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Evidence That Self-Affirmation Reduces Alcohol Consumption: Randomized Exploratory Trial With a New, Brief Means of Self-Affirming

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Objective: To test the ability of a new, brief means of affirming the self (the "self-affirming implementation intention") to decrease alcohol consumption against a standard means of self-affirmation (the self-affirming "kindness" questionnaire) and an active control condition; to test whether self-affirmation effects can be sustained beyond the experimental session; and to examine potential moderators of the effects. ***Method:*** Two hundred seventy-eight participants were randomly allocated to one of three conditions: control questionnaire, self-affirming questionnaire, and self-affirming implementation intention. All participants were exposed to a threatening health message, designed to inform them about the health risks associated with consuming alcohol. ***Main Outcome Measures:*** The main outcome measure was subsequent alcohol intake. ***Results:*** There were significant public health gains and statistically significant decreases (>1 unit/day) in alcohol consumption in the two experimental conditions but not in the control condition. At the end of the study, participants in the control condition were consuming 2.31 units of alcohol per day; people in the self-affirming questionnaire condition were consuming 1.52 units of alcohol per day; and people in the self-affirming implementation intention condition were consuming 1.53 units of alcohol per day. There were no significant differences between the self-affirming questionnaire and self-affirming implementation intention, and adherence did not moderate the effects. Self-affirmation also improved message processing, increased perceived threat, and led to lower message derogation. ***Conclusions:*** The findings support the efficacy of a new, brief self-affirmation manipulation to enhance the effectiveness of health risk information over time. Further research is needed to identify mediators of the effects of self-affirmation on health behavior change.

Keywords: brief intervention, health behavior change, self-affirmation, alcohol

Alcohol Reduction Campaigns

Despite fear-arousing campaigns designed to reduce alcohol consumption, alcohol-related mortality continues to increase in the U.K. (e.g., Westlake & Yar, 2006). One possible reason for this seeming lack of success in reducing alcohol consumption is that fear- arousing campaigns are perceived as threatening by consumers of alcohol who are then motivated to ignore or derogate the message. The evidence shows that these defensive reactions undermine the potency of health messages (see Leffingwell, Neumann, Leedy, & Babitzke, 2007, for an example in the alcohol domain). The broad aim of the present study was to test a new brief intervention that (a) would overcome people's tendency to process threatening information defensively, and (b) like government-level interventions, could be applied in a general population without potentially expensive tailoring or targeting. The present research applies Steele's (1988) concept of self-affirmation to reduce alcohol consumption and tests a new, brief means of self-affirming against a standard means of self-affirmation and an active control condition.

Self-Affirmation Theory

According to self-affirmation theory (Steele, 1988), people are motivated to preserve a positive, moral and adaptive self-image and to maintain self-integrity. Thus, health-risk messages elicit defensive information processing because they are threatening to the self. According to Steele's (1988) self-affirmation theory, however, because people are motivated to defend their *global* sense of self-worth, it means that self-affirming in one domain (e.g., by recalling past acts of kindness) should reduce the need to be defensive when threatened in another domain (e.g., by a health message). In other words, if a person's self-image can be bolstered (affirmed) in a domain that is important to them, they should be less likely to process threatening information defensively and consequently be more likely to change their behavior in line with the threatening message. The evidence shows that affirming the self leads to significant improvements in the way that threatening health messages are processed (see Harris & Epton's, 2009, review).

Multiple Means of Affirming the Self

From a practical perspective, one strength of self-affirmation theory is that, in principle, any kind of self-affirming thought

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should be sufficient to offset the effects of threats to the self (Armitage & Rowe, in press; Harris & Epton, 2009). Accordingly, numerous means of affirming the self have arisen, with participants being asked to write essays about cherished values or complete and elaborate on questionnaires designed to tap cherished values (see McQueen & Klein, 2006). For example, Reed and Aspinwall's (1998) "kindness questionnaire" manipulation consists of 10 yes/no items designed to elicit examples of situations in which people were kind to others; when people answer "yes", they are asked to elaborate on their answers. Although the kindness questionnaire technique has been shown to increase people's receptiveness to threatening messages (e.g., Armitage, Harris, Hepton, & Napper, 2008; Epton & Harris, 2008; Reed & Aspinwall, 1998), it is time-consuming and requires verbal fluency on behalf of the participant. Moreover, it is difficult to analyze participants' idiosyncratic responses to the request for elaboration (in questionnaires or essays), meaning it has not been possible to identify the active ingredients of the intervention. The first aim of the present research was therefore to test a briefer, standardized self-affirmation manipulation based on implementation intentions (Gollwitzer, 1993).

