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# Avoidance orientation moderates the effect of threatening messages

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## Abstract

This study investigated the influence of individual differences in people's dispositional avoidance orientation on the persuasive effects of low- and high-threat messages promoting moderate drinking. First, participants ( $N = 99$ ) individual differences in avoidance orientation were assessed, after which they were provided with either high- or low-threat messages about the consequences of drinking too much alcohol. The primary outcome measures were information acceptance, attitude and intention. Results showed that participants low in avoidance orientation were more likely to be persuaded by the low-threat message, whereas participants high in avoidance orientation were more likely to be persuaded by the high-threat message.

## Keywords

avoidance orientation, personality, threatening messages

## Introduction

An important goal of health-promoting messages is to encourage and motivate people to engage in healthful and disease-preventive behaviors. Many health education campaigns have tried to reach this goal by using threatening information, thus *scaring* an audience into adopting a recommended healthful behavior (cf. Hill et al., 1998). The effectiveness of threatening health information is still debated, however (Earl and Albarracín, 2007; Hastings et al., 2004; Terblanche-Smit and Terblanche, 2010), and the mechanisms whereby threatening health information influences persuasion are not yet fully understood (Ruiter et al., 2001). In the present study we investigated the hypothesis that high threat messages are particularly persuasive for people with a strong avoidance orientation.

Numerous studies have tested the effects of threatening health-promoting messages on measures of attitude, intention and behavior (for an overview see Ruiter et al., 2001). Unfortunately, such studies have yielded mixed findings. On the one hand, several authors propose that perceived threat motivates behavior change (Floyd et al., 2000). The results of a

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meta-analytic study of research on threatening messages suggest a positive relation between threat perceptions and healthful behavior (Witte and Allen, 2000). On the other hand, the results of numerous studies suggest that people who are confronted with threatening information tend to downplay and dismiss this information (Brown and Locker, 2009; Brown and Smith, 2007; Kruglanski and Webster, 1996; Nielsen and Shapiro, 2009). These responses are referred to as *defensive* (Good and Abraham, 2007) and are assumed to be the consequence of motivated reasoning, a reasoning process that is biased to hold on to prior beliefs and justify current behavior (Keller and Block, 1999), and which often occurs when people's prior motives are incompatible with stimulus information (Kunda, 1990). As a result, people who are most at risk are oftentimes least persuaded (Liberman and Chaiken, 1992). In fact, Witte and Allen's (2000) meta-analysis found that threatening information had a larger, positive, effect on defensive responses ( $r = .20$ ) than on either health-conducive intentions ( $r = .13$ ) or behavior ( $r = .16$ ). Quite possibly, threatening messages give rise to both defensive and health-conducive reactions (Croyle and Hunt, 1991; Jemmott et al., 1986).

Another possibility is that threatening messages result in defensive reactions in some circumstances but in health-conducive reactions in other circumstances. To account for the confusing findings in the literature, researchers have investigated the latter possibility, turning their attention towards variables that can influence the effects of threatening information. Many researchers have emphasized the need to explore the role of stable individual-difference variables in the processing of threatening messages (Brouwers and Sorrentino, 1993; Leary and Jones, 1993; Liberman and Chaiken, 1992; McMath and Prentice Dunn, 2005; Ruiter et al., 2004), and it has been argued that insight in the influence of such variables can increase our knowledge of the working mechanisms of threatening messages (Ruiter et al., 2001). For this reason, researchers have turned their

attention to need for cognition (McMath and Prentice Dunn, 2005; Ruiter et al., 2004), uncertainty orientation (Brouwers and Sorrentino, 1993), locus of control (Bennett et al., 1997) and trait anxiety (Witte and Morrison, 2000). In the present study, we investigated the influence of another potentially important variable: the strength of people's dispositional avoidance orientation, or Behavioral Inhibition System.

## **Behavioral inhibition and behavioral activation**

According to Gray (1990), two basic mechanisms control human behavior. One system, the Behavioral Activation System (BAS), controls appetitive motivation and is sensitive to stimuli associated with reward and non-punishment. The other system, the Behavioral Inhibition System (BIS), controls aversive motivation and is activated by stimuli of punishment and omission/termination of rewards. This bidimensional approach to the regulation of behavior has implications for the study of personality; it implies that personality has an underlying structure consisting of two factors: sensitivity to stimuli associated with positive reinforcement and sensitivity to stimuli associated with negative reinforcement (Gray, 1990).

