Evaluating the effects of six alcohol-related message frames on emotions and intentions: The neglected role of disgust

Natalie N Collymore and Mark R McDermott

Abstract

A total of 120 18- to 56-year-olds, divided into six groups containing equal numbers of men and women, were shown a textual message and associated photograph featuring alcohol-related behaviour. Subsequently, questions were answered about intentions to reduce consumption, to drink moderately and how positive and negative the messages made participants feel. Loss-framed messages, in particular those featuring health-related disgust, were the most effective for increasing intentions to reduce alcohol intake. In conclusion, studies have over-focused on fear-loss frames, neglecting the utility of disgust-loss frames in health messages. This study suggests that disgust-loss frames deserve equivalent attention.

Introduction

According to Burr (2008), more than 10 million adults in England exceed the recommended daily limits for alcohol consumption, costing the UK an estimated £25.1b per annum. These detrimental effects, which include ill-health (Barbosa et al., 2010) and aggressive and violent behaviour (Finney, 2004; Toomey et al., 2012), are of recurrent concern to governments and policymakers (Eurocare – The European Alcohol Policy Alliance, 2012).

One response to tackle the problem of risky single-occasion drinking has been to help those who drink to do so more responsibly. National health communication and awareness initiatives, such as those instigated by the independent UK charity Drinkaware, aim to help drinkers stay within low-risk drinking levels. They do this by informing people of the recommended daily limits for alcohol consumption. Thereby, the concept of risky-drinking (drinking behaviours associated with a higher risk of developing health problems) is made more transparent and easier to identify. Health communication practitioners attempt to combat risky-drinking by distributing such information through health-related

Corresponding author:
Mark R McDermott, School of Psychology, University of East London, Stratford Campus, Water Lane, London E15 4LZ, UK.
Email: m.r.mcdermott@uel.ac.uk

communications that employ different types of message frames (e.g. loss or gain frames), in an effort to encourage healthier attitudes, intentions and behaviours among the public (Gallagher and Updegraff, 2012). Depending on how the information regarding risk is presented, the pay-off for adopting the recommended behaviour can be presented as relating to a gain (positive frame), whereas non-adoption can be portrayed as relating to a loss or affliction (negative frame).

Message framing

The key conceptual approach in the framing literature is provided by Prospect Theory (Tversky and Kahneman, 1979, 1981), which postulates that people presented with gains are less likely to want to risk those gains (are risk-aversive) and instead opt for certainty (Kahneman, 2012). However, when faced with a potential loss, people tend to be risk-seeking as a way of reducing their chances of loss. Rothman and Salovey (1997) have argued that past studies of message framing and health behaviour show that gain- and loss-framed messages have different persuasive effects, depending on the specific health behaviour: individuals are more persuaded by gain-framed messages when health behaviours have a more certain outcome associated with them, whereas loss-framed messages are more effective where behaviours give rise to a more uncertain outcome. Specifically, gain-framed messages are argued to be more efficacious for stimulating preventative actions such as using sunblock (Detweiler et al., 1999) because this use leads to the more certain outcome of preventing skin melanoma. By comparison, loss-framed messages are argued to be better at stimulating detection behaviours such as engaging with mammography screening (Gallagher et al., 2011), since such a behaviour has more uncertain and risky prospects associated with it, namely, that a breast carcinoma may or may not be discovered. The evidence for this differential efficacy of loss and gain frames, however, is argued to be equivocal by O'Keefe and Jensen (2007) and Cesario et al. (2013). Despite this, health messages that employ gain and loss framing strategies have been applied to a range of health issues, for example: reducing binge alcohol use (Moscato et al., 2001), breast self-examination (Meyerowitz and Chaiken, 1987), raising awareness about the effects of alcohol consumption during pregnancy (Bazzo et al., 2012), sunscreen use (Olson et al., 2008) and healthy eating (Gerend and Maner, 2011).

Fear framing

The type of frame often used in public health communications and thereby subjected to significant research scrutiny, for example, by Witte and Allen (2000), is the 'loss' or 'fear' appeal. By emphasizing the harmful effects that refusal to adopt message recommendations will have on health, fear appeals aim to frighten people into adopting healthier behaviours. The Extended Parallel Process Model's (EPPM) account of appraisal during effective and ineffective fear appeals (Maloney et al., 2011; Witte, 1992) suggests that when appraising threat, people either try to avert the danger (danger control) or they try to lessen their fears by perceiving the threat as being less severe (fear control). Danger control results in engagement with the message's recommended behaviours, whereas fear control leads to discounting the risks and the subsequent non-engagement with recommended behaviours.

