth Travis, Laura Ashley & Daryl B. O'Connor

To cite this article: Elizabeth Travis, Laura Ashley & Daryl B. O'Connor (22 Mar 2024): Effects of a self-affirmation intervention on responses to bowel cancer screening information, Psychology & Health, DOI: 10.1080/08870446.2024.2332265

To link to this article: https://doi.org/10.1080/08870446.2024.2332265

PSYCHOLOGY & HEALTH
https://doi.org/10.1080/08870446.2024.2332265

Effects of a self-affirmation intervention on responses to bowel cancer screening information

Elizabeth Travis[a], Laura Ashley[b] and Daryl B. O'Connor[a]

[a]School of Psychology, University of Leeds, Leeds, UK; [b]School of Humanities & Social Sciences, Leeds Beckett University, Leeds, UK

ABSTRACT

Objective: To investigate the effect of two brief self-affirmation interventions, immediately prior to reading standard information about bowel cancer screening, on state anxiety, message acceptance and behavioural intention to screen for bowel cancer.

Methods: 242 adults aged 49 were randomised to one of two self-affirmation interventions (health or values) or one of two control conditions, before reading an NHS England bowel cancer screening leaflet. Participant friend and family history of bowel cancer, state anxiety, message acceptance, behavioural intention to screen, trait self-esteem and spontaneous self-affirmation were measured. Data were analysed using between-participants analysis of variance, planned contrasts and moderated regression.

Results: No main effects of experimental condition on levels of state anxiety, message acceptance and behavioural intention were found. However, planned contrasts showed participants who self-affirmed about their health or values (conditions-collapsed) were significantly less anxious and reported significantly higher behavioural intentions compared to participants in the controls (conditions-collapsed). Irrespective of condition, higher levels of spontaneous self-affirmation and trait self-esteem were correlated with lower anxiety, higher intentions, and message acceptance.

Conclusion: There was some evidence of the effect of health-based self-affirmation on lowering anxiety; however, further research is needed to explore the effectiveness of different self-affirmation interventions in larger samples.

ARTICLE HISTORY
Received 6 March 2024
Accepted 14 March 2024

KEYWORDS
Bowel cancer screening; self-affirmation; fecal immunochemical test; patient anxiety; message acceptance; behavioural intention

Introduction

1.9 million new cases of colorectal cancer, also known as bowel cancer, were reported in 2020 worldwide (World Health Organisation, 2023) and 42,886 new cases are reported yearly in the United Kingdom (UK) (2016-2018 average) (Cancer Research UK, 2023). Bowel cancer is a leading cause of cancer death accounting for 10% of all cancer deaths in the UK, with more than nine out of ten cases diagnosed in people

CONTACT Elizabeth Travis pseat@leeds.ac.uk School of Psychology, University of Leeds, Leeds, UK.
Supplemental data for this article can be accessed online at https://doi.org/10.1080/08870446.2024.2332265.

over the age of 50 (Cancer Research UK, 2023). The National Health Service (NHS) England bowel cancer screening programme (BCSP) has recently extended from over 60 years for the eligible age for asymptomatic screening to people aged 50 and over, being rolled out over the next 4 years, available every two years (NHS, 2023). Population screening has been found to reduce the risk of death caused by bowel cancer by 25%, in people who participate in at least one round of organised asymptomatic bowel cancer screening (Hewitson et al., 2008). Asymptomatic bowel cancer screening involves initial fecal immunochemical testing (FIT); a test that looks for traces of blood in a feces sample (NHS, 2023). Since the introduction of the FIT in 2019, uptake of bowel cancer screening in England was reported to be 71.0% in 2021 (GOV.UK, 2023), nevertheless, the levels of uptake remain suboptimal.

In England people aged 50 years and over are mailed an NHS leaflet about bowel cancer screening, followed by a FIT kit for their completion two weeks later (see supplementary file 1). When people receive health threatening information, such as a leaflet about bowel cancer screening, they can feel anxious, upset, or defensive. Studies have shown levels of message acceptance, stress and behavioural intention vary considerably in participants informed of their increased risk of cancer due to their current health behaviours (Klein et al., 2010; Creswell et al., 2005; Sherman et al., 2000; Sherman et al., 2009).

We are faced daily with numerous threats to our self-integrity; our sense of being good, virtuous, successful, and able to control important life outcomes (Sherman & Cohen, 2006; Steele, 1988). Understanding how we maintain our integrity of the self when under psychological threat, forms the basis of self-affirmation; an act where we as individuals can use alternative sources of self-integrity that demonstrate one's moral and adaptive adequacy (Steele, 1988). The act of self-affirming is understood to restore our sense of self, enabling us to be more willing to process threatening information (Cohen & Sherman, 2014).

Message acceptance has been found to increase in participants undertaking affirmation conditions, in a meta-analysis of 45 tests (Good & Abraham, 2007). Likewise, a later review by Epton et al. (2015) reported positive effects of self-affirmation, induced by people reflecting upon important values, across 34 tests of message acceptance, 64 tests of intention to engage in health behaviours and 46 tests of actual behaviour. Participants who affirm about their values have been shown to have lower cortisol responses to stress, compared to controls (Creswell et al., 2005; Dutcher et al., 2020). Self-affirmation inductions carried out as experimental manipulations have largely involved participants choosing a value that is most important to themselves, in a domain unrelated to the threat, writing in essay form or by answering values related yes/no questions as to why that value is important to them (Armitage et al., 2011; Reed & Aspinwall, 1998). It has been suggested that self-affirming in a domain unrelated to the threat (e.g. health) is more effective, given it encourages the mind to focus on their self-integrity beyond the threat (Cohen & Sherman, 2014). Yet, other findings have suggested that affirming values related to the threat domain can also be effective (Klein et al., 2010; Wiesenfeld et al., 2001). It is therefore important that research investigates and compares the effects of self-affirming in a domain related and unrelated to the threat.