The above theorizing has important implications for the persuasive effects of threatening health information. Since avoidance orientation is conceptualized as sensitivity to negative stimuli, and threatening health-promoting messages usually contain negative information, it could be argued that people with a strong avoidance orientation might be more strongly affected by threatening information than people with a weak avoidance orientation. Thus, for people with a strong avoidance orientation, threatening information might be more persuasive than low-threat information. For people with a weak avoidance orientation, on the other hand, who are less strongly affected by negative information, high- and low-threat information might not be differentially persuasive. This would be in line with the results of studies in the domain of message

framing. Health-promoting messages can be framed in terms of the positive consequences of healthy behavior (gain-framed) or in terms of the negative consequences of unhealthy behavior (loss-framed). Previous studies have shown that, similar to high-threat messages, loss-framed messages are perceived as more threatening than gain-framed messages (Van 't Riet, Ruiter, Werrij and De Vries, 2010), and are more likely to evoke negative affect (Cox and Cox, 2001; Schneider et al., 2001; Shen and Dillard, 2007). Several recent studies investigated the influence of approach- and avoidance orientation on the effects of gain- and loss-framed health-promoting messages and showed that the strength of people's avoidance orientation can moderate the influence of gain- and loss-framed messages on measures of persuasion, such that, for people with a strong avoidance orientation, loss-framed messages are more persuasive than gain-framed messages, whereas no such effect was found for people with a weak avoidance orientation (Gerend and Shepherd, 2007; Mann et al., 2004; Sherman et al., 2006).

In the present study we investigated the influence of individual differences in people's dispositional avoidance orientation on the effects of low- and high-threat messages. Our hypothesis was that high-threat messages are more persuasive than low-threat messages for people with a strong avoidance orientation. For people with a weak avoidance orientation, we expected no differential effects of high- and low-threat messages. To test our hypothesis, we provided participants with high- or low-threat messages stressing the negative consequences of drinking alcohol and assessed information acceptance, attitudes and intentions as the outcome measures. Attitudes and intentions were included as outcome measures because it is well established that they are important predictors of behavior (e.g. Ajzen, 1991). It might be argued that information acceptance is a more distal predictor of behavior than attitude or intention and therefore less relevant as an outcome measure. However, a meta-analytic study has shown that perceived effectiveness, a measure akin to information acceptance, is substantially

correlated with actual effectiveness (Dillard et al., 2007). Furthermore, theoretical support for the relevance of information acceptance comes from Ajzen's (2002) notion of the 'error choice method', according to which, because it is improbable that participants will have an objective basis for estimating how relevant or convincing messages might be for most people, their judgements are likely to reflect their own attitudes. We therefore included information acceptance as an outcome measure in the present study.

## Method

### Participants

University students listed in a database of voluntary research participants were invited by email to take part in the experiment. Given the high prevalence of binge drinking in student populations (Goldman et al., 2002), its well-known health consequences (Wechsler et al., 1994) and the growing concern at young people's excessive drinking (Donaldson, 2001), we used messages stressing the negative consequences of drinking too much alcohol as the persuasive messages in our study. In total, 114 students participated in the experiment in exchange for €5. Fifteen participants indicated that they never consumed alcohol. These participants were excluded from the analyses. Among the remaining 99 participants, most were female (83 vs 16 males) and age ranged from 18 to 28 years, with a mean age of 21.0 years ( $SD = 1.9$ ). The study was approved by the Medical Ethical Committee of Maastricht University.

### Design and procedure

The present study used a one-factorial (threat: high-threat content vs low-threat content) between-participants design. There were three main outcome measures: acceptance of the information, attitude towards reducing alcohol consumption, and intention to reduce alcohol consumption.

Participants were scheduled to visit the laboratory, and were seated in individual booths. First,

we assessed current levels of alcohol consumption and approach/avoidance orientation. Next, we told participants that they were about to participate in a study that aimed to test health-education materials designed for use 'on the Internet'. We provided participants with a persuasive message about alcohol, which had either high-threat or low-threat content. After reading it, participants completed the dependent measures, then were debriefed and received their fee.

### Baseline measures

**Assessment of alcohol consumption.** Introducing the alcohol consumption questionnaire, we asked participants to consider a unit of alcohol as a glass of beer (12 oz.), a glass of wine, a shot or a mixed-drink (e.g. Bacardi-Coke). Next, following procedures outlined by Van Dijck and Knibbe (2005), we assessed alcohol consumption during the working week and during the weekend separately, because students' estimates of alcohol consumption may be more accurate when they can estimate working week and weekend alcohol consumption separately. For both working week and weekend alcohol consumption, one item assessed frequency of consumption, by asking participants on how many days they consumed alcohol in an average working week or weekend, respectively. Another item assessed quantity of alcohol consumption, by asking participants how many drinks they usually consumed on such a day. Scores on these items were multiplied to arrive at estimates of alcohol-consumption during the working week and weekend. Working-week and weekend alcohol consumption were then summed up to arrive at an assessment of total weekly alcohol consumption. The mean number of alcoholic consumptions during the working week was 2.64 ( $SD = 3.63$ ; range 0–24) and the mean number of alcoholic consumptions during the weekend was 4.26 ( $SD = 6.66$ ; range 0–60).