A New, Brief Means of Affirming the Self

Implementation intentions are specific kinds of plans that work by encouraging people to link in memory-critical situations with appropriate behavioral responses, and which have been used with some success to change health behaviors (Gollwitzer & Sheeran, 2006). The principal idea behind implementation intentions is that the salience of critical situations is enhanced when they are encountered in the environment and that appropriate behavioral responses are triggered automatically (Gollwitzer, 1993). Thus people drinking alcohol might identify "being offered an alcoholic drink" as a critical situation and "telling myself that if I try hard enough I can keep from drinking" as an appropriate response. Armitage (2009) showed that reading and/or writing implementation intentions such as these reduced heavy drinkers' alcohol intake by more than one unit per day (a unit is defined as 8 g/10 ml of alcohol, which is equivalent to half a pint/300 ml of ordinary strength beer, a 125 ml glass of wine at 9% strength or one measure/25 ml of spirits) compared with a decrease of just 0.1 unit per day in a control condition ($p < .01$). Translating these concepts to the present study, "feeling threatened or anxious" is the critical situation, and appropriate self-affirming responses include: "thinking about the things I value about myself" and "remembering things that I have succeeded in" (Harris, Napper, Griffin, Schuez, & Stride, 2011). Compared with alternative means of self-affirming, such as writing essays and elaborating on questionnaires, asking participants to rehearse implementation intentions such as "if I feel threatened or anxious then I will remember things that I have succeeded in" is brief and less dependent on verbal fluency.

Effects of Self-Affirmation on Health Behavior

To date, the effect of self-affirmation on health behavior has not received as much research attention as reactions to the message. One early exception was Sherman, Nelson, and Steele (2000, Experiment 2) who showed that affirmed students were more likely to buy condoms at the end of an experimental session in which a self-affirmation manipulation had been administered. The longer-term effects of self-affirmation on health behavior have been tested in four studies to date and have produced mixed findings: Reed and Aspinwall (1998) found no effects of self-affirmation on female students' caffeine consumption one week postmessage; Harris and Napper (2005) showed no main effect of self-affirmation on female students' alcohol consumption one month postmessage; and Harris, Mayle, Mabbott, and Napper (2007) found no effects of self-affirmation on students' cigarette smoking 1-week postmessage; but Epton and Harris (2008) showed that self-affirmation did change female students' dietary intakes for at least seven days. However, it is notable that of these four studies, only Epton and Harris (2008) had sufficient power to detect a large effect size between the experimental and control groups at $p < .01$ (Cohen, 1992). The second aim of the present study is therefore to assess whether any positive effects of self-affirmation can be sustained over a period of time longer than the experimental session and greater than seven days (Epton & Harris, 2008).

Adherence

There is an extant literature showing that the more time-consuming and difficult tasks are, the more likely people are to not adhere to instructions and hence not engage with the materials in the manner in which the researcher intended (e.g., van Dulmen et al., 2007). It is therefore plausible that a time-consuming, difficult manipulation such as the kindness questionnaire might reduce concordance with experimental instructions and thereby undermine the effect of a self-affirmation manipulation. Alternatively, given that in principle any kind of self-affirming thought should be sufficient to offset the effects of threats to the self (e.g., Armitage & Rowe, in press), there is no evidence yet to suggest that a minimum level of engagement with the manipulations is required before an individual is sufficiently affirmed (Steele, 1988). The third aim of the present research is therefore to investigate the issue of adherence and its effects on the potency of the self-affirmation manipulations.

Rationale for the Present Research

The literature reviewed above provides the following rationale for the present research. First, although self-affirmation manipulations consistently improve participants' receptiveness to threatening health messages, there is a dearth of literature examining whether the effects of self-affirmation on health behavior persists beyond the experimental session (cf. Epton & Harris, 2008). Second, two potential difficulties with self-affirmation research can be addressed by (a) developing a brief means of affirming the self that is not as reliant on verbal fluency as essay writing or questionnaire elaboration and (b) testing whether adherence to experimental instructions can affect the potency of self-affirmation manipulations. Given that the present research is testing a new means of self-affirming, the kindness questionnaire described above will be used in addition to an active control condition in order to allow a direct comparison.

It is predicted that (i) both self-affirmation manipulations will improve reactions to the message and reduce alcohol consumption;

(ii) greater adherence will enhance the effectiveness of both self-affirmation manipulations; and (iii) greater adherence will be observed in the new briefer self-affirming implementation intention condition thereby increasing its potency relative to the self-affirming questionnaire condition. In addition, the relative potency of the different self-affirming implementation intentions will be explored.

Method

Participants

Participants were recruited from a medium-sized retailer in the North of England. Of the available sample of 300 people over 18 years old who were approached, 278 agreed to participate in the study (see Figure 1). The sample consisted of 185 women and 93 men between 18 years and 55 years old (see Table 1). Participants were asked to describe their ethnic backgrounds, and 54.3% (n = 151) described themselves as White, 11.5% (n = 32) as Black, 20.9% (n = 58) as Asian, 4.3% (n = 12) as "mixed race," and 8.6% (n = 24) declined to describe their ethnic backgrounds.