A recent study by Iles et al. (2022), based on 1,056 women in the US, measured the effectiveness of health versus general values self-affirmation inductions and essay writing versus questionnaires toward threatening health messages. Findings showed no differences in intention to reduce alcohol intake in those who affirmed health versus non-health values, and higher breast cancer worry and intentions to reduce alcohol consumption in essay versus questionnaire-based inductions. No differences in those who affirmed health versus non-health values on message acceptance measures were found (Iles et al., 2022). Replication of their findings is recommended by Iles et al. (2022) in a non-US participant pool, given that health affirmations could significantly facilitate dissemination of health-risk information. The current study therefore aims to continue to compare the effectiveness of health versus general values self-affirmation inductions, and to do so, item question wording in the current study for the questionnaire inductions used were taken and adapted from the previous inductions tested by Iles et al. (2022).

To our knowledge only one study to date has examined the effects of a self-affirmation intervention on responses to information about bowel cancer screening and risk. Klein et al. (2010) examined whether maintaining good health would facilitate bowel cancer screening intentions and subsequent screening behaviour at a 6-month follow-up. Findings were mixed, with intentions to screen dependent on participant's optimistic and realistic beliefs about their bowel cancer risk. Specifically, unrealistically optimistic participants who affirmed (compared to controls) about their health prior to receiving bowel cancer screening risk information had greater intentions to screen (Klein et al., 2010). In recent work Clarke et al. (2023) found higher levels of defensive information processing to be associated with lower bowel cancer screening uptake. Denying the immediacy to be tested and self-exempting oneself have been suggested as key barriers to FIT uptake (Clarke et al., 2023). Interventions such as self-affirmation which are known to reduce defensiveness (Good & Abraham, 2007) should now be tested to investigate the effects on bowel cancer screening intention and uptake.

Ferrer and Cohen (2019) proposed three conditions thought to facilitate the effectiveness of self-affirmation inductions; the presence of a psychological threat, resources to foster change, and timeliness of self-affirmation with respect to a health threat and resources. The sample age for participants in the current study was chosen to be 49 years old to ensure the majority of participants had no previous direct exposure yet relevance and salience of the health information. Participants at this age group were likely to receive their first invitation to screen for bowel cancer the following year and this was explained to participants. It is important to examine other factors that may moderate the effectiveness of self-affirmation inductions. Factors include having a history of friends and family with bowel cancer, trait self-esteem and spontaneous self-affirmation. According to a previous review, the risk of developing bowel cancer is double in individuals with one or more first degree relative affected (Butterworth et al., 2006). Having greater proximity to cancer is known to increase fear and motivation levels to screen (Vrinten et al., 2017). This increases the practical importance of finding an affirmation intervention to reduce anxiety and increase intentions within this participant group. A secondary aim of the current study was therefore to explore whether having a history of friends and family with bowel cancer moderates the

effectiveness of the self-affirmation interventions. This study also wanted to investigate whether trait self-esteem and the extent to which one spontaneously makes self-affirmations moderated the effectiveness of the interventions and to explore whether these variables were associated with the key outcome variables (anxiety, message acceptance and behavioural intention). Trait self-esteem has been found to moderate the relationship between values affirmation and psychological stress responses to a laboratory stressor, whereby affirmed participants with high self-esteem reported lower stress responses (Creswell et al., 2005). Creswell et al. (2005) suggest that self-affirmation may be most effective in reducing stress in people with a positive dispositional self-concept (i.e. high in self-resources such as trait self-esteem and optimism) yet increase stress in those with a negative dispositional self-concept (i.e. low in self-resources). Harris et al. (2019) showed that individuals who have a tendency to make spontaneous self-affirmations have lower levels of depression, anxiety and higher levels of wellbeing and message acceptance. Harris et al. (2019) also explained that spontaneous self-affirmation functions in a way that is similar to experimentally induced self-affirmation by resulting in greater open-mindedness and readiness to engage in behavior change. Further to this, it was reported by Jessop et al. (2023) that a values self-affirmation induction moderated the association between spontaneous self-affirmation and well-being, such that the self-affirmation induction boosted state wellbeing scores in participants with lower spontaneous self-affirmation.

The current study hypothesised:

1. Participants who completed a health or values based self-affirmation task before reading an information leaflet about bowel cancer screening would report lower levels of state anxiety and higher levels of message acceptance and behavioural intention, compared to those participants in non-active or active control conditions.
2. The effectiveness of the self-affirmation interventions would be moderated by history of friends or family with bowel cancer, such that intervention effects would be stronger for participants with a history of friends or family with bowel cancer.
3. Irrespective of the self-affirmation intervention, participants who have a history of friends or family with bowel cancer will report higher levels of anxiety, message acceptance and behavioural intention, compared to those with no history of friends or family with bowel cancer.

In secondary analyses, the current study also investigated whether the effectiveness of the self-affirmation interventions would be moderated by self-esteem and spontaneous self-affirmation. The study predicted that participants who have higher self-esteem or spontaneous self-affirmation and who have affirmed health or values before reading an information leaflet about bowel cancer screening, will report lower levels of anxiety, and higher levels of message acceptance and behavioural intention. Furthermore, it was predicted that irrespective of the self-affirmation intervention, levels of self-esteem and spontaneous self-affirmation would be associated with levels of anxiety, message acceptance and behavioural intention.

Methods

Design and participants

The current study used a between-participants cross-sectional online questionnaire design. Participants were recruited using an online participant database (Prolific) and were required to be aged 49 years old. This age group was chosen to ensure the majority of participants had no previous exposure to the information and were one year younger than the pre-existing UK NHS Bowel Cancer Screening Programme eligible screening age for bowel cancer. Participants were required to currently live in the United Kingdom and have no previous bowel cancer screening experience. Participants were evenly randomised, using the Qualtrics questionnaire randomizer function to one of two self-affirmation conditions or one of two control conditions. Participants were then informed that the NHS information leaflet they were about to read was a leaflet they would receive from the NHS in less than 12 months regarding bowel cancer screening. After reading the information leaflet about bowel cancer screening, participants were asked to rate their levels of state anxiety, message acceptance, behavioural intention to screen, self-esteem, and spontaneous self-affirmation. The study received ethical approval from the University of (Leeds) Ethics committee on the 17th of February 2023 (Reference: PSYC-831) and was preregistered on AsPredicted (#122350) on the 20th of February 2023 ahead of data collection (https://aspredicted.org/2G2_LTV).