Disgust framing

Fear appeals, which strategically evoke feelings of fear, often evoke supplementary emotions that can moderate perception and behaviour (Bennett, 1998; Dillard et al., 1996; Dillard and Nabi, 2006; Nabi, 2002; Pinto and Priest, 1991). However, research seldom focuses on the moderating effects of other emotions. For example, anti-smoking fear appeals typically, but not always, employ disgust-eliciting graphic images (Bazzo et al., 2012; Leshner et al., 2009, 2010, 2011) as part of 'high fear' conditions (Morales et al., 2012); however, disgust in these studies is not the main focus of manipulated experimental conditions.

Arguably distinctly different, the interplay between fear, as after Izard (1977), (intense feelings of wanting to escape threat) and disgust (repulsion from threat by means of avoiding contamination) often accompanied by feelings of nausea (Rozin et al., 2000) can be observed in psychopathologies such as obsessive-compulsive disorder and arachnophobia (Davey, 2011). Further, Darwin (1872, 1965) was one of the first to recognize the importance of disgust as a variable and as a disease-avoidance mechanism. Curtis et al. (2011) have also noted disgust as an adaptive system that serves to protect against disease contamination. Oaten et al. (2009) in reviewing disgust literature also note the correspondence between disgust elicitors and disease, that things found to be disgusting have the capacity to spread disease. In this vein, Curtis et al. (2004) found that images of disgust stimuli with the potential to spread disease were rated higher in disgust than stimuli of similar appearance that included little to no reference to disease. The most reported disgust elicitors are associated with bodily secretions, including faeces, blood, sweat, vomit, and pus (Curtis et al., 2004). The stigmatization of individuals with visible differences can also be accounted for by an evolutionary perspective on disgust (Park et al., 2003), as it is suggested that when encountering disability, prejudicial reactions arise from people's anxieties and disgusts (Kurzban and Leary, 2001; Neuberg et al., 2000; Ryan, 1971), with stigma and appearance having been used as manipulation variables in evaluation studies of health messages (e.g. Olson et al., 2008; Thomas et al., 2011).

The effectiveness of emotional appeals has been aligned with Nabi's (1999) Cognitive-Functional Model (CFM) which postulates that motivating people to behave in a specific way requires messages to be framed with the emotions that evoke the desired behaviour. For example, persuading people to reduce alcohol consumption requires health messages to be loaded with a discrete emotion that evokes avoidance behaviour. Disgust is such an emotion that evokes avoidance behaviour. To reduce alcohol intake, a disgust elicitor would need to be present and arouse feelings of disgust within the message viewer. Once the emotion is evoked, the viewer becomes motivated to engage with the message recommendations and responds with the desired action. Although disgust has a place within the health message framing literature, the strategic inclusion of disgust is usually as a secondary factor to a fear appeal and rarely features alone. Despite disgust being identified as a predictor of message encoding (Leshner et al., 2009) and the possible use of alcohol warning labels (Stockwell, 2006), anti-alcohol related health communications rarely employ such disgust-based strategies. In summary, health communication research that is centred on disgust is minimal, and as indicated by online literature searches, is not evident in relation to risky single-occasion drinking.

Current study and hypotheses

In light of the review here, the current study focuses on the manipulation of message frames as strategies for changing intentions to indulge in risky single-occasion drinking and their effects on positive and negative affects, the latter distinction in the dependent variables (DVs) as after Tomkins (1962). More specifically, in view of the disease-avoidance role of disgust, this study explores the effects of a stand-alone disgust-loss frame message as compared with fear-loss frame appeals containing no disgust elicitors, and with gain frame messages. It is hypothesized that there will be a differential effect of message framing type on drinking intentions and on associated negative and positive emotions. Given the mixed picture in the literature, however, no specific order of efficacy is stipulated here. Subsidiary to the hypothesis of differential effects of framing types is the additional proposition that health-related rather than socially related message frames will produce differential intentions to reduce drinking and to drink moderately.