In order to assess the potential generalizability of the findings, the study population was compared with the English population as a whole (U.K. National Statistics, 2010). Consistent with the sampling frame, there were more people aged 16–74 in the present sample than in the English population at large (see Table 1). Moreover, there were more women in the present sample and fewer people identified themselves as White. The U.K. government currently recommends that women consume no more than 2–3 units per day (a unit is defined as 8 g/10 ml of pure alcohol, which is equivalent to half a pint/300 ml of ordinary strength beer, a 125 ml glass of wine at 9% strength, or one measure/25 ml of spirits) and men consume no more than 3–4 units per day (U.K. National Statistics, 2010). The number of people drinking within government-recommended levels (67.2%) was directly comparable with figures for the English population as a whole (69.1%).

Table 1
Baseline Characteristics of the Sample

Variable	Present sample (n = 278)	Population[a] (N = 49,138,831)
Gender (%)		
Male	33.5	48.7
Female	66.2	51.3
Age (%)		
0–15 years	0	20.1
16–74 years	100.0	72.3
75 years and older	0	7.5
Ethnicity (%)		
White	54.0	90.9
Asian	20.9	3.5
Black	11.5	1.1
Other	5.1	4.5
Alcohol Consumption (%)		
Drinking within government-recommended limits	69.1	70.0
Not drinking within government-recommended limits	30.9	30.0

[a] Demographic data are from the most recent (2001) census for England. Alcohol consumption data are based on the 2004 General Household Survey. Both were obtained from the National Statistics website: www.statistics.gov.uk. Crown copyright material is reproduced with the permission of the Controller of Her Majesty's Stationery Office. Columns not adding up to 100% indicate no response given.

Design

The design was mixed. The between-participants factor was *condition*: Participants were randomized to one of two experimental groups or a control condition. The within-participants factor was the 1-month *time* interval between baseline and follow-up. The main outcome variable was alcohol consumption. The University of Sheffield ethics committee gave approval for the re-

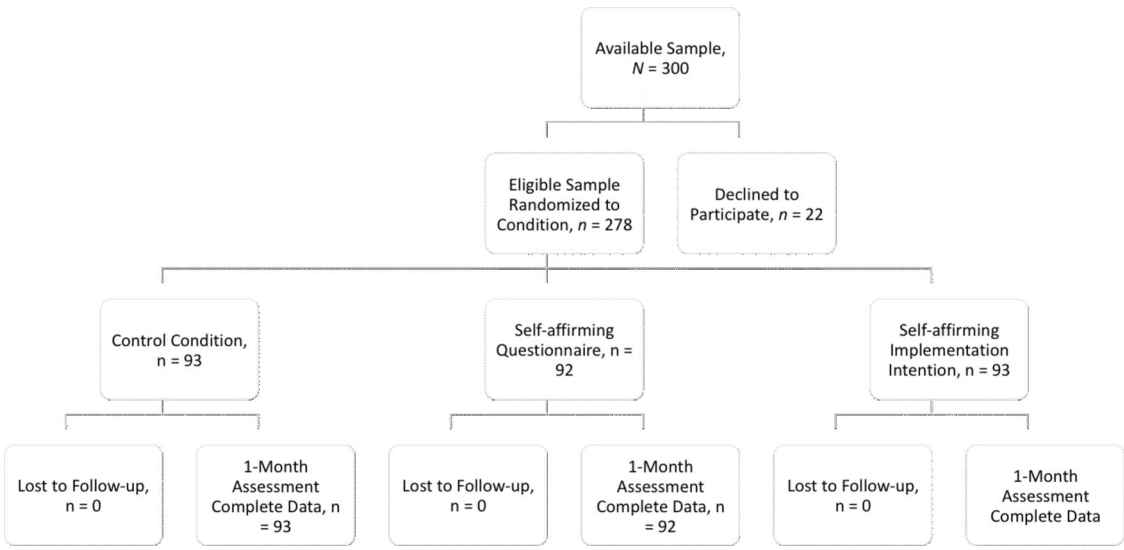

Figure 1. Participant flow through phases of the experiment.

search, and it was made clear that participants could remove themselves or their data from the study at any point with no adverse consequences.

Procedure

Potential participants were approached in the canteen of a medium-sized retailer, where all employees were expected to go during breaks and when starting or finishing their shifts. Following screening to ensure they were 18 years old or older (consistent with U.K. licensing laws), employees were asked if they would be willing to participate in a study measuring "personal and social beliefs" that would involve filling out a second questionnaire one month later. If they agreed and consented they were given a questionnaire in a folder, which ensured that neither employees nor experimenter could see to which condition the participant had been allocated. The researcher then left the room, and the questionnaires were deposited in a second folder to ensure that the researcher did not see whether or not the participant had responded. A similar procedure was used at follow-up, but after participants had completed the questionnaires they were thanked and debriefed.