Sample size justification

The sample size calculation was informed by two meta-analyses: Good and Abraham (2007) review of self-affirmation interventions and defensive responses, and Epton et al. (2015) review of self-affirmation interventions and health behaviour change. Based on effect sizes reported in these reviews (f = .38 and f = .085 retrospectively) we calculated a mean effect size of f = .23. A power analysis using G*Power determined 211 participants would be required to achieve 80% power at alpha = 0.05. We added 20 additional participants per condition to account for participants who may fail the attention check or who may report previous bowel cancer screening experience. The overall target sample size was 291, aimed to be of equal numbers of male and female.

Experimental conditions

The 4 experimental conditions in this study are described below. The item wording for the conditions were taken and adapted from Iles et al. (2022), and in line with previous research previous studies (Armitage et al., 2011; Armitage & Rowe, 2011). To avoid participants replying with a 'no' response and providing no explanation, the item questions taken from Iles et al. (2022) were rephrased to begin "*Please write about a…*". Instructions were provided to participants in all conditions except in *non-active* to encourage participants to type their immediate thoughts and reflections as they come to mind. Instructions provided were:

'Writing and reflecting on what matters to you has been shown to be beneficial for lots of reasons. We would like you to write a couple of sentences in response to the four questions below. Do not worry about spelling, punctuation of grammar, just jot down your immediate thoughts and reflections that come to mind.'

Values-based affirmation questionnaire

Participants in this condition answered four open questions which have been found to generate largely affirmative responses (Iles et al., 2022; Armitage et al., 2011), these were:

'Please write about a time when you have done something to help another person (in the past year)'.

'Please write about a time when you have done something that you are particularly proud of (in the past year).'

'Please write about a time when someone paid you a particularly nice compliment (in the past year)'.

'Please write about an aspect of your personality that you particularly like'.

Health-based affirmation questionnaire

The health-based affirmation condition did not ask participants about the threat itself (the risk of bowel cancer). Participants in this condition answered four open questions designed to generate affirmative responses to their health specifically (Iles et al., 2022), these were:

'Please write about an aspect of your personality that you think will help you to live longer'.

'Please write about something you are doing right now to maintain your health'.

'Please write about a time when you have done exercise that caused you to break a sweat (in the past year)'.

'Please write about a time when you found yourself saying 'no' when offered an unhealthy food (in the past year)'.

Non-active

Participants in this condition were not asked to answer any questions and were immediately presented with the bowel cancer screening leaflet to read.

Active control questionnaire

Participants in this condition answered four open questions about negative aspects of the self which should not affirm the self (Iles et al., 2022), these were:

'Please write about a time when you have done something to hurt someone's feelings (in the past year)'.

'Please write about a time when you have done something that you wished you had done better (in the past year)'.

'Please write about a time when someone said something critical about you (in the past year)'.

'Please write about an aspect of your personality that you wish was different'.

Measures

State Anxiety was assessed using the Spielberger six-item short form state anxiety inventory (STAI-6) scale (Marteau & Bekker, 1992). This scale measures state anxiety levels "right now" on a 4-point Likert scale (not at all (0), somewhat (1), moderately (2) and very much (3)). Items statements included "I feel calm', 'I am tense'. A mean state anxiety score was computed. The Cronbach's alpha for this scale in the current sample was α = .87.

Message acceptance measured the extent participants agreed or disagreed with the information provided within the bowel cancer screening leaflet, rated on a 9–point Likert scale (ranging from strongly disagree– 0 to strongly agree – 9). For example, 'Regular bowel cancer screening reduces the risk of dying from bowel cancer (by at least 25%)'. Participants were also asked 'how important they think it is that people take part in bowel cancer screening to reduce their risk of bowel cancer', again rated on a 9-point Likert scale (ranging from strongly disagree (0) to strongly agree (9)). Item phrasing and scales were informed by Sherman et al. (2000). An overall mean message acceptance score was computed. The Cronbach's alpha for this scale in the current sample was α = .75.

Behavioural intention to take part in bowel cancer screening tests was measured using a 4 -point Likert scale (Definitely not (0); Probably not (1); Yes, probably (2); Yes, definitely (3)) in response to the question 'will you do the test? (the FIT kit)'. The phrasing and scale for this item was taken from Kotzur et al. (2022).

History of friends or family with bowel cancer were recorded, asking participants 'Do you have a family history of bowel cancer? i.e. has anyone in your family ever been diagnosed with bowel cancer?' and 'have any of your friends ever been diagnosed with bowel cancer?' Options of response were Yes (1) or No (0).

Self-esteem was assessed using the Rosenberg self-esteem scale (RSES) 10-item assessment of global feelings of self-worth (Rosenberg, 1965). Participants rated how strongly they agreed with statements dealing with general feelings on a 4-point Likert scale (strongly disagree (1), disagree (2), agree (3), strongly agree (4)). For example, 'I feel that I have a number of good qualities.' Scores were summed, with higher scores indicating higher self-esteem. The Cronbach's alpha for this scale in the current sample was α = .93

The *Spontaneous self-affirmation Measure* used a 16-item assessment of tendency to respond to threats with affirming self-related cognitions (Harris et al., 2019), rated on a 7–point Likert scale (ranging from disagree completely (1) to agree completely (7)). For example, 'When I feel threatened or anxious by people or events, I find myself… Thinking about the things I like about myself'. Three items describing the tendency to think negative thoughts about self-items acted as controls for response bias and were not calculated in the mean score computed. The Cronbach's alpha for this scale in the current sample was α = .94

Participant demographics were also asked to collate details of participant gender, ethnicity, and level of education. See Table 1 for participant characteristics.

Table 1. Participant characteristics for each study.