**Assessment of behavioral inhibition and behavioral activation.** The BIS/BAS Scales (Carver and White, 1994) assess the strength of people's

approach (BAS) and avoidance (BIS) motivations. We used the Dutch version (Franken et al., 2005) of this scale to assess individual differences in BIS and BAS. Participants rated their agreement with 24 statements (including 4 filler items) using Likert scales with endpoints of 1 (*strongly disagree*) and 4 (*strongly agree*). The BAS scale consists of three subscales that measure Reward Responsiveness (e.g. 'When good things happen to me, it affects me strongly'), Drive (e.g. 'When I go after something I want, I move on it right away'), and Fun Seeking (e.g. I will often do things for no other reason than they might be fun'). In the present experiment, all BAS items were combined to form a BAS score ( $\alpha = .80$ ) with higher scores indicating more BAS activity and thus a stronger approach orientation. The BIS subscale consists of seven items that assess sensitivity to negative situations (e.g. 'I feel worried when I think I have done poorly at something'). All BIS items were combined to create a BIS score ( $\alpha = .83$ ) with higher scores indicating more BIS activity and thus higher avoidance orientation. BIS and BAS scores were non-significantly correlated ( $r = .04$ )

**Persuasive message.** For the present study, we designed short messages of 379 and 389 words. In the high-threat condition, the persuasive message stressed the severe and threatening consequences of drinking too much alcohol, like suffering from brain damage and having an increased risk of gastro-intestinal bleeding or cirrhosis of the liver. In the low-threat condition, the persuasive message stressed less threatening consequences of drinking too much alcohol, like having a weakened immune system and having trouble maintaining a proper weight. The full texts are available from the authors upon request.

### Outcome measures

**Manipulation checks.** To assess the effects of the threat manipulation, we conducted a *manipulation check*. One item asked participants to indicate to what extent they found the message

threatening (1 = *Not threatening at all*; 7 = *Very threatening*).

**Information acceptance.** Eight items adopted from previous research (Van 't Riet, Ruiter, Werrij, Candel and De Vries, 2010) assessed participants' acceptance of the information by asking them to indicate the extent to which they thought the information was convincing (1 = *Very convincing*; 7 = *Not at all convincing*), relevant (1 = *Very relevant*; 7 = *Not at all relevant*), objective (1 = *Very objective*; 7 = *Not at all objective*), useful (1 = *Very useful*; 7 = *Not at all useful*), and interesting (1 = *Very interesting*; 7 = *Not at all interesting*). Furthermore, three items asked participants to indicate the extent to which participants felt that the information was true (1 = *Very true*; 7 = *Not at all true*) and exaggerated (1 = *Very exaggerated*; 7 = *Not at all exaggerated*) and the extent to which participants agreed with the information (1 = *I totally agree*; 7 = *I totally disagree*). After we reversed the scores of all items except the *exaggerated* item, the scores on the eight items were averaged to create an average information acceptance score ( $\alpha = .83$ ).

**Attitude.** Six items were used to assess *attitude towards drinking less alcohol*, asking participants to indicate the extent to which they rated cutting down on their drinking as (1) *very good* vs. (7) *very bad*, (1) *very healthy* vs. (7) *very unhealthy*, (1) *very nice* vs. (7) *not at all nice*, (1) *very much worth the effort* vs. (7) *not worth the effort at all*, (1) *very important* vs. (7) *very unimportant*, (1) *very sensible* vs. (7) *not sensible at all*. These items were adopted from previous research (Van 't Riet, Ruiter, Werrij, Candel and De Vries, 2010; for a similar procedure to assess attitude see De Bruijn et al., 2007). After scores on the attitude items were reversed, an average score was created ( $\alpha = .81$ ).

**Intention.** Six items were used to assess *intention to reduce alcohol intake*. These items were adopted from previous research (Van 't Riet, Ruiter, Werrij and De Vries, 2010). One item asked participants 'how likely is it that you will

cut down on your drinking *in the future*?' (1 = *Very likely*; 7 = *Very unlikely*). One item asked participants: 'how likely is it that you will cut down on your drinking *in the coming week*?' (1 = *Very likely*; 7 = *Very unlikely*). Two items asked participants whether they planned to cut down on their drinking *in the future* and *in the coming week*. One item asked participants whether they *considered* cutting down on their drinking *in the future* and one item asked participants whether they *were sure* that they would cut down on their drinking *in the coming week*. These four items used a 7-point scale (1 = *Certainly*; 7 = *Certainly not*). Scores on the intention items were reversed such that a high score indicates a strong intention to drink less alcohol and an average intention score was calculated ( $\alpha = .91$ ).