The first page, entitled "personal and social beliefs questionnaire," gave information regarding consent and ethics as well as instructions for completing the measures. Demographic measures and a measure of alcohol intake followed. The self-affirmation manipulations or distracter task appeared next, followed by a message designed to reduce alcohol consumption. After the health message a series of measures (e.g., perceived threat) that were designed to tap reactions to the information served as manipulation checks.

The only difference between the experimental and control conditions was the material that appeared on the second page, namely, the self-affirmation manipulations or the distracter task. This meant that the person randomizing the questionnaires (by means of a web-based randomizer), the person administering the questionnaires, and the participants were blind with respect to condition.

Materials

Self-affirming implementation intention. The self-affirming implementation intention is based on Harris, Napper, Griffin, Schuez, and Stride (2011), who identified ways in which people respond to threatening stimuli. In order to turn these responses into if-then statements in accordance with Gollwitzer's (1993) recommendations (see Chapman, Armitage, & Norman, 2009), participants were presented with the stem, adapted from Harris et al. (2011), "If I feel threatened or anxious, then I will . . ." Participants were presented with four options, also adapted from Harris et al. (2011): ". . . think about the things I value about myself," ". . . remember things that I have succeeded in," ". . . think about what I stand for," and ". . . think about things that are important to me" and were asked to write out their chosen option on three blank lines. To ensure that participants wrote out the self-affirming implementation intention in full, they were prompted with "If . . ." at the beginning of the first blank line.

Self-affirming questionnaire. The self-affirming questionnaire was identical to that used by Reed and Aspinwall (1998) and Armitage et al. (2008), and encouraged participants to elaborate on their past acts of kindness, "a highly important personal value" (p. 107), according to Reed and Aspinwall's (1998) piloting. The manipulation consisted of 10 questions designed to encourage participants to recall and give examples of past acts of kindness, for example: "Have you ever forgiven another person when they have hurt you? *yes-no*." When participants responded "yes," they were asked to provide specific examples of their behavior. Two (out of 92, 2.17%) participants in the self-affirming questionnaire condition answered "no" to each question. Excluding these individuals from the analyses made no difference to the findings, so they were retained to maximize ecological validity.

Control questionnaire. The control questionnaire was identical to that used by Reed and Aspinwall (1998) and Armitage et al. (2008) and was designed to contain no self-relevant statements and nothing related to the concept of kindness. Thus, participants were asked to give their opinions on 10 unrelated issues: "I think the color blue looks great on most people *yes-no*." Consistent with the self-affirming questionnaire instructions, when participants responded "yes," they were asked to elaborate.

Health message. The health message was the diagram from page 7 of Babor, Higgins-Biddle, Saunders, and Monteiro's (2001) primary care guide to the use of the Alcohol Use Disorders Identification Test (AUDIT). The diagram has a drawing of the body with the 13 parts of the body that are most affected by alcohol consumption highlighted alongside a list of 39 medical conditions that are related to alcohol consumption.

Measures

Premanipulation. An adapted version of the timeline follow-back technique (e.g., Sobell & Sobell, 1992), designed to minimize memory errors, was used to measure *alcohol consumption* before the self-affirmation manipulation. Participants were asked to describe in detail the types and number of alcoholic drinks they consumed in a typical week. Each day of the week was presented on a separate line and space was given to write a description. These descriptions were then converted to units (i.e., 8 g) of alcohol for analysis. The validity of similar instruments has been established against several biomarkers, and when they were used in similar situations to the one in the present study, self-reports have been shown to agree 97.1% with biological measures (Babor, Steinberg, Anton, & Del Boca, 2000).

Postmanipulation, premessage. *Self-esteem* was measured immediately after the self-affirmation manipulations or distracter task using Robins, Hendin, and Trzesniewski's (2001) single-item self-esteem scale. The item is "I have high self-esteem," measured on a 5-point *not very true of me* to *very true of me* Likert scale. Robins et al. (2001) reported four studies, which together demonstrated test–retest reliability over four years, superior construct validity when compared with Rosenberg's (1965) standard measure, and predictive validity with respect to psychological and physical well-being (see also Armitage & Harris, 2006).

Immediately postmessage. Manipulation checks were conducted immediately postmessage. After reading the health message, participants were asked to report their reactions, which were measured on 7-point (+1 to +7) scales, unless otherwise indicated.

Message derogation was measured using Jessop, Simmonds, and Sparks' (2009) items. Participants were presented with the stem: "What did you think about the information you just read?