Method

Participants

There were 120 participants (60 females and 60 males) who ranged in age from 18 to 56 years (mean: 27.40 years, standard deviation (SD) = ±8.99 years). Participants were opportunistically sampled from a university campus in London, England, and from staff working in two small business office environments in London. In all, 91 participants were university students, 27 of the participants were non-students in employment and two were unemployed. Participants were ethnically diverse, with the majority self-designating as White (57%), followed by 13% as British, 4% as Black, 4% as Mixed Race, 3% as Asian, 3% as African, 2.5% as Black British, 2.5% as Black African, 0.8% as Irish, 0.8% as Chinese, 0.8% as Latin, 0.8% as Eastern European, 0.8% as Indian, 0.8% as Caribbean, 0.8% as German, 0.8% as Nepalese and 4% as 'Other'. In all, 66% of participants reported their partnership status as 'single', 23% as 'married', 11% as 'co-habiting' and 1% reported as being 'separated'.

In all, 88% of participants reported drinking 1–12 units of alcohol per week, with 12% reporting drinking more than 12 units per week. The modal number of units consumed each week was 1–2 units (38% of respondents), while the mean number of units drunk per week was reported as 5–6 units (SD = 4); 18% reported consuming 3–4 units per week, 9% reported 5–6 units, 8% reported 7–8 units, 7% reported 9–10 units and 8% reported drinking 11–12 units per week.

Materials

Participants were given a letter of invitation containing information regarding the study, a consent form and an 8-page questionnaire booklet in hard copy form. On page 1 of the questionnaire, participants read instructions, and thereafter on page 2 through to page 7, a series of six photographs occurred each accompanied by a unique health persuasion message, constituting two fear-loss framed communications, two gain-framed communications and two disgust-loss framed communications. The hard copy questionnaire booklet was bound together in such a way (in the top left hand corner only) to ensure only one image and paired text could be viewed at any one time. The textual content of the individual messages was derived from the National Health Service (NHS) Choices and from the Drinkaware websites. These text and picture combinations are shown in Figure 1.

The 'social fear-loss frame' message featured a scenario showing an image of two women fighting in a bar accompanied by text emphasizing that immoderate drinking in social situations can lead to making poor interpersonal choices and behaving in an undignified way. The 'health gain frame' message featured a scenario showing a woman exercising on a treadmill, with the associated text reminding the reader that drinking up to two small glasses of red wine per day can be good for the health of their heart. The 'social disgust-loss frame' message featured an image of a man vomiting on a nightclub dance floor, with the accompanying text reminding the reader that significantly exceeding recommended daily limits for alcohol consumption can lead to sudden loss of control of bodily functions. The 'health fear-loss frame' message featured an image of a man experiencing chest pain, the accompanying text reminding the viewer that significantly exceeding recommended daily limits can be bad for heart health. The 'social gain frame' message featured an image of a group of people seated socializing in a bar, the accompanying textual message reminding viewers that moderate drinking is associated with making good interpersonal choices. The 'health disgust-loss frame' message featured an image of a woman with inflamed rosacea on her face, the accompanying text reminding readers that drinking a lot more than the recommended daily limits of alcohol can produce this facial condition. To control for order effects, the six image and textual message combinations appeared within the questionnaire booklet in one of six different orders, resulting in 20 booklets of each type for distribution to participants.

Participants were instructed as follows: 'At the top of each page please look at the photo

Social gain frame

"Drinking moderately in social situations helps you to make good interpersonal choices and behave with dignity."

Health gain frame

"Drinking up to two small (125ml) glasses of red wine per day can be good for the health of your heart."

Social fear-loss frame

"Drinking immoderately in social situations means that you are more likely to make bad interpersonal choices and behave in an undignified manner."

Health fear-loss frame

"Drinking a lot more than two small (125ml) glasses of red wine per day can be bad for the health of your heart."

Social disgust-loss frame

"Drinking a lot more than two small (125ml) glasses of red wine a day can lead to sudden loss of control of bodily functions, such as vomiting."

Health disgust-loss frame

"Drinking a lot more than two small (125ml) glasses of wine a day can produce pus spots on your face."