Participants Characteristics	Total Sample (*N* = 242)	Condition 1 Health affirmation *(N = 63)*	Condition 2 Values affirmation *(N = 57)*	Condition 3 Active Control *(N = 59)*	Condition 4 Non-active Control *(N = 63)*
Gender					
Female	134 (55.4)	32 (50.8)	34 (59.6)	34 (57.6)	34 (54.0)
Male	108 (44.6)	31 (49.2)	23 (40.4)	25(42.4)	29 (46.0)
History of friends and family with bowel cancer					
History of friend(s) with bowel cancer	26 (10.7)	7 (11.1)	4 (7.0)	9 (15.3)	6 (9.5)
History of family with bowel cancer	29 (12)	11 (17.5)	4 (7.0)	7 (11.9)	7 (11.1)
Ethnicity					
White British or White other	230 (95.0)	60 (95.2)	56 (98.2)	53 (89.8)	61 (96.8)
Black or mixed Black or Black other	3 (1.2)	1 (1.6)	0 (0)	2 (3.4)	0 (0)
Asian or mixed Asian or Asian other	5 (2.1)	1 (1.6)	1 (1.8)	1 (1.7)	2 (3.2)
Mixed or multiple ethnic groups	4 (1.7)	1 (1.6)	0 (0)	3 (5.1)	0 (0)
Education					
Below degree level educated	112 (46.3)	31 (49.2)	26 (45.6)	25 (42.4)	30 (47.6)
Degree level educated and above	130 (53.7)	32 (50.8)	31 (54.4)	34 (57.6)	33 (52.4)

Data analysis

The hypotheses were tested using two blocks of analyses, first a one-way between-participants analysis of variance (ANOVA) was carried out to test the main effect of experimental condition: values affirmation, health affirmation, non-active control, and active control. Planned contrasts were then used to specifically compare the effectiveness of values versus health affirmation. Second, a two-way (2×2) between-participants ANOVA was carried out to see whether having a history of friends or family with bowel cancer condition (history, no history) moderated the relationship between the affirmation interventions (values and health conditions-collapsed) on message acceptance, anxiety, and behavioural intention, compared to the control conditions (non-active control and active control conditions-collapsed). These analyses deviated from that preregistered on Aspredicted (#122350) on the 20th of February 2023 (https://aspredicted.org/2G2_LTV). Note that the preregistered 4 (condition) x 2 (history) way ANOVA was replaced with the analyses outlined above in response to reviewer feedback.

In exploratory analyses, the PROCESS Macro for SPSS, using model 1 (Hayes, 2012), was used to test the moderating effect of trait self-esteem and spontaneous self-affirmation on anxiety, intention, and message acceptance. Linear regression tested the associations between levels of self-esteem and spontaneous self-affirmation with levels of anxiety, message acceptance and behavioural intention. Finally, education was controlled for in all the analyses because we wanted to ensure that any observed intervention effects held after accounting for differences in education. Moreover, we followed the recommendations put forward by Simmons et al. (2011) in terms of transparency regarding the treatment of covariates by running the analyses without any covariates and then with the covariates.

Treatment of data

Histograms and box plots of outcome variables were run to check for data normality and identify potential outliers. Outliers were replaced with a score equal to the mean plus three standard deviations. Data remained heavily skewed after removing outliers and Log10 transformation was applied to behavioural intention and message acceptance. We ran the analyses in datasets with and without transformations and the results were substantively the same. Therefore, we elected to report the results based on these data with the outliers removed. Data met the assumptions of linear regression, in that linearity, residuals and multicollinearity were not violated, Cooks Distance = .000, and the sample size was deemed sufficient.

The questionnaire included two attention checks. The attention checks identified participants who are not engaged with the questions and allowed the researchers to screen out those participants prior to conducting analyses (Maniaci & Rogge, 2014). The attention checks had to be completed by the participant for the data to be included. One participant was removed from the data because they did not complete the attention checks. Twenty-five participants exited the survey early and were therefore removed from the data set as non-completers. Three of the twenty-five non-completers had been assigned to the health condition, 8 had been assigned to the values condition, 6 assigned to the active control condition, and 1 to the non-active control condition. Seven of twenty-five non-completers participants exited at 5% progress; at that point they had not been assigned an experimental condition within the survey. A further thirteen participants were removed because they had previous bowel cancer screening experience and therefore did not meet the eligibility criteria. 242 participants remained for analysis.

Results

Participant characteristics

See Table 1 for participant characteristics, n (%), overall and broken down by self-affirmation condition.

Descriptive statistics

The means, standard deviations and correlations between variables are shown in Table 2. The means and standard deviations for main study variables by each condition are shown in Table 3.

Main effects of experimental condition

A one-way (values affirmation, health affirmation, non-active control, and active control) ANOVA found no main effect of experimental condition on state anxiety levels, F (3, 238) = 2.58. p = .054 η_p^2 = .03 (values affirmation: M = .74 SE = .09; health affirmation: M = .69 SE = .08; non-active control: M = .96 SE = .09; active control: M = .94 SE = .08), behavioural intention levels, F (3, 238) =1.36 p = .256 η_p^2 = .02 (values affirmation: M = 2.72 SE = .08; health affirmation: M = 2.75 SE = .07; non-active control: M = 2.56 SE = .09; active control: M = 2.58 SE = .10), or message acceptance levels, F

Table 2. Bivariate correlations of study variables.

	M	SD	1	2	3	4	5
1. Anxiety	.83	.67	–				
2. Behavioural Intention	2.66	.61	−0.22**	–			
3. Message Acceptance	8.11	.94	−0.12	.53**	–		
4. Self esteem	29.18	6.29	−0.46**	.15*	.14*	–	
5. Spontaneous affirmation measure	4.33	1.22	−0.17**	.18**	.17**	.42**	–

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

Table 3. Means and standard deviations for state anxiety, behavioural intention, and message acceptance measures by self-affirmation condition and history of friends or family with bowel cancer.

	Condition 1 Health affirmation			Condition 2 Values affirmation			Condition 3 Active Control			Condition 4 Non-active control		
Dependent variable	n	Mean	SD	n	Mean	SD	n	Mean	SD	n	Mean	SD
State anxiety												
Overall sample	63	0.69	0.63	57	0.74	0.67	59	0.94	0.65	63	0.96	0.69
Previous history of friends or family with bowel cancer	14	1.02	0.65	8	0.94	0.42	16	1.07	0.55	13	1.05	0.59
No history of friends or family with bowel cancer	49	0.59	0.60	49	0.71	0.70	43	0.88	0.68	50	0.93	0.72
Behavioural intention												
Overall sample	63	2.75	0.54	57	2.72	0.62	59	2.58	0.75	63	2.56	0.69
Previous history of friends or family with bowel cancer	14	3.00	0.00	8	2.75	0.71	16	2.81	0.40	13	2.54	0.78
No history of friends or family with bowel cancer	49	2.67	0.59	49	2.73	0.53	43	2.53	0.70	50	2.56	0.68
Message Acceptance												
Overall sample	63	8.08	1.10	57	8.11	0.93	59	8.25	0.76	63	7.93	1.16
Previous history of friends or family with bowel cancer	14	8.46	0.55	8	7.84	1.24	16	8.36	0.64	13	7.93	1.21
No history of friends or family with bowel cancer	49	8.00	1.03	49	8.16	0.87	43	8.22	0.81	50	7.97	1.04

(3, 238) = 1.11. p = .347 η_p^2 = .05 (values affirmation: M=8.11 SE = .12; health affirmation: M=8.08 SE = .13; non-active control: M=7.93 SE = .15; active control: M=8.25 SE = .10). When controlling for education there continued to be no effect of experimental condition on state anxiety, F (3, 237) = 2.53 p = .058 η_p^2 = .03, levels of behavioural intention, F (3, 237) = 1.49 p = .217 η_p^2 = .02, or message acceptance, F (3, 237) = 1.04 p = .376 η_p^2 = .01.