Did you think it was . . .” to which they responded on four scales (e.g., *not at all overblown–very overblown*). Cronbach’s alpha indicated excellent internal reliability ($\alpha = .97$). *Defensive avoidance* was also measured using the same means as Jessop et al. (2009): “When I read the information about drinking my first reaction was that I didn’t want to think about it” that respondents answered on a *strongly disagree–strongly agree* scale.

Five items adapted from Witte (2010) were used to measure *perceived threat*; participants were asked to complete the stem, “The information made me feel . . .” (e.g., *not at all frightened–very frightened*). Cronbach’s alpha indicated high internal reliability ($\alpha = .98$). *Message processing*, namely, people’s engagement with the risk message was measured using Armitage and Talibudeen’s (2010) items: “How much of the article did you read?” and “How much of the information do you think you will be able to recall in a week?” Participants responded on 6-point scales with the labels: *none*, *a bit*, *some*, *most*, *almost all*, and *all*. Cronbach’s alpha indicated good internal reliability ($\alpha = .92$). *Perceived message quality* was measured using five items adapted from Witte (2010). Participants were asked to complete the stem, “What did you think about the information you just read? Did you think it was . . .” (e.g., *not at all persuasive–very persuasive*). Cronbach’s alpha indicated high internal reliability ($\alpha = .95$).

Follow-up. *Alcohol consumption* was measured 1-month postbaseline in the same way as it was in premanipulation.

Analyses

The principal analyses were conducted using MANOVA, ANOVA, and ANCOVA with simple planned contrasts to clarify where significant differences lay.

Results

Randomization Check

The success of the randomization procedure was checked using MANOVA. The independent variable was *condition* with three levels: control questionnaire, self-affirming questionnaire, and self-affirming implementation intention. The dependent variables were age, gender, and alcohol intake at baseline. The multivariate test and all the univariate tests were nonsignificant, $Fs_{univariate}(2, 274) = 0.20$ to 2.47, $ps > .09$, $\eta_p^2s < .02$, meaning that randomization was successful.

Manipulation Checks: Effects on Affect and Cognition

The effects of the self-affirmation manipulations on affect and cognition were tested using MANOVA (see Table 2). *Condition* (control questionnaire, self-affirming questionnaire, and self-affirming implementation intention) was the between-participants factor. The dependent variables were self-esteem, message processing, perceived threat, perceived message quality, message derogation, and defensive avoidance. There were significant differences between groups for each of the dependent variables, and simple contrasts confirmed significant differences ($p < .01$) between the control condition and the two experimental conditions. Self-affirmation was associated with higher self-esteem, greater message processing, more perceived threat, higher perceived message quality, and less message derogation but greater defensive avoidance (see Table 2). There was just one difference between the two experimental conditions: Perceived message quality was significantly ($p < .05$) higher in the self-affirming implementation intention condition than in the self-affirming questionnaire condition.

Effects of the Self-Affirmation Manipulations on Alcohol Consumption

The effect of the manipulations on alcohol consumption was tested initially using repeated measures ANOVA. *Condition* (control questionnaire, self-affirming questionnaire, and self-affirming implementation intention) was the experimental between-participants factor, *initial intake* (drinking within government-recommended levels at baseline vs. not drinking within government-recommended levels at baseline) was the quasi-experimental between-persons factor, and *time* (baseline vs. follow-up) was the within-persons factor. Alcohol intake was the dependent variable.

The analyses revealed significant main effects of condition, $F(2, 272) = 4.09$, $p < .05$, $\eta_p^2 = .03$, initial intake, $F(2, 272) = 207.07$, $p < .01$, $\eta_p^2 = .43$, and time, $F(1, 272) = 164.63$, $p < .01$, $\eta_p^2 =$

Table 2
Comparison of Experimental and Control Groups Immediately Postmessage

	Control questionnaire ($n = 93$)		Self-affirming questionnaire ($n = 92$)		Self-affirming implementation intention ($n = 93$)			
Dependent variables	*M*	*SD*	*M*	*SD*	*M*	*SD*	*F*	η_p^2
Self-Esteem	2.58_a	0.80	4.00_b	0.96	4.00_b	0.81	84.60^{**}	.38
Message Processing	1.87_a	0.93	3.35_b	1.46	3.52_b	0.91	59.99^{**}	.30
Perceived Threat	2.46_a	1.06	4.75_b	1.84	5.04_b	1.12	97.01^{**}	.41
Perceived Message Quality	3.21_a	0.92	5.23_b	1.61	5.52_c	0.72	112.23^{**}	.45
Message Derogation	4.36_a	1.38	3.61_b	1.39	3.53_b	1.36	10.40^{**}	.07
Defensive Avoidance	2.89_a	1.41	5.09_b	1.52	5.17_b	1.21	80.53^{**}	.37

Note. Values with different subscripts in a row indicate significant ($p < .05$) differences according to simple contrasts. F and η_p^2 refer to the univariate main effects of condition ($df = 2, 275$).
** $p < .01$.