Figure 1. The six text and picture combinations featuring alcohol-related behaviour.

and read the text to its right. Then answer the questions below it'. Subsequently, participants were presented with one image and its paired textual message at the top of each of six separate pages. On each page, respondents were asked the same 10 questions about how the specific image and text made them feel and in relation to future drinking intentions. The first question, for example, was as follows: 'In relation to the picture and the text above, to what extent do you feel comfortable about your current level of alcohol consumption'. For eight items in which this format was used, respondents were asked how *comfortable, satisfied, happy, worried, concerned, disgraced, ashamed* and *embarrassed* they felt. The remaining two items asked about drinking intentions: 'In relation to the picture and the text above, to what extent do you intend to reduce your current level of alcohol consumption?' and 'To what extent do you think the picture and text would positively affect your intentions to drink alcohol moderately in the future?' Each question was answered on a 5-point Likert scale.

Design and procedure

The study utilized a within-participants repeated-measures analysis of variance (ANOVA) design. The independent variable was message type with six levels. Responses to 10 items asking participants about their reaction to each of the six message types constituted the dependent variables (DVs) in the study. All selected imagery was chosen as moderate representations of the concepts they sought to signify, particularly in relation to fear and disgust health loss frames. The questionnaire booklets were distributed during November to March, in 2012–2013, to 120 participants. Each participant received a letter of invitation, informing them that the study would focus on feelings about drinking in relation to text and image combinations. They were assured all data would be treated confidentially and that they could withdraw from the study at any point without consequence. After signing a consent form, participants completed the questionnaires in approximately 20 minutes. Participants were debriefed on completion of questionnaires.

Results

Preliminary independent *t*-tests for sex showed there were no sex differences in the scores reported for each of the 10 DVs. Subsequently, the responses from males and females were amalgamated. Both age and amount of alcohol drunk per week were examined as potential covariates of the DVs by means of preliminary bivariate correlations. For age, only one out of a possible 60 bivariate coefficients attained statistical significance. For amount drunk per week, less than a quarter of the coefficients attained significance (at $p < .05$). This level of association of age and amount drunk with the DVs was not sufficient to justify their inclusion as covariates. Consequently, simple within-participants repeated-measures ANOVA for each DV was performed, incorporating Greenhouse-Geisser readjustment. Results for each of these analyses are summarized in Table 1 which reports means, grand means, SDs, *F*-ratios and pairwise comparisons for intention items, and for positive and negative emotion items.

The grand and individual means with associated *F*-ratios for the three positive emotion items are notable in that the health disgust-loss frame image and message elicits in respondents feelings of being least comfortable, satisfied and happy overall with their current level of alcohol consumption. The health and social gain frame images and messages conversely produced in respondents feelings of being the most comfortable, satisfied and happy with their current level of alcohol consumption.

The grand means and associated *F*-ratios for the negative emotion items are notable in that the health disgust-loss frame image and message elicits in respondents feelings of being the most negative overall, and specifically in relation to feeling most worried and disgraced about their current level of alcohol consumption. The two types of fear-loss frame also invoke significant negative emotional responses: the social

Table 1. Analysis of variance for 10 items and six message types including mean scores, standard deviations (SDs) and pairwise comparisons.