Planned contrasts showed participants who self-affirmed about their health or values (conditions-collapsed) were significantly less anxious, t (238) = −2.72, p = .007, reported significantly higher behavioural intentions, t (238) = 2.02, p = .045, and similar levels of message acceptance, t (238) = .013, p = .990, compared to participants in the active control or the non-active conditions (conditions-collapsed).

Planned contrasts showed participants who self-affirmed about their health were significantly less anxious, t (238) = −2.51, p = .013, yet reported similar levels of intention, t (238) = 1.72, p = .086, and message acceptance, t (238) = −0.02, p = .984, compared to participants who did not self-affirm (receiving either the active control or the non-active conditions).

Planned contrasts also showed participants who self-affirmed about their values were no lower or higher in anxiety, t (238) = −1.94, p = .054, intention, t(238) = 1.57,

p = .117, or message acceptance, t (238) = .041, p = .968, compared to participants who did not self-affirm (receiving the active control or the non-active conditions).

The effects of friends or family history with bowel cancer

A significant main effect of history of friends or family with bowel cancer was found only on state anxiety levels, F (1, 238) = 5.77 p = .017 η_p^2 = .02, with anxiety significantly higher in those with a history of friends or family with bowel cancer than those with no history. There were no significant main or interaction effects on any other dependent measures, without or with covariates. The inferential statistics are provided in Supplementary File 2.

Exploratory analyses: trait self-esteem and the spontaneous self affirmation measure

The effectiveness of the self-affirmation interventions was not moderated by trait self-esteem, with no significant effects for levels of anxiety, message acceptance or behavioural intention. See Supplementary file 2. When controlling for spontaneous self-affirmation there continued to be no significant effects for levels of anxiety, message acceptance or behavioural intention.

The effectiveness of the self-affirmation interventions was not moderated by spontaneous self-affirmation, with no significant effects for levels of anxiety, message acceptance or behavioural intention. See Supplementary file 2. When controlling for trait self-esteem there continued to be no significant effects for levels of anxiety, message acceptance or behavioural intention.

Irrespective of the experimental intervention, correlational analyses found that self-esteem and spontaneous self-affirmation were significantly associated with lower anxiety, higher behaviour intention and message acceptance (see Table 2). However, when self-esteem and SSAM were entered together in regression analyses, only self-esteem was significantly associated with lower anxiety (β = .47, p < .001), and only spontaneous self-affirmation was significantly associated with higher behavioural intention (β = .16, p = .027). Self-esteem and SSAM were no longer significantly associated with message acceptance. When controlling for education all findings remained the same.

Discussion

This is the first study to investigate whether self-affirming about health and values before reading health threatening information, in the format of bowel cancer screening information, reduces participant state anxiety and increases message acceptance and behavioural intention to screen for bowel cancer. It is also the first study to investigate moderating effects of history of friends and family with bowel cancer, self-esteem, and SSA on participants levels of state anxiety, message acceptance and behavioural intention.

Summary of findings

The current study provided partial support for the first hypothesis. The main analyses found no effects of experimental condition on levels of state anxiety, message

acceptance and behavioural intention. However, planned contrasts compared self-affirmation manipulations (conditions-collapsed) with the controls (conditions-collapsed) and showed intervention participants who self-affirmed to be significantly less anxious, have higher intentions to screen compared to control participants, yet similar in levels of message acceptance, after reading the leaflet. When comparing the self-affirmation conditions individually with controls (conditions-collapsed), participants who self-affirmed about their health were significantly less anxious, yet similar in levels of intention and message acceptance compared to those who did not self-affirm, having received non-active or active control conditions. Participants who self-affirmed about their values however reported similar levels of anxiety, intention and message acceptance compared to those who did not self-affirm, having received non-active or active control conditions. There was therefore some evidence of the effect of health-based self-affirmation on lower anxiety, future research is needed to further explore the effectiveness of different self-affirmation interventions in larger samples.

The second hypothesis was not supported: the effectiveness of the self-affirmation interventions was not found to be moderated by history of friends or family with bowel cancer. Intervention effects were not significantly different for participants with a history of friends or family with bowel cancer. The third hypothesis was partially supported: irrespective of the self-affirmation intervention, the current study found participants with a history of friends or family with bowel cancer to report higher levels of anxiety, yet similar levels of intention and message acceptance, compared to those with no history. In secondary analyses, the effectiveness of the self-affirmation interventions was not found to be moderated by self-esteem or spontaneous self-affirmation. Predictions were however supported in that irrespective of condition, higher levels of spontaneous self-affirmation were found to be associated with lower anxiety, message acceptance and higher screening intentions. Higher levels of trait self-esteem were also found to be associated with lower anxiety, and higher screening intentions. However, when self-esteem and SSAM were tested simultaneously, only self-esteem was found to be associated with lower anxiety and only spontaneous self-affirmation was associated with higher behavioural intention. Self-esteem and SSAM were no longer found to be associated with message acceptance.