**Statistical analysis.** First, we investigated associations between all relevant variables by means of correlation analyses. Next, we used regression analyses to test the main effects of threat (coded as 0 = *low threat*; 1 = *high threat*), BIS, and the Threat X BIS interaction term on information acceptance, attitude and intention. To ensure that multi-collinearity did not affect the results, individual scores on the BIS measure were centered (i.e. by subtracting the mean from each score). The centered BAS score was included in the analyses as a covariate. In case of a significant interaction effect, analyses were performed to estimate the effect of message threat for participants with a strong avoidance orientation (one SD above the mean) and for participants with a weak avoidance orientation (one SD below the mean), following a procedure for simple slope analyses outlined by Aiken and West (1991). Next, additional analyses were performed with baseline alcohol consumption as covariates. Because previous research has found that BIS and BAS can interact to produce effects on health behavior (Simons and Arens, 2007), the three-way interaction between Threat, BIS and BAS was also included in these analyses. Finally, mediation analyses were performed to shed light on the relations between the outcome measures. In all

**Table 1.** Means, standard deviations (SD) and correlations between BIS, BAS, baseline alcohol consumption, perceived threat, information acceptance, attitude and intention

	M	SD	BIS	BAS	Alcohol consumption	Perceived threat	Information acceptance	Attitude
BIS	20.69	3.29	–					
BAS	38.38	4.19	.04	–				
Alcohol consumption	6.90	7.83	-.14	.24*	–			
Perceived threat	4.11	1.23	.01	.15	-.11	–		
Information acceptance	5.11	.87	-.10	.10	.00	.25*	–	
Attitude	5.48	.72	.07	-.06	-.36**	-.10	.07	–
Intention	3.37	1.46	-.21*	.04	.01	.14	.14	.18

\* $p < .05$ \*\* $p < .01$ 

analyses, the semipartial correlation ( $sr$ ) was used as a measure of effect size and was interpreted according to guidelines by Cohen (1992), stating that  $sr = .10$  corresponds with a small effect size,  $sr = .30$  corresponds with a medium effect size, and  $sr = .50$  corresponds with a large effect size. The used statistical package was SPSS 15.0.

## Results

### Correlation analyses

Correlation analyses showed that alcohol consumption was significantly correlated with BAS and attitude and that intention to reduce alcohol intake was negatively associated with BIS. Attitude and intention were only weakly and non-significantly correlated (Table 1).

### Randomization check and manipulation check

Regression analyses showed that there were no differences between the high- and low-threat groups in age, alcohol consumption, BIS or BAS,  $ps > .20$ . There were also no differences in gender,  $\chi^2(1) = .00$ ,  $p = .98$ , suggesting that randomization was successful. As evidence that the threat manipulation was successful, a

linear regression analysis showed that the high-threat information was perceived as significantly more threatening than the low-threat information ( $M_{\text{low-threat}} = 3.86$ ;  $M_{\text{high-threat}} = 4.44$ ),  $B(SE) = .59(.24)$ ,  $t(97) = 2.41$ ,  $p < .05$ ,  $sr = .24$ . There were no significant effects of BIS or the threat by BIS interaction term on perceived threat,  $ps > .71$ .

### Information acceptance

As can be seen in Table 2, our analyses revealed that there were no main effects of threat ( $M_{\text{low-threat}} = 5.07$ ;  $M_{\text{high-threat}} = 5.15$ ;  $p = .77$ ), BAS ( $p = .29$ ) or BIS ( $p = .32$ ) on information acceptance. Also, the interaction between threat and BIS did not have a significant contribution to the prediction of information acceptance ( $p = .87$ ). Additional analyses revealed that the effect of Threat was not moderated by BAS ( $p = .83$ ). Next, we repeated the analyses, controlling for baseline alcohol consumption. The results of these analyses showed no significant effects,  $ps > .11$ .

### Attitude

Regression analyses with attitude as the dependent variable revealed no significant main effects of threat ( $M_{\text{low-threat}} = 5.51$ ;  $M_{\text{high-threat}} = 5.45$ ;

**Table 2.** Results of the linear regression analyses for information acceptance, attitude and intention

	Step 1					Step 2				
	B	SE	t	p-value	sr	B	SE	t	p-value	sr
Information acceptance										
Threat <sup>a</sup>	.05	.18	.30	.77	.03	.05	.18	.28	.78	.03
BAS	.02	.02	1.06	.29	.11	.02	.02	1.05	.30	.11
BIS	-.03	.03	-1.01	.32	-.10	-.03	.03	-.75	.45	-.08
Threat × BIS						-.01	.06	-.17	.87	-.02
Attitude										
Threat <sup>a</sup>	-.05	.15	-.34	.74	-.04	-.03	.15	-.17	.87	-.02
BAS	-.01	.02	-.63	.53	-.06	-.01	.02	-.55	.58	-.06
BIS	.01	.02	.64	.53	.07	-.02	.03	-.56	.57	-.06
Threat × BIS						.10*	.05	2.06	.04	.21
Intention										
Threat <sup>a</sup>	.27	.29	.93	.36	.09	.34	.28	1.20	.23	.12
BAS	.02	.04	.47	.64	.05	.02	.03	.70	.54	.06
BIS	-.09*	.04	-2.02	.05	-.20	-.17**	.05	-3.34	.001	-.32
Threat × BIS						.28**	.09	2.93	.004	.28