.38. The interactions between condition and time, $F(2, 272) = 11.27$, $p < .01$, $\eta_p^2 = .08$, and between initial intake and time, $F(2, 272) = 119.18$, $p < .01$, $\eta_p^2 = .31$, were also statistically significant. However, the two-way interaction between condition and initial intake, $F(2, 272) = 0.35$, $p = .70$, $\eta_p^2 < .01$, and the three-way interaction between condition, initial intake and time, $F(2, 272) = 0.23$, $p = .79$, $\eta_p^2 < .01$, were nonsignificant. Thus, the manipulations exerted similar effects regardless of participants' initial alcohol intakes. Subsequent analyses therefore focus on the sample as a whole.

The data presented in Table 3 illustrate the significant two-way interaction between condition and time for alcohol intake. This was decomposed using a series of ANOVAs, ANCOVAs, and planned contrasts. Separate within-persons ANOVAs tested change in alcohol consumption across time for the three conditions. This revealed significant decreases in alcohol consumption for both the self-affirming questionnaire, $F(1, 91) = 52.16$, $p < .01$, $\eta_p^2 = .36$, and self-affirming implementation intention conditions, $F(1, 92) = 57.12$, $p < .01$, $\eta_p^2 = .38$, but no change in the control condition, $F(1, 92) = 0.04$, $p = .84$, $\eta_p^2 < .01$ (see Table 3). Thus, alcohol consumption decreased significantly—by just over 1.00 unit per day (c. 40%) on average—in the two self-affirmation groups but not in the control group.

ANCOVA, with condition as the between-persons factor, alcohol consumption at follow-up as the dependent variable, and baseline alcohol consumption as the covariate was conducted. Consistent with the preceding analyses, there were significant differences in follow-up alcohol consumption controlling for baseline consumption, $F(2, 274) = 18.35$, $p < .01$, $\eta_p^2 = .12$. Simple contrasts confirmed that participants in the control group consumed significantly ($p < .01$) more alcohol at follow-up, controlling for baseline alcohol intake, than the two experimental groups. However, there was not a significant difference between the two experimental conditions ($p = .68$).

Public health significance. Public health significance was assessed by examining differences in the proportions of participants drinking within government-recommended levels at baseline and follow-up (see Table 4). In the control condition, 61/93 (65.59%) participants were drinking within government-recommended levels at baseline compared with 73/93 (78.49%) at follow-up. Although this represented a public health gain of 12.90%, Wilcoxon signed-ranks test revealed that it was not statistically significant, $Z = 0.21$, $p = .83$. In the self-affirming questionnaire group, an additional 27 people were drinking within government-recommended levels postintervention, a public health gain of 29.35%. Wilcoxon signed-ranks test confirmed that this gain was significant, $Z = 4.38$, $p < .01$. In the self-affirming implementation intention group, 32 extra people were drinking within government-recommended levels at follow-up, a public health gain of 34.41%, $Z = 5.14$, $p < .01$. Thus, the interventions produced both statistically significant effects and significant public health gains, with a slight advantage for the self-affirming implementation intention group. Consistent with predictions, both self-affirmation manipulations significantly decreased alcohol consumption.

Potential moderating effects. The potential moderating effects of adherence were tested separately for the self-affirming questionnaire and self-affirming implementation intention conditions. Adherence for the self-affirming questionnaire was reasonable: 61.96% (57/92) of participants completed every question and elaborated on their answers whereas only 11.96% (11/92) did not complete any questions and/or did not elaborate on any answers. However, given that participants were not required to answer "yes" to each of the self-affirming questions, this means that overall adherence was 88.04% (81/92), meaning that there were insufficient cases to conduct an adequately powered analysis of adherence.

The potential effects of answering individual items on reductions in alcohol consumption were explored using multiple regression. Follow-up alcohol consumption was regressed on baseline consumption and whether or not participants elaborated on individual items in the self-affirming questionnaire. As the preceding analyses imply, baseline alcohol consumption was the largest predictor of subsequent alcohol consumption, $\beta = .59$, $p < .01$. In addition, elaboration on item 7 of the self-affirming questionnaire ("Have you ever tried not to hurt the feelings of another person?") was a significant predictor, $\beta = -.31$, $p < .05$, meaning that elaborating on this item had an independent effect on decreases in alcohol intake.