Comparison with the literature

Several authors have argued that self-affirming in a domain related to the threat (e.g. health) is less effective, due to a potential increase in defensive processing and enhanced dissonance (Cohen & Sherman, 2014; Sivanathan et al., 2008). Klein et al. (2010) however found unrealistically optimistic participants who self-affirmed about their health before reading about bowel cancer risks, to have higher levels of bowel cancer screening interest, relative to controls. Future work should replicate and explore whether levels of unrealistic optimism and other (un)realistic beliefs moderate the effects for self-affirmation manipulations in bowel cancer screening patients. Furthermore, Iles et al. (2022) found similar levels of message acceptance and behavioural intention in response to a health threat, when comparing values and health affirmation inductions. The current study builds on the existing literature (Good

& Abraham, 2007; Epton et al., 2015; Iles et al., 2022), with no main effect of experimental condition on levels of state anxiety, message acceptance and behavioural intention. However, planned contrasts do provide some evidence towards the potential effectiveness of self-affirmation manipulations which are focussed on health-related affirmations, found in this study to lower anxiety. Future research should replicate with a larger sample, to compare the effect of different types of self-affirmation induction, inside and outside the domain of health on measures including patient reported anxiety within a cancer screening setting. This is of particular importance given the use and completion of a self-affirmation by people within the domain of health is imagined to be more natural, when received with a health information leaflet (Arpan et al., 2017; Epton et al., 2015).

A review by Vrinten et al. (2017) found people who have never experienced cancer in someone close to them to be less afraid of cancer, providing a false sense of security and lowering motivation levels to attend screening. Whilst those who have witnessed the consequences of cancer in a loved one, reported seeing them suffer from the side effects of chemotherapy or surgery or had experienced the loss of family and friends who have died from cancer thought to have shaped their fear of cancer (Vrinten et al., 2017).

In contrast to previous work, trait self-esteem and spontaneous self-affirmation did not moderate the effectiveness of the self-affirmation interventions, in the current study (Creswell et al., 2005; Ferrer et al., 2015). The results are however consistent with Taylor et al. (2003) who found lower stress response in those with higher dispositional self-resources (self-esteem). Likewise, findings are consistent with previous work by Harris et al. (2019) who showed participants who tended to make spontaneous self-affirmations to have lower levels of depression, anxiety, and higher levels of wellbeing and message acceptance. Spontaneous self-affirmation may therefore act as a resource to reduce negative responses to health threatening information (Ferrer et al., 2015). Further work is needed to test interventions which target self-esteem and spontaneous self-affirmation within a bowel cancer screening setting.

Strengths and limitations

The presence of a psychological threat, resources to foster change, and timeliness of self-affirmation in respect to a health threat and resources are known to facilitate the effectiveness of self-affirmation inductions (Ferrer & Cohen, 2019). These conditions were fully considered in the context of the current study to enable and maximise the self-affirmation effects for this behaviour change. A key strength of the current study was that the data was collected from an equal representation of male and female participants, with varying levels of education attainment (see Table 1). Validation of whether the current study findings are replicated in a larger sample of screening patients upon their first invitation to screen for bowel cancer is recommended. The information leaflet was the standard NHS England leaflet in current use, being of personal relevance to all participants, allowing for a real-world setting. At 49 years of age many participants are soon to be receiving their bowel cancer screening invitation for the first time when 50 years old. For some participants however this could be

somewhat later than 50, due to the eligible screening age of 50-year-olds in England currently being in the process of being rolled out over the next 4 years. It could therefore be argued for these participants who receive their invitation after the age of 50 that the measure captured is one of willingness rather than intention to screen.

The current study has several limitations. First, participants were mostly White (95%). Despite 81% of the current population in England identifying as White (Office for National Statistics, 2023), participation in bowel cancer screening is lower within ethnic minority groups and deprived areas of England (Moss et al., 2017). Recruitment was conducted solely *via* a crowdsourcing platform, Prolific. To partake in the study, participants needed to have access to an online device and have a certain level of literacy. The extent of which current findings are generalisable is therefore limited (Newman et al., 2021). Future research needs to target responses to self-affirmation inductions from underrepresented groups to fully test and propose improvements which will improve screening intention and uptake that address ethnic and socioeconomic disparities. Second, the number of participants with a history of friends or family with bowel cancer was relatively small, meaning that in some conditions, the cell sizes were small (e.g. in the values affirmation condition the number of participants with previous history was only eight). The test of the interaction between affirmation condition and family history is therefore underpowered. It is advised not to draw strong conclusions from the study analysis regarding history of the effect of friends and family with bowel cancer, and a larger sample in future work is therefore required. Third, similar to recent online work which tested modifications to bowel cancer screening invitation materials, levels of anxiety reported were low, and intentions to screen high, even within the control groups (Travis et al., 2023). Therefore, in contrast to qualitative work that reported patient anxiety to be a key barrier from the moment the patient receives the invitation letter (Travis et al., 2022), findings from the current study limit the practical importance of finding an affirmation intervention to reduce anxiety and increase intentions, within the participant group. It may be that other variables are more prominent predictors of the uptake of screening. This should be explored further when designing future experimental studies. Fourth, we recognise that the observed effects are relatively small and there is a need to replicate these findings and for further research using these interventions and measures before any firm conclusions can be drawn. Finally, item question wording for the current study questionnaire inductions used were taken and adapted from the previous inductions tested by Iles et al. (2022); however, we do not know whether any of the experimental conditions in fact lowered participants' sense of self-worth or competence. For example, for participants in the health affirmation condition the questions may have reminded them of ways in which they struggle to maintain their health, engage in exercise, or resist unhealthy food. Future work is required to understand people's reactions to the affirmation questions and to measure self-worth and competence responses. Additional manipulation checks are a way of measuring the extent to which each of the experimental conditions affirms the self and should be considered (Napper et al., 2009).

Conclusion

The current study findings showed no effects of experimental condition on levels of state anxiety, message acceptance and behavioural intention. However, planned

contrasts provided some evidence towards the potential effectiveness of self-affirmation manipulations on lowering anxiety and increasing behavioural intentions. Specifically, planned contrasts provided some evidence towards the potential effectiveness of self-affirmation manipulations which are focussed on health-related affirmations, found in this study to lower anxiety. Future research is needed replicate with a larger sample, to compare the effect of different types of self-affirmation induction, inside and outside the domain of health on measures including patient reported anxiety within a cancer screening setting. Intervention effects did not differ by participant history of friends or family with bowel cancer, or by self-esteem or spontaneous self-affirmation. Predictions were however supported in that irrespective of condition, higher levels of spontaneous self-affirmation and trait self-esteem were found to be associated with lower anxiety, and higher screening intentions. Spontaneous self-affirmation may facilitate the reduction in negative responses to health threatening information. Further work is needed to test interventions which target self-esteem and spontaneous self-affirmation within a bowel cancer screening setting.