| Item | Message type | | | | | | | | | | | | | Analysis of variance | | |
| | Fear-loss frame – social | | Fear-loss frame – health | | Gain frame – social | | Gain frame – health | | Disgust-loss frame – social | | Disgust-loss frame – health | | | | | |
	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD	F	df	p
Intentions (I)															
1. Intend to reduce	2.18[a]	1.31	2.16[b]	1.28	1.95[c]	1.17	1.80[abd]	1.11	2.08	1.25	2.34[cd]	1.35	7.13	4,523	<.001
2. Positively affect future intentions	2.66[a]	1.31	2.79[b]	1.42	2.33[bc]	1.28	2.44[d]	1.39	2.76	1.45	3.10[acd]	1.47	7.81	5,557	<.001
Grand means (I)	2.42[abc]	1.10	2.48[eh]	1.13	2.14[bghi]	0.91	2.12[adef]	0.99	2.42[g]	1.10	2.72[cfi]	1.24	10.99	5,537	<.001
Negative emotions (Ne)															
1. Worried	1.87	1.11	1.97[ab]	1.22	1.61[ac]	0.95	1.60[bd]	0.92	1.85	1.11	2.13[cd]	1.23	8.54	5,547	<.001
2. Concerned	2.02[ab]	1.21	2.04[cd]	1.20	1.67[ace]	0.97	1.65[bdf]	0.93	1.85	1.10	2.03[ef]	1.24	6.37	5,559	<.001
3. Embarrassed	1.74[ab]	1.05	1.64	0.98	1.44[a]	0.87	1.43[b]	0.78	1.65	1.04	1.64	1.03	4.68	4,515	<.001
4. Ashamed	1.71[ab]	1.12	1.68[cd]	1.00	1.39[ace]	0.78	1.38[bdf]	0.76	1.62	1.01	1.69[ef]	1.03	6.75	4,514	<.001
5. Disgraced	1.76[a]	1.08	1.72	1.07	1.53	0.96	1.47[ab]	0.82	1.70	1.04	1.77[b]	1.09	3.66	4,515	<.005
Grand means (Ne)	1.82[ab]	1.00	1.81[ce]	0.95	1.53[bef]	0.79	1.51[acd]	0.71	1.74	0.92	1.86[df]	1.00	9.49	4,508	<.001
Positive emotions (Pe)															
1. Happy	3.72	1.11	3.69[a]	1.16	3.96[b]	1.03	3.96[a]	1.06	3.70	1.18	3.70[b]	1.10	4.09	5,542	<.002
2. Satisfied	3.67[a]	1.26	3.57[cd]	1.29	3.97[abcd]	1.09	3.92	1.13	3.65[c]	1.27	3.57[d]	1.25	5.07	4,521	<.001
3. Comfortable	3.78[a]	1.24	3.76[cd]	1.27	4.13[acdef]	1.00	4.17[bgh]	1.11	3.74[g]	1.27	3.53[fh]	1.38	8.35	4,518	<.001
Grand means (Pe)	3.73[ab]	1.06	3.67[dg]	1.13	4.02[bfgh]	0.91	4.02[acde]	0.94	3.70[cf]	1.08	3.60[eh]	1.10	9.49	4,505	<.001

Means with a common superscript differ significantly. Possible scores range from 1 to 5, with higher scores expressing more agreement; $N = 120$.

fear-loss frame invokes the most shame and embarrassment, while the health fear-loss scenario was most effective at eliciting concern about current drinking levels. The least effective messages and images in this respect are for the social and health gain frame conditions.

The grand means for the two intention items and associated F-ratios are notable in that the health disgust-loss frame image and message has the greatest effect on intentions to reduce future drinking and to drink moderately. The two fear-loss frame messages thereafter produce the second highest mean intentions to reduce drinking, while the health fear-loss frame and the social disgust-loss frame produce the second highest mean intentions to drink moderately. The least effective message and image for reducing drinking intentions is observable as the health gain frame condition. Overall, significant differences across the six conditions were observed on the ANOVAs for each of the three grand means and for the 10 individual items, with post hoc pairwise analyses indicating differences between the loss-frame types of message and the gain frame messages.

Discussion

The focus of this study was upon evaluating the utility of disgust-only message frames relative to others more frequently encountered, on intentions to reduce alcohol consumption, drinking moderately and on related motivational emotions. The results indicate that as hypothesized, there is a differential effect of the six message types on intentions and associated emotions. The health disgust-loss frame was found to be most effective at evoking intentions to reduce drinking or to drink moderately, followed by health and social fear-loss frames. The two gain frames were least effective at producing intentions to reduce or moderate drinking – this order of efficacy being as hypothesized. Despite the understanding that drinking is a social habit which often takes place within an interpersonal context, messages that highlight the health risks as opposed to promoting the social benefits of drinking were found to be more effective for changing

intentions to engage in risky single-occasion drinking.

Unlike Leshner et al. (2011), who found that both fear and disgust frames produce similar effects on resources allocated to encode messages (in anti-tobacco ads), the current study has observed a trend towards the superior effect of a health disgust-loss frame relative to other types, including fear-loss frames, and statistically significant differences of both disgust- and loss-framed messages as compared with the two gain-framed conditions. Respondents reported feeling most happy, satisfied and comfortable with their drinking in both of the two gain frames, suggesting that such frames are least effective at motivating people to change their drinking habits. The results suggest that when people are reminded of the health risks posed by drinking, they become more concerned about their drinking and motivated to change than they do when presented with the social consequences. On average, people experienced less satisfaction when reminded of the risks posed to health.