Adherence in the self-affirmation implementation intention condition was very high: Just 3.23% (3/93) of participants failed to comply fully with the instructions, meaning that there were insufficient cases to conduct an analysis of adherence. As predicted, adherence in the self-affirmation implementation intention condition was greater than in the self-affirming questionnaire, but the high levels of adherence overall precluded further analyses. The question does arise, however, as to whether any of the self-affirming implementation intentions were more effective than the others. This was explored by looking at which specific self-affirming implementation intentions were chosen. "If I feel threatened or anxious, then I will think about what I stand for" was chosen most often (34.41%, 32/93), and "If I feel threatened or anxious, then I will remember things that I have succeeded in" was chosen least often (18.28%; 17/93). ANCOVA with follow-up

Table 3
Effects of the Interventions on Alcohol Consumption (in Units Per Day)

Independent variables	Baseline		Follow-up			
	M	*SD*	*M*	*SD*	*F*	η_p^2
Control Questionnaire ($n = 93$)	2.34	1.45	2.31	1.61	0.04	<.01
Self-Affirming Questionnaire ($n = 92$)	2.55	1.73	1.52	0.92	52.16	.36
Self-Affirming Implementation Intention ($n = 93$)	2.83	1.79	1.53	1.05	57.12	.38

Note. The F and η_p^2 values refer to the within-person effects of the interventions.

Table 4
Public Health Significance: Proportions of Participants in the Two Experimental Groups Drinking Within Government-Recommended Levels at Baseline and Follow-Up

Conditions	*N* of participants drinking within government-recommended levels		Public health benefit	Z^a
	Baseline	Follow-up		
Control Questionnaire (n = 93)	61/93 (65.59%)	73/93 (78.49%)	+12/93 (+12.90%)	0.21
Self-Affirming Questionnaire	59/92 (64.13%)	86/92 (93.48%)	+27/92 (+29.35%)	4.64**
Self-Affirming Implementation Intention	56/93 (60.21%)	88/93 (94.62%)	+32/93 (+34.41%)	5.14**

[a] Wilcoxon signed-ranks test.
** $p < .01$.

alcohol consumption as the dependent variable, *choice* (which of the four options was chosen) as the independent variable, and baseline alcohol consumption as the covariate revealed no significant effect of choice of self-affirming implementation intention on reductions in alcohol consumption, $F(1, 88) = 1.40$, $p = .25$, $\eta_p^2 = .05$.

Discussion

This is the first study to have looked at the ability of self-affirmation to reduce alcohol consumption in a sample of nonstudents. The key finding was that self-affirmation, regardless of mode of delivery, was effective in reducing alcohol intake by facilitating the processing of health-risk information. By the end of the study, participants in the two self-affirmation conditions drank on average 8 fewer grams of pure alcohol compared with participants in the control condition, and crucially, were much more likely to be drinking "in moderation" (i.e., within government-recommended levels), which is the point at which health benefits might start to accrue. Adherence was high overall and did not moderate the effects of self-affirmation on behavior change. The following discussion focuses on the practical and conceptual implications of these findings.

Main Effects

Consistent with a growing body of research on the impact of self-affirmation on the processing of threatening health messages, the present study showed that despite perceiving more threat and engaging in greater defensive avoidance, people who were self-affirmed were less likely to derogate the message and were more likely to regard the message as being of high quality and to engage in more positive reactions to the message (McQueen & Klein, 2006). Moreover, the present study was able to demonstrate that these effects extend beyond the student population (cf. Armitage et al., 2008), which has been the principal test bed for self-affirmation researchers (Harris & Epton, 2009). The effects were also sustained for at least a 4-week period, meaning that the present work extends that of Epton and Harris (2008) who showed that self-affirmation could affect health behavior for at least seven days, and suggests that self-affirmation could exert powerful effects.

Moyer, Finey, Swearingen, and Vergun's (2002) meta-analysis of brief interventions to reduce alcohol consumption in nontreatment-seeking samples reported a mean effect size of d = 0.67 for studies with follow-ups shorter than three months. The effect sizes for the present study were $d_{\text{self-affirming questionnaire}} = 0.74$ and $d_{\text{self-affirming implementation intention}} = 0.89$, the size of which compare particularly favorably considering that Moyer et al.'s (2002) definition of "brief" included interventions with up to four sessions and that the present research was not carried out in a clinic. The implication is that the self-affirming techniques described in the present study have the potential to contribute to both public health and clinical practice.

The question then arises as to whether the present findings could be replicated in a clinical population. Although this question has not yet been addressed in relation to alcohol, it is notable that interventions in eating disorders often include a self-affirming task. For example, one component of Stice and Presnell's (2007) program asks participants to: "write down all your positive qualities" (p. 43), and it would be valuable to extend this work in relation to a population experiencing problems with alcohol. Based on the findings of the present study, there are grounds for cautious optimism: Given that the present intervention was brief, low in intensity, and delivered in the field, it is plausible that a self-affirming consultation with a health professional in a clinical setting would exert greater effects than those observed in the present study.