<sup>a</sup>coded as 0 = non-threatening message, 1 = threatening message

\* $p < .05$

\*\* $p < .01$

$p = .74$ ), BAS ( $p = .53$ ) or BIS ( $p = .53$ ). However, the interaction between threat and BIS contributed significantly to the prediction of attitude (Table 2). Simple slope analyses were performed to analyse the main effect of threat for participants with a weak and strong BIS. For participants with a weak BIS (one SD below the mean BIS score) and thus a weaker avoidance orientation, the low-threat message resulted in more positive attitudes than the high-threat message, although the semi-partial correlation showed a small to medium effect size and the effect did not reach conventional levels of significance,  $B(SE) = -.35(.21)$ ,  $t(94) = -1.70$ ,  $p = .09$ ,  $sr = -.17$ . For participants with a strong BIS (one SD above the mean BIS score), and thus a stronger avoidance orientation, there were no significant differences between the high- and low-threat messages,  $B(SE) = .30(.23)$ ,  $t(94) = 1.34$ ,  $p = .18$ ,  $sr = .13$ . BAS did not moderate the effect of Threat on attitude ( $p = .53$ ). When controlling for baseline alcohol consumption the analyses revealed similar results and identical conclusions.

### Intention

As can be seen in Table 2, regression analyses with intention as the dependent variable revealed no main effect of threat ( $M_{\text{low-threat}} = 3.22$ ;  $M_{\text{high-threat}} = 3.56$ ;  $p = .36$ ) or BAS ( $p = .64$ ). However, BIS unexpectedly had a significant contribution to the prediction of intention, such that participants with a stronger BIS had weaker intentions to cut down on their drinking. In addition, there was a significant interaction between threat and BIS (Table 2). Simple slope analyses revealed that, for participants with a weak BIS (one SD below the mean BIS score), there were no significant differences between the high- and low-threat messages,  $B(SE) = -.55(.40)$ ,  $t(94) = -1.38$ ,  $p = .17$ ,  $sr = -.13$ . For participants with a strong BIS (one SD above the mean BIS score), the high-threat message resulted in higher intention scores than the low threat message,  $B(SE) = 1.23(.43)$ ,  $t(94) = 2.84$ ,  $p < .01$ ,  $sr = .27$ . BAS did not moderate the effect of Threat on intention. Controlling for baseline alcohol consumption yielded similar results and identical conclusions.

### Additional analyses of moderating and mediating effects

Because previous research has found that BIS and BAS can interact to produce effects on health behavior (Simons and Arens, 2007), we investigated whether the three-way interaction between Threat, BIS and BAS had a significant contribution to the prediction of information acceptance, attitude or intention. Results of these moderator analyses showed that this was not the case ( $ps > .20$ ). Furthermore, we ran analyses to check whether (besides BIS) gender, age or alcohol consumption moderated the effect of threat on any of the three outcome measures. This was not the case, as all such interaction effects proved non-significant ( $ps > .11$ ). We also checked whether the interaction between BIS and threat was qualified by a three-way interaction between BIS, threat and any of these baseline variables. No significant three-way interactions were found,  $ps > .19$ . We did, however, find a BIS by alcohol consumption interaction effect for intention,  $B(SE) = .01(.005)$ ,  $t(93) = 2.68$ ,  $p < .01$ ,  $sr = .24$ . Further inspection of this interaction effect revealed that BIS scores were negatively associated with intention to reduce alcohol consumption for participants with a low alcohol consumption level (one SD below the mean of the alcohol consumption score),  $B(SE) = -.28(.06)$ ,  $t(93) = -4.35$ ,  $p < .001$ ,  $sr = -.31$ . For participants with a high alcohol consumption level, BIS was not significantly associated with intention to drink less alcohol,  $B(SE) = -.08(.06)$ ,  $t(93) = -1.25$ ,  $p = .22$ ,  $sr = -.17$ .

In addition to these moderator analyses, we investigated the nature of the relationships between the outcome measures. Specifically, we investigated whether the effect of the Threat by BIS interaction term on intention was mediated by attitude. In the approach for identifying mediators outlined by Baron and Kenny (1986), a variable functions as a mediator when 1) the independent variable has a significant effect on the mediator, 2) the independent variable has a total effect on the dependent variable, 3) the

mediator is significantly associated with the dependent variable when the other independent variables are controlled for, and 4) the effect of the independent variable on the dependent variable is reduced when the mediator is entered into the model. Since there was no significant effect of the Threat by BIS interaction term on information acceptance, this variable did not qualify as a mediator of the interaction effect. However, as we have seen above, the Threat by BIS interaction term had significant effects on both attitude and intention. Thus, for attitude to qualify as a mediator, conditions 1 and 2 of Baron and Kenny's approach were met. An additional analysis with Threat, BIS, the Threat by BIS interaction term and attitude as the independent variables revealed that condition 3 was not met, as attitude did not have a significant effect on intention,  $B(SE) = .30(.20)$ ,  $t(.94) = 1.51$ ,  $p = .14$ ,  $sr = .14$ .