Our findings are consistent with those of Curtis et al. (2004), since the framing condition which featured a visual image invoking both disgust and a potential disease threat produced greater effects on mean intention scores than the social disgust-loss frame condition, albeit these were trends rather than statistically significant differences on post hoc tests. These findings align with disease-avoidance theory as articulated by Curtis et al. (2011), wherein they conceive of disgust as an '… evolved psychological system for protecting organisms from infection' (p. 389). Thereby, the image and text featuring the face disfigured by pus spots produced the greatest effect on intentions to drink moderately as, according to disease-avoidance theory, such would cue perceived risk of contact with pathogens and so promote behaviours to decrease the likelihood of this. The health disgust-loss frame may have been more effective than others as it draws attention to the actual effects of contracting disease. Subsequently, this may place the audience in the hypothetical position of imagining having such a condition, thus making the severity

of the threat more relevant. In comparison, the social disgust-loss frame presents only the bodily secretion of vomit, which can be viewed as a substance that has the potential to spread pathogens, but does not explicitly exhibit the actual effects of those pathogens.

Interestingly, Woolf (2007) distinguishes between three types of disgust, namely, disgust emanating from immorality (e.g. racism); disgust emanating from interactions among people (e.g. physical contact with 'undesirable' others) and what he calls 'animal-nature' disgust, which arises from the realization that we are like animals and will eventually die, with threats to physical integrity from disease being especially disgusting given they can cue mortality salience (Rozin et al., 2000). Animal-nature disgust aligns with the Oaten et al. (2009) designation of 'simple disgust' which connotes disease, while the interpersonal and moral forms align with what he describes as 'complex disgust', involving violations of social norms. In this way, the lacerated, pus-filled face image condition in this study, as a mortality cue, and as a simple 'animal-nature' disgust elicitor, is more effective for changing audience intentions than a complex, interpersonal disgust elicitor, such as the social disgust-loss frame image featuring vomiting in a public bar. Notably also, the health disgust-loss frame was more effective overall for invoking feelings of worry, which is of note since although fear induces feelings of anxiety as a response to threat and the uncertainty that comes with it (Witte and Allen, 2000), it is evident here that the fear-loss frame is not necessarily pre-eminent as an antecedent of anxiety and associated disease-avoidance.

Furthermore, the efficacy of the health disgust-loss frame condition may also lie in the stigmatizing effects of visible facial disfigurement, as reviewed by Rumsey and Harcourt (2004) and, as suggested by the relatively elevated mean score for the feeling of disgrace, is consistent with Park et al. (2003) who link evolved disease-avoidance to prejudice against others with physical disabilities and abnormalities. These findings also align with Nabi's (1999) CFM which argues that to stimulate people to behave in a desired way requires message-relevant affect to be invoked by framing.

Overall, our results here, which favour the use of loss-framed messages for promoting health promotion and disease-reduction behaviours (namely, reducing alcohol intake), do not support Rothman et al.'s (2006) contention that gain-framed appeals are more effective for targeting behaviours that prevent disease onset. Rather, they are more consistent with the results of O'Keefe and Jensen's (2007) meta-analysis in which they conclude that gain- and loss-framed messages cannot be simply aligned with prevention versus detection behaviours. Here, it is apparent that loss-framed messages, and in particular that featuring health-related disgust, is the most effective frame for changing intentions to reduce alcohol intake. Of course, the study is not without its limitations methodologically, with in hindsight the additional inclusion of physiological indicators of processing being preferable, and the possibility that processing of message frames was impacted by encoders' emotional states (Choi and Choi, 2010), while other personality variables (such as agreeableness) may have also had moderating effects (Covey, 2014). Further research might address these limitations and explore whether a message frame can elicit too much disgust and thereafter become ineffective in an applied but controlled setting, wherein drinkers are exposed to graphic warning labels varying in levels of disgust.

Declaration of conflicting interests

Funding

References

Barbosa C, Taylor B, Godfrey C, et al. (2010) Modelling lifetime QALYs and health care costs from different drinking patterns over time: A Markov model. *International Journal of Methods in Psychiatric Research* 19(2): 97–109.