Different Means of Affirming the Self

Although there were few statistically significant differences between the two self-affirmation manipulations, the evidence suggests a slight advantage for the self-affirming implementation intention tested for the first time in the present study. Perceived message quality was significantly higher in the self-affirming implementation intention condition compared with any of the other conditions. In addition, the effect sizes associated with the self-affirming implementation intention condition were higher: d = 0.89 as opposed to d = 0.74 in the self-affirming questionnaire condition, and there was a public health gain of 34.41% as opposed to 29.35% in the self-affirming questionnaire condition. From a practical perspective, this is particularly encouraging, given that the self-affirming implementation intention is briefer and is easier to standardize than participants' responses to the self-affirming questionnaire (or an essay on a cherished value).

Self-Affirmation Theory

From a theoretical perspective, it is notable that there were no moderating effects associated with adherence. Although lack of

adherence was expected to undermine the effects of self-affirmation, there was no evidence of this in the present research. Similarly, each of the self-affirming implementation intentions seemed to be equivalently effective. Together these findings imply that almost any self-affirming thought might be sufficient to offset the effects of threats to the self (Armitage & Rowe, in press; Harris & Epton, 2009). For example, simply being exposed to the kindness questionnaire might be sufficient to enhance the processing of threatening messages (Steele, 1988), raising the possibility that even briefer self-affirmation manipulations could be developed.

In contrast with self-affirmation research in general, which shows that individuals at higher risk are more susceptible to the effects of self-affirmation than those at lower risk (e.g., Armitage et al., 2008), risk status (i.e., drinking within government-recommended levels or not) did not moderate the effects of self-affirmation in the present study. However, it is worth bearing in mind that problem drinkers were not targeted in the present study and it may be that people drinking just above government-recommended levels do not perceive themselves as being as "at-risk" as problem drinkers. It would be valuable to evaluate the current intervention in problem drinkers in future work because, from a theoretical perspective, it is plausible that problem drinkers may be more susceptible to the observed effects (e.g., Armitage et al., 2008).

Potential Limitations and Avenues for Further Research

Although the present research provides some valuable insights into the utility of self-affirmation for reducing alcohol intake, it is important to highlight some possible limitations. In order to comply with the wishes of the managers who sanctioned the research, a pragmatic decision was made to use a 1-month follow-up rather than a 6-month follow-up, which is widely regarded as the time it takes for healthy habits to be established (e.g., Prochaska & DiClemente, 1983). Thus, the lack of attrition came at the expense of a longer-term follow-up. Nevertheless, there are three reasons for using cautious optimism when interpreting the present findings. First, although there is evidence to support the view that health behavior can be regarded as "maintained" within weeks rather than months (e.g., Armitage, 2005), there is not yet any evidence to suggest that behavior can be considered maintained at six months. Second, greater initial changes in health behavior are associated with larger improvements in the long-term (e.g., Jeffery, Wing, & Mayer, 1998), implying that large initial changes should be the focus for research attention. Third, Moyer et al.'s (2002) meta-analysis showed that brief interventions significantly decreased alcohol consumption for up to 12 months.

A second possible limitation is that the present study relied on self-reports of alcohol consumption. However, Del Boca and Noll's (2000) review concludes that self-reported alcohol consumption is at least as accurate—if not more accurate—than biomarkers. For example, Babor et al. (2000) showed that alcohol self-reports and alcohol biomarkers corresponded as high as 97.1% in situations where heavy drinking was unlikely to be denied (e.g., nonclinical setting, anonymous responses as in the present study), whereas positive serum gamma-glutamyl transpeptidase results were only obtained in 39.7% of people who admitted drinking heavily. A further related limitation is that the increase in self-esteem caused by the self-affirmation interventions may have led participants not to admit the discrepancy between their current feelings about themselves and their actual levels of drinking. However, the weak correlations between self-esteem and subsequent alcohol intake ($r_{\text{control condition}} = .02$, $r_{\text{self-affirming questionnaire condition}} = .16$, $r_{\text{self-affirming implementation intention condition}} < .01$) suggest that self-esteem exerted little influence on self-reported alcohol consumption. Nevertheless, it would be valuable to supplement self-report behavioral measures with more objective behavioral measures in future research.

A third limitation concerns the potential generalizability of the present sample, which included greater proportions of women and members of ethnic minority groups than the U.K. population. That said, there are grounds for cautious optimism given that the average alcohol consumption of the present sample was directly comparable with the alcohol consumption of the U.K. population. Nevertheless, it would be valuable to replicate the findings with a more representative sample.

Conclusions

The present study demonstrates the effectiveness of self-affirmation for reducing alcohol consumption and extends the reach of self-affirmation beyond the student population and the laboratory by showing effects up to four weeks postmessage. The brief self-affirmation manipulation framed in terms of implementation intentions was slightly more effective than the standard self-affirming questionnaire, and adherence was higher, which traded against the time taken to complete the self-affirming questionnaire would suggest the self-affirming implementation intention is a tool that would benefit from further investigation. Further work needs to establish whether self-affirming techniques can be translated to clinical populations.

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