### Discussion

We hypothesized that high-threat messages would be more persuasive than low-threat messages for participants with a strong avoidance orientation, whereas high- and low-threat messages would be equally persuasive for participants with a weak avoidance orientation. The results partly supported our hypothesis. With regards to attitude, we found an interaction in the predicted direction. However, instead of finding that the *high-threat* message resulted in more positive attitudes than the low-threat message for participants with a *strong* avoidance orientation, we found that the *low-threat* message resulted in more positive attitudes for participants with a *weak* avoidance orientation, although this difference was only marginally significant and should be interpreted with caution. With regards to intention, the hypothesized pattern emerged: for participants with a strong avoidance orientation, the high-threat message resulted in stronger intentions than the low-threat message, whereas for participants with a weak orientation intention, we found no differences in intention between the high- and low-threat conditions.

With regards to information acceptance, our results showed no support for our hypothesis.

The present study contributes to existing research by highlighting the role of avoidance orientation in the processing of threatening health-promoting messages. Many researchers have emphasized the need to explore the role of stable individual-difference variables in the processing of threatening messages (Brouwers and Sorrentino, 1993; Leary and Jones, 1993; Liberman and Chaiken, 1992; McMath and Prentice Dunn, 2005; Ruiter et al., 2004) as insight in the influence of such variables can increase our knowledge of the working mechanisms of threatening messages (Ruiter et al., 2001). Furthermore, the revealed interaction between threat and avoidance orientation for both attitude and intention is in line with findings from the message-framing literature, which shows that loss-framed messages, which are generally perceived as more threatening than gain-framed messages (Van 't Riet, Ruiter, Werrij and De Vries, 2010), are particularly persuasive for recipients with a strong avoidance orientation, whereas gain-framed messages are particularly persuasive for recipients with a strong approach orientation (Gerend and Shepherd, 2007; Mann et al., 2004; Sherman et al., 2006).

One surprising finding in our study was that, contrary to established theory (Ajzen, 1991), the correlation between attitude and intention was small to medium and did not reach conventional levels of significance. Likewise, the effect of message threat and BIS on intention was not mediated by attitude. One potential explanation for this might be that some of the participants who consumed alcohol only moderately had already succeeded in reducing their alcohol intake and, while still having positive attitudes towards moderating their alcohol intake, no longer had strong intentions to reduce their alcohol intake even further. To investigate this possibility, we investigated whether the correlation between attitude and intention was dependent on weekly alcohol consumption. These analyses showed that the correlation between attitude and intentions was not significant for participants

with an alcohol-consumption score below the median of 5.0 consumptions per week ( $n = 48$ ),  $r = .02$ ,  $p = .88$ , but it was highly significant for participants with an alcohol-consumption score above the median ( $n = 51$ ),  $r = .49$ ,  $p < .001$ . Thus, for participants who already consumed alcohol in moderate amounts, positive attitudes towards reducing their alcohol consumption did not necessarily translate into strong intentions.

A second surprising finding was that, whereas in previous studies BAS, and not BIS, has been found to be associated with alcohol consumption (e.g. O'Connor and Colder, 2005; Pardo et al., 2007; Zisseron and Palfai, 2007), in the present study a higher BIS was associated with weaker intentions to reduce alcohol consumption. It could be argued that participants with a strong BIS may have had a low alcohol intake in the first place, and therefore weak intentions to reduce alcohol consumption. However, since the correlation analyses showed a weak and non-significant relation between BIS and alcohol consumption, this did not seem to be the case in the present study. Furthermore, regression analyses showed that BIS was only associated with intention among participants with low alcohol consumption levels. Future research should investigate the relationship between health-risk behaviors, avoidance orientation and intentions to change behavior.

The present study was subject to certain limitations. First, our sample consisted of university students. Although alcohol consumption is a relevant behavior for this group and there is a need to target adolescents and young adults with health education aimed at reduced drinking, future studies should investigate whether our results can be replicated in more diverse samples. Second, it could be argued that our outcome measures of attitude towards reducing alcohol intake and intention to reduce alcohol intake were not particularly appropriate for the many participants in the present study who only consumed alcohol in moderate quantities and might have little reason to reduce their alcohol consumption. Instead, these outcome measures might be more appropriate for binge drinkers or

excessive drinkers and this may have influenced the results. The fact that a baseline measure of alcohol consumption did not affect the results, alone or in combination with any of the other variables under investigation, argues against this. Still, future research could employ samples of excessive drinkers to investigate whether our results can be replicated in such high-risk groups. Third, it has been argued that the effects of threatening messages in the real world might differ substantially from effects in laboratory settings (Hastings et al., 2004). Therefore, research is needed that investigates whether the present findings can be replicated in a field study. Finally, our study did not include a long-term follow-up, making it impossible to assess behavioral effects. Future research should investigate the long-term behavioral effects of threatening messages in people with strong and weak avoidance orientation.