Bazzo S, Battistella G, Riscica P, et al. (2012) Evaluation of the impact of the image used in a communication campaign to raise aware-ness about the effects of alcohol use during pregnancy. *Alcohol and Alcoholism* 47(6): 657–662.

Bennett R (1998) Shame, guilt & responses to non profit and public sector ads. *International Journal of Advertising* 17: 483–499.

Burr T (2008) *Reducing Alcohol Harm: Health Services in England for Alcohol Misuse*. London: The Stationary Office.

Cesario J, Corker KS and Jelinek S (2013) A self-regulatory framework for message framing. *Journal of Experimental Social Psychology* 49: 238–249.

Choi H and Choi J (2010) Predictors and the role of attitude toward the message and perceived message quality in gain- and loss-frame antidrug persuasion of adolescents. *Health Communication* 25(4): 303–311.

Covey J (2014) The role of dispositional factors in moderating message framing effects. *Health Psychology* 33(1): 52–65.

Curtis V, Aunger R and Rabie T (2004) Evidence that disgust evolved to protect from risk of disease. *Proceedings of the Royal Society B: Biological Sciences* 271(Suppl. 4): S131–S133.

Curtis V, De Barra M and Aunger M (2011) Disgust as an adaptive system for disease avoidance behaviour. *Philosophical Transactions of the Royal Society B: Biological Sciences* 366: 389–401.

Darwin C (1872) *The Expression of the Emotions in Man and Animals*. London: John Murray.

Davey GCL (2011) Disgust: The disease-avoidance emotion and its dysfunctions. *Philosophical Transactions of the Royal Society B: Biological Sciences* 366: 3453–3465.

Detweiler JB, Bedell BT, Salovey P, et al. (1999) Message framing and sunscreen use: Gain-framed messages motivate beach-goers. *Health Psychology* 18(2): 189–196.

Dillard JP and Nabi RL (2006) The persuasive influence of emotion in cancer prevention and detection messages. *Journal of Communication* 56(1): S123–S139.

Dillard JP, Plotnick CA, Godbold LC, et al. (1996) The multiple affective outcomes of AIDS PSAs: Fear appeals do more than scare people. *Communication Research* 23: 44–72.

Eurocare – The European Alcohol Alliance (2012) *Annual report*. Brussels. Available at: http://www.eurocare.org/about_us/governance/annual_reports2

Finney A (2004) *Alcohol and intimate partner violence: Key findings from the research*. Home Office Findings no. 216. London: Home Office.

Gallagher KM and Updegraff JA (2012) Health message framing effects on attitudes, intentions, and behavior: A meta-analytic review. *Annals of Behavioral Medicine* 43(1): 101–116.

Gallagher KM, Updegraff JA, Rothman AJ, et al. (2011) Perceived susceptibility to breast cancer moderates the effect of gain- and loss-framed messages on use of screening mammography. *Health Psychology* 30(2): 145–152.

Gerend MA and Maner JK (2011) Fear, anger, fruits, and veggies: Interactive effects of emotion and message framing on health behavior. *Health Psychology* 30(4): 420–423.

Izard CE (1977) *Human Emotions*. New York: Plenum Press.

Kahneman D (2012) *Thinking, Fast and Slow*. London: Penguin Books.

Kurzban R and Leary MR (2001) Evolutionary origins of stigmatization: The functions of social exclusion. *Psychological Bulletin* 127: 187–208.

Leshner G, Bolls P and Thomas E (2009) Scare 'em or disgust 'em: The effects of graphic and health promotion messages. *Health Communication* 24: 447–458.

Leshner G, Bolls P and Wise K (2011) Motivated processing of fear appeal and disgust images in televised anti-tobacco ads. *Journal of Media Psychology* 23(2): 77–89.

Leshner G, Vultee F, Bolls PD, et al. (2010) When a fear appeal isn't just a fear appeal: The effects of graphic anti-tobacco messages. *Journal of Broadcasting & Electronic Media* 54(3): 485–507.

Maloney EK, Lapinski MK and Witte K (2011) Fear appeals and persuasion: A review and update of the extended parallel process model. *Social and Personality Psychology Compass* 5(4): 206–219.