Authors' contribution

Elizabeth Travis: Conceptualization; Data curation; Formal analysis; Investigation; Methodology; Writing–original draft; Writing–review & editing. Laura Ashley: Conceptualization; Investigation; Methodology; Writing–review & editing. Daryl B. O'Connor: Conceptualization; Investigation; Methodology; Writing–review & editing.

Disclosure statement

No potential conflict of interest was reported by the author(s).

Funding

This study received internal funding from the University of Leeds to recruit participants *via* prolific.

ORCID

Elizabeth Travis http://orcid.org/0000-0003-1140-1822
Laura Ashley http://orcid.org/0000-0002-9439-3778
Daryl B. O'Connor http://orcid.org/0000-0003-4117-4093

Data availability statement

Authors agree to make data and materials supporting the results or analyses presented in their paper available upon reasonable request.

References

Armitage, C. J., & Rowe, R. (2011). Testing multiple means of self-affirmation. *British Journal of Psychology (London, England: 1953)*, *102*(3), 535–545. https://doi.org/10.1111/j.2044-8295.2010.02014.x

Armitage, C. J., Harris, P. R., & Arden, M. A. (2011). Evidence that self-affirmation reduces alcohol consumption: Randomized exploratory trial with a new, brief means of self-affirming. *Health Psychology: Official Journal of the Division of Health Psychology, American Psychological Association*, *30*(5), 633–641. https://doi.org/10.1037/a0023738

Arpan, L. M., Lee, Y. S., & Wang, Z. (2017). Integrating self-affirmation with health risk messages: Effects on message evaluation and response. *Health Communication*, *32*(2), 189–199. https://doi.org/10.1080/10410236.2015.1113483

Butterworth, A. S., Higgins, J. P., & Pharoah, P. (2006). Relative and absolute risk of colorectal cancer for individuals with a family history: A meta-analysis. *European Journal of Cancer (Oxford, England: 1990)*, *42*(2), 216–227. https://doi.org/10.1016/j.ejca.2005.09.023

Cancer Research UK. (2023). *Bowel cancer statistics*. https://www.cancerresearchuk.org/health-professional/cancer-statistics/statistics-by-cancer-type/bowel-cancer#heading-One

Clarke, N., Hayes, L., McQueen, A., Gallagher, P., Kearney, P. M., McNamara, D., O'Morain, C. A., von Wagner, C., Mooney, T., & Sharp, L. (2023). The role of defensive information processing in population-based colorectal cancer screening uptake. *Cancer*, *129*(8), 1253–1260. https://doi.org/10.1002/cncr.34603

Cohen, G. L., & Sherman, D. K. (2014). The psychology of change: Self-affirmation and social psychological intervention. *Annual Review of Psychology*, *65*(1), 333–371. https://doi.org/10.1146/annurev-psych-010213-115137

Creswell, J. D., Welch, W. T., Taylor, S. E., Sherman, D. K., Gruenewald, T. L., & Mann, T. (2005). Affirmation of personal values buffers neuroendocrine and psychological stress responses. *Psychological Science*, *16*(11), 846–851. https://doi.org/10.1111/j.1467-9280.2005.01624.x

Dutcher, J. M., Eisenberger, N. I., Woo, H., Klein, W. M., Harris, P. R., Levine, J. M., & Creswell, J. D. (2020). Neural mechanisms of self-affirmation's stress buffering effects. *Social Cognitive and Affective Neuroscience*, *15*(10), 1086–1096. https://doi.org/10.1093/scan/nsaa042

Epton, T., Harris, P. R., Kane, R., van Koningsbruggen, G. M., & Sheeran, P. (2015). The impact of self-affirmation on health-behavior change: A meta-analysis. *Health Psychology: Official Journal of the Division of Health Psychology, American Psychological Association*, *34*(3), 187–196. https://doi.org/10.1037/hea0000116

Ferrer, R. A., & Cohen, G. L. (2019). Reconceptualizing self-affirmation with the trigger and channel framework: Lessons from the health domain. *Personality and Social Psychology Review: An Official Journal of the Society for Personality and Social Psychology, Inc*, *23*(3), 285–304. https://doi.org/10.1177/1088868318797036

Ferrer, R. A., Taber, J. M., Klein, W. M., Harris, P. R., Lewis, K. L., & Biesecker, L. G. (2015). The role of current affect, anticipated affect and spontaneous self-affirmation in decisions to receive self-threatening genetic risk information. *Cognition & Emotion*, *29*(8), 1456–1465. https://doi.org/10.1177/10888683187970

Good, A., & Abraham, C. (2007). Measuring defensive responses to threatening messages: A meta-analysis of measures. *Health Psychology Review*, *1*(2), 208–229. https://doi.org/10.1080/17437190802280889

GOV.UK. (2023). *Research and analysis. Young person and adult screening KPI data: Q4 summary factsheets*. https://www.gov.uk/government/publications/nhs-screening-programmes-kpi-reports-2020-to-2021/young-person-and-adult-screening-kpi-data-q4-summary-factsheets

Harris, P. R., Griffin, D. W., Napper, L. E., Bond, R., Schüz, B., Stride, C., & Brearley, I. (2019). Individual differences in self-affirmation: Distinguishing self-affirmation from positive self-regard. *Self and Identity*, *18*(6), 589–630. https://doi.org/10.1080/15298868.2018.1504819

Hayes, A. F. (2012). PROCESS: A versatile computational tool for observed variable mediation, moderation, and conditional process modeling. [White paper]. Retrieved from http://www.afhayes.com/ public/process2012.pdf

Hewitson, P., Glasziou, P., Watson, E., Towler, B., & Irwig, L. (2008). Cochrane systematic review of colorectal cancer screening using the fecal occult blood test (hemoccult): an update. *The American Journal of Gastroenterology*, *103*(6), 1541–1549. https://doi.org/10.1111/j.1572-0241.2008.01875.x

Iles, I. A., Gillman, A. S., Ferrer, R. A., & Klein, W. M. (2022). Self-affirmation inductions to reduce defensive processing of threatening health risk information. *Psychology & Health*, *37*(10), 1287–1308. https://doi.org/10.1080/08870446.2021.1945060