In sum, we proposed that avoidance orientation might moderate the effects of threatening health-promoting messages on persuasion. Our results supported this assumption and suggest that stable individual differences in avoidance orientation are of great importance in the study of threatening health-promoting information. For health-care practitioners working in the field of alcohol-abuse prevention, our results suggest that health-education campaigns could be tailored to individual differences in avoidance orientation. In line with a growing practice to tailor health-education interventions to individual characteristics of the recipient (Dijkstra and De Vries, 1999; Rimer and Kreuter, 2006; Ruiter et al., 2006) high-threat material could be offered to recipients high in avoidance orientation, whereas low-threat material could be offered to recipients low in avoidance orientation (cf. Latimer et al., 2005).

## References

- Aiken LS and West SG (1991). *Multiple Regression: Testing and Interpreting Interactions*. Los Angeles: Sage.
- Ajzen I (1991) The theory of planned behavior. *Organizational Behavior and Human Decision Processes* 50: 179–211.
- Ajzen I (2002) Attitudes. In: Fernandez Ballesteros R (ed.) *Encyclopedia of Psychological Assessment*. London: Sage, pp. 110–115.
- Baron RM and Kenny DA (1986) The moderator-mediator variable distinction in social psychological research: conceptual, strategic and statistical considerations. *Journal of Personality and Social Psychology* 51: 1173–1182.
- Bennett P, Norman P, Moore L, Murphy S and Tudor Smith C (1997) Health locus of control and value for health in smokers and nonsmokers. *Health Psychology* 16: 179–182.
- Brouwers MC and Sorrentino RM (1993) Uncertainty orientation and protection motivation theory: the role of individual differences in health compliance. *Journal of Personality and Social Psychology* 65: 102–112.
- Brown SL and Locker E (2009) Defensive responses to an emotive anti-alcohol message. *Psychology and Health* 24: 517–528.
- Brown SL and Smith EZ (2007) The inhibitory effects of a distressing anti-smoking message on risk perceptions in smokers. *Psychology and Health* 22: 255–268.
- Carver CS and White TL (1994) Behavioral inhibition, behavioral activation, and affective responses to impending reward and punishment: the BIS/BAS Scales. *Journal of Personality and Social Psychology* 67: 319–333.
- Cohen J (1992) A power primer. *Psychological Bulletin* 112: 155–159.
- Cox D and Cox AD (2001) Communicating the consequences of early detection: the role of evidence and framing. *Journal of Marketing* 65: 91–103.
- Croyle RT and Hunt JR (1991) Coping with health threat: social influence processes in reactions to medical test results. *Journal of Personality and Social Psychology* 60: 382–389.
- De Hoog N, Stroebe W and De Wit JB (2005) The impact of fear appeals on processing and acceptance of action recommendations. *Personality and Social Psychology Bulletin* 31: 24–33.
- De Bruijn GJ, Kremers SP, De Vet E, De Nooijer J, Van Mechelen W and Brug J (2007) Does habit strength moderate the intention-behaviour relationship in the Theory of Planned Behaviour? The case of fruit consumption. *Psychology and Health* 22: 899–916.
- Dijkstra A and De Vries H (1999) The development of computer-generated tailored interventions. *Patient Education and Counseling* 36: 193–203.