Meyerowitz BE and Chaiken S (1987) The effect of message framing on breast self-examination attitudes, intentions, and behavior. *Journal of Personality and Social Psychology* 52(3): 500–510.

Morales AC, Wu EC and Fitzsimons GJ (2012) How disgust enhances the effectiveness of fear appeals. *Journal of Marketing Research* 49: 383–393.

Moscato S, Black DR, Blue CL, et al. (2001) Evaluating a fear appeal message to reduce alcohol use among 'Greeks'. *American Journal of Health Behavior* 25(5): 481–491.

Nabi RL (1999) A cognitive-functional model for the effects of discrete negative emotions on information processing, attitude change, and recall. *Communication Theory* 9: 292–320.

Nabi RL (2002) Anger, fear, uncertainty, and attitudes: A test of the cognitive-functional model. *Communication Monographs* 69: 204–216.

Neuberg SL, Smith DM and Asher T (2000) Why people stigmatize: Toward a biocultural framework. In: Heatherton T, Kleck R, Hull JG et al. (eds) *The Social Psychology of Stigma*. New York: Guilford Press, pp. 31–61.

Oaten M, Stevenson RJ and Case TI (2009) Disgust as a disease-avoidance mechanism. *Psychological Bulletin* 135(2): 303–321.

O'Keefe DJ and Jensen JD (2007) The relative persuasiveness of gain-framed and loss-framed messages for encouraging disease prevention behaviors: A meta-analytic review. *Journal of Health Communication* 12: 623–644.

Olson AL, Gaffney CA, Starr P, et al. (2008) The impact of an appearance-based educational intervention on adolescent intention to use sunscreen. *Health Education Research* 23(5): 763–769.

Park JH, Faulkner J and Schaller M (2003) Evolved disease-avoidance processes and contemporary anti-social behavior: Prejudicial attitudes and avoidance of people with physical disabilities. *Journal of Nonverbal Behavior* 27(2): 65–87.

Pinto MB and Priest S (1991) Guilt appeals in advertising: An exploratory study. *Psychological Reports* 69: 375–385.

Rothman AJ and Salovey P (1997) Shaping perceptions to motivate healthy behavior: The role of message framing. *Psychological Bulletin* 121: 3–19.

Rothman AJ, Bartels RD, Wlaschin J, et al. (2006) The strategic use of gain- and loss-framed messages to promote healthy behavior: How theory can inform practice. *Journal of Communication* 56: S202–S220.

Rozin P, Haidt J and McCauley CR (2000) Disgust. In: Lewis M and Haviland-Jones JM (eds) *Handbook of Emotions* (2nd edn). New York: Guilford Press, pp. 637–653.

Rumsey N and Harcourt D (2004) Body image and disfigurement: Issues and interventions. *Body Image* 1: 83–97.

Ryan W (1971) *Blaming the Victim*. New York: Pantheon Books.

Stockwell T (2006) *A Review of Research into the Impacts of Alcohol Warning Labels on Attitudes and Behaviour*. Vancouver, BC, Canada: Centre for Addictions Research of British Columbia.

Thomas K, Hevey D, Pertl M, et al. (2011) Appearance matters: The frame and focus of health messages influences beliefs about skin cancer. *British Journal of Health Psychology* 16: 418–429.

Tomkins SS (1962) *Affect Imagery Consciousness: The Positive Affects*, vol. 1, ch. 9. New York: Springer.

Toomey TL, Erickson DJ, Carlin BP, et al. (2012) The association between density of alcohol establishments and violent crime within urban neighborhoods. *Alcoholism: Clinical and Experimental Research* 36(8): 1468–1473.

Tversky A and Kahneman D (1979) Prospect theory: An analysis of decision under risk. *Econometrica* 47(2): 263–291.

Tversky A and Kahneman D (1981) The framing of decisions and the psychology of choice. *Science* (New Series) 211(4481): 453–458.

Witte K (1992) Putting the fear back into fear appeals: The extended parallel process model. *Communication Monographs* 59: 329–349.

Witte K and Allen M (2000) A meta-analysis of fear appeals: Implications for effective public health campaigns. *Health Education & Behavior* 27(5): 591–615.

Woolf JR (2007) *The effects of disgust eliciting persuasive messages on physical activity*. Doctoral Dissertation, University of Texas at Austin, Austin, TX.