Jessop, D. C., Harris, P. R., & Gibbons, T. (2023). Individual differences in spontaneous self-affirmation predict well-being. *Self and Identity*, *22*(2), 247–275. https://doi.org/10.1080/15298868.2022.2079711

Klein, W. M., Lipkus, I. M., Scholl, S. M., McQueen, A., Cerully, J. L., & Harris, P. R. (2010). Self-affirmation moderates effects of unrealistic optimism and pessimism on reactions to tailored risk feedback. *Psychology & Health*, *25*(10), 1195–1208. https://doi.org/10.1080/08870440903261970

Kotzur, M., Macdonald, S., O'Carroll, R. E., O'Connor, R. C., Irvine, A., Steele, R. J., & Robb, K. A. (2022). What are common barriers and helpful solutions to colorectal cancer screening? A cross-sectional survey to develop intervention content for a planning support tool. *BMJ Open*, *12*(9), e062738. https://doi.org/10.1136/bmjopen-2022-062738

Maniaci, M. R., & Rogge, R. D. (2014). Caring about carelessness: Participant inattention and its effects on research. *Journal of Research in Personality*, *48*, 61–83. https://doi.org/10.1016/j.jrp.2013.09.008

Marteau, T. M., & Bekker, H. (1992). The development of a six-item short-form of the state scale of the Spielberger State—Trait Anxiety Inventory (STAI). *The British Journal of Clinical Psychology*, *31*(3), 301–306. https://doi.org/10.1111/j.2044-8260.1992.tb00997.x

Moss, S., Mathews, C., Day, T. J., Smith, S., Seaman, H. E., Snowball, J., & Halloran, S. P. (2017). Increased uptake and improved outcomes of bowel cancer screening with a faecal immunochemical test: Results from a pilot study within the national screening programme in England. *Gut*, *66*(9), 1631–1644. https://doi.org/10.1136/gutjnl-2015-310691

Napper, L., Harris, P. R., & Epton, T. (2009). Developing and testing a self-affirmation manipulation. *Self and Identity*, *8*(1), 45–62. https://doi.org/10.1080/15298860802079786

Newman, A., Bavik, Y. L., Mount, M., & Shao, B. (2021). Data collection via online platforms: Challenges and recommendations for future research. *Applied Psychology*, *70*(3), 1380–1402. https://doi.org/10.1111/apps.12302

NHS. (2023). *Overview. Bowel cancer screening*. https://www.nhs.uk/conditions/bowel-cancer-screening/

Office for National Statistics. (2023). *Ethnic group, England and Wales: Census*. https://www.ons.gov.uk/peoplepopulationandcommunity/culturalidentity/ethnicity/bulletins/ethnicgroupenglandandwales/census2021#:~:text=%22Black%2C%20Black%20British%2C%20Caribbean,was%202.2%25%20(1.2%20million)

Reed, M. B., & Aspinwall, L. G. (1998). Self-affirmation reduces biased processing of health-risk information. *Motivation and Emotion*, *22*(2), 99–132. https://doi.org/10.1023/A:1021463221281

Rosenberg, M. (1965). Rosenberg self-esteem scale. *(RSES) [Database record]. APA PsycTests*. https://doi.org/10.1037/t01038-000

Sherman, D. A. K., Nelson, L. D., & Steele, C. M. (2000). Do messages about health risks threaten the self? Increasing the acceptance of threatening health messages via self- affirmation. *Personality and Social Psychology Bulletin*, *26*(9), 1046–1058. https://doi.org/10.1177/01461672002611003

Sherman, D. K., & Cohen, G. L. (2006). The psychology of self-defense: Self-affirmation theory. *Advances in Experimental Social Psychology*, *38*, 183–242.

Sherman, D. K., Bunyan, D. P., Creswell, J. D., & Jaremka, L. M. (2009). Psychological vulnerability and stress: The effects of self-affirmation on sympathetic nervous system responses to naturalistic stressors. *Health Psychology: Official Journal of the Division of Health Psychology, American Psychological Association*, *28*(5), 554–562. https://doi.org/10.1037/a0014663

Simmons, J. P., Nelson, L. D., & Simonsohn, U. (2011). False-positive psychology: Undisclosed flexibility in data collection and analysis allows presenting anything as significant. *Psychological Science*, *22*(11), 1359–1366. https://doi.org/10.1177/0956797611417632

Sivanathan, N., Molden, D. C., Galinsky, A. D., & Ku, G. (2008). The promise and peril of self-affirmation in de-escalation of commitment. *Organizational Behavior and Human Decision Processes*, *107*(1), 1–14. https://doi.org/10.1016/j.obhdp.2007.12.004

Steele, C. M. (1988). The psychology of self-affirmation: Sustaining the integrity of the self. In *Advances in experimental social psychology* (Vol. *21*, pp. 261–302). Academic Press.

Taylor, S. E., Lerner, J. S., Sherman, D. K., Sage, R. M., & McDowell, N. K. (2003). Are self-enhancing cognitions associated with healthy or unhealthy biological profiles? *Journal of Personality and Social Psychology*, *85*(4), 605–615. https://doi.org/10.1037/0022-3514.85.4.605

Travis, E., Ashley, L., & O'Connor, D. B. (2023). Effects of a modified invitation letter to follow-up colonoscopy for bowel cancer detection. *British Journal of Health Psychology*, 00, 1–16. https://doi.org/10.1111/bjhp.12704

Travis, E., Kerrison, R. S., O'Connor, D. B., & Ashley, L. (2022). Barriers and facilitators to colonoscopy for cancer detection: Patient and practitioner perspectives. *Psychology & Health*, 1–21. https://doi.org/10.1080/08870446.2022.2141241

Vrinten, C., McGregor, L. M., Heinrich, M., von Wagner, C., Waller, J., Wardle, J., & Black, G. B. (2017). What do people fear about cancer? A systematic review and meta-synthesis of cancer fears in the general population. *Psycho-oncology*, *26*(8), 1070–1079. https://doi.org/10.1002/pon.4287

Wiesenfeld, B. M., Brockner, J., Petzall, B., Wolf, R., & Bailey, J. (2001). Stress and coping among layoff survivors: A self-affirmation analysis. *Anxiety, Stress and Coping*, *14*(1), 15–34. https://doi.org/10.1080/10615800108248346

World Health Organisation. (2023). *Cancer*. https://www.who.int/news-room/fact-sheets/detail/cancer