- Dillard JP, Weber KM and Vail RG (2007) The relationship between the perceived and the actual effectiveness of persuasive messages: a meta-analysis with implications for formative campaign research. *Journal of Communication* 57: 613–631.
- Donaldson L (2001) *The Annual Report of the Chief Medical Officer*. London: Department of Health.
- Earl A and Albarracín D (2007) Nature, decay, and spiraling of the effects of fear-inducing arguments and HIV counseling and testing: a meta-analysis of the short- and long-term outcomes of HIV-prevention interventions. *Health Psychology* 26: 496–506.
- Floyd DL, Prentice Dunn S and Rogers RW (2000) A meta-analysis of research on protection motivation theory. *Journal of Applied Social Psychology* 30: 407–429.
- Franken IH, Muris P and Rassin E (2005) Psychometric properties of the Dutch BIS/BAS scales. *Journal of Psychopathology and Behavioral Assessment* 27: 25–30.
- Gerend MA and Shepherd JE (2007) Using message framing to promote acceptance of the human papillomavirus vaccine. *Health Psychology* 26: 745–752.
- Goldman MS, Boyd GM and Faden V (2002) College drinking, what it is, and what to do about it: A review of the state of the science. *Journal of Studies on Alcohol* 14: S1–S50.
- Good A and Abraham C (2007) Measuring defensive responses to threatening messages: a meta-analysis of measures. *Health Psychology Review* 1: 208–229.
- Gray JA (1990) Brain systems that mediate both emotion and cognition. *Cognition and Emotion* 4: 269–288.
- Hastings G, Stead M and Webb J (2004) Fear appeals in social marketing: strategic and ethical reasons for concern. *Psychology and Marketing* 21: 961–986.
- Hill D, Chapman S and Donovan R (1998) The return of scare tactics. *Tobacco Control* 7: 5–8.
- Jemmott JB, Ditto PH and Croyle RT (1986) Judging health status: effects of perceived prevalence and personal relevance. *Journal of Personality and Social Psychology* 50: 899–905.
- Keller PA and Block LG (1999) The effect of affect-based dissonance versus cognition-based dissonance on motivated reasoning and health-related persuasion. *Journal of Experimental Psychology: Applied* 5: 302–313.
- Kruglanski AW and Webster DM (1996) Motivated closing of the mind: ‘seizing’ and ‘freezing’. *Psychological Review* 103: 263–283.
- Kunda Z (1990) The case for motivated reasoning. *Psychological Bulletin* 108: 480–498.
- Latimer AE, Katulak NA, Mowad L and Salovey P (2005) Motivating cancer prevention and early detection behaviors using psychologically tailored messages. *Journal of Health Communication* 10: 137–155.
- Leary MR and Jones JL (1993) The social psychology of tanning and sunscreen use: self-presentational motives as a predictor of health risk. *Journal of Applied Social Psychology* 23: 1390–1406.
- Liberman A and Chaiken S (1992) Defensive processing of personally relevant health messages. *Personality and Social Psychology Bulletin* 18: 669–679.
- McMath BF and Prentice Dunn S (2005) Protection motivation theory and skin cancer risk: the role of individual differences in responses to persuasive appeals. *Journal of Applied Social Psychology* 35: 621–643.
- Mann T, Sherman D and Updegraff J (2004) Dispositional motivations and message framing: a test of the congruency hypothesis in college students. *Health Psychology* 23: 330–334.
- Nielsen J and Shapiro S (2009) Coping with fear through suppression and avoidance of threatening information. *Journal of Experimental Psychology: Applied* 15: 258–274.
- O’Connor RM and Colder CR (2005) Predicting alcohol patterns in first-year college students through motivational systems and reasons for drinking. *Psychology of Addictive Behaviors* 19: 10–20.
- Pardo Y, Aguilar R, Molinuevo B and Torrubia R (2007) Alcohol use as a behavioural sign of disinhibition: evidence from J.A. Gray’s model of personality. *Addictive Behaviors* 32: 2398–2403.
- Rimer BK and Kreuter MW (2006). Advancing tailored health communication: a persuasion and message effects perspective. *Journal of Communication* 56: S184–S201.
- Ruiter RA, Abraham C and Kok G (2001) Scary warnings and rational precautions: A review of the psychology of fear appeals. *Psychology and Health* 16: 613–630.
- Ruiter RA, Kessels LT, Jansma BM and Brug J (2006) Increased attention for computer-tailored health communications: an event-related potential study. *Health Psychology* 25: 300–306.

- Ruiter RA, Verplanken B, De Cremer D and Kok G (2004). Danger and fear control in response to fear appeals: the role of need for cognition. *Basic and Applied Social Psychology* 26: 13–24.
- Schneider TR, Salovey P, Apanovitch AM, Pizarro J and McCarthy D, et al. (2001) The effects of message framing and ethnic targeting on mammography use among low-income women. *Health Psychology* 20: 256–266.
- Shen L and Dillard JP (2007) The influence of behavioral inhibition/approach systems and message framing on the processing of persuasive health messages. *Communication Research* 34: 433–467.
- Sherman DK, Mann T and Updegraff JA (2006) Approach/avoidance motivation, message framing, and health behavior: understanding the congruency effect. *Motivation and Emotion* 30: 165–169.
- Simons JS and Arens AM (2007) Moderating effects of sensitivity to punishment and sensitivity to reward on associations between marijuana effect expectancies and use. *Psychology of Addictive Behaviors* 21: 409–414.
- Terblanche-Smit M and Terblanche NS (2010) Race and attitude formation in HIV/Aids fear advertising. *Journal of Business Research* 63: 121–125.
- Van 't Riet J, Ruiter RA, Werrij MQ, Candel MJ and De Vries H (2010) Distinct pathways to persuasion: the role of affect in message-framing effects. *European Journal of Social Psychology* 40: 1261–1276.
- Van 't Riet J, Ruiter RA, Werrij MQ and De Vries H (2010) Self-efficacy moderates message-framing effects: the case of skin cancer detection. *Psychology and Health* 25: 339–349.
- Van Dijck D and Knibbe RA (2005) *De prevalentie van probleemdrinken in Nederland* [The prevalence of problematic drinking in the Netherlands]. Maastricht: Maastricht University.
- Wechsler H, Davenport A, Dowdall G, Moeykens B and Castillo S (1994) Health and behavioral consequences of binge drinking in college: a national survey of students at 140 campuses. *Journal of the American Medical Association* 272: 1672–1677.
- Witte K and Allen M (2000) A meta-analysis of fear appeals: implications for effective public health campaigns. *Health Education and Behavior* 27: 591–615.
- Witte K and Morrison K (2000) Examining the influence of trait anxiety/repression-sensitization on individuals' reactions to fear appeals. *Western Journal of Communication* 64: 1–27.
- Zisserson RN and Palfai TP (2007) Behavioral Activation System (BAS) sensitivity and reactivity to alcohol cues among hazardous drinkers. *Addictive Behaviors* 32: 2178–2186.