The Role of Coping Appraisal in Reactions to Fear Appeals: Do We Need Threat Information?

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Abstract

Fear appeal theory postulates a multiplicative relationship between threat information and coping appraisal on fear control (e.g. avoid thinking about breast cancer to reduce feelings of fear) and danger control (e.g. motivation to perform monthly breast self-examination to detect breast cancer). That is, the effects of threat information on measures of both coping modes are moderated by beliefs about one's ability to cope with the presented threat. However, in the present study no support for an interaction between threat information and coping appraisal was found on both coping modes. Instead threat information seems to contribute positively to fear control and not to danger control, whereas coping appraisal contributed positively to danger control and negatively to fear control. The results thus suggest that we might do without threatening information in persuading people to adopt health-promoting behaviours.

Keywords

coping beliefs, fear appeals, persuasion, threat information

MOST SOCIAL cognitive theories about fear appeals suggest that providing *threatening information* is effective in motivating people to safer and recommended behaviour. Empirical findings, however, are less conclusive and stress the independent and more important role of beliefs about the effectiveness and feasibility of recommended action in averting the threat. The latter beliefs include an evaluation of one's possibilities to cope with the presented threat and are traditionally referred to as *coping appraisal* in the fear appeal literature (see Rogers, 1983; Witte, 1992). The present study examines the relationship between threat information and coping appraisal in explaining reactions to a fear appeal about breast cancer and performing monthly breast self-examination. More specifically, it examines the question whether we need threat information to motivate people into safer and recommended behavior.

Theoretical background

A fear appeal is defined as a persuasive communication that presents threatening information to arouse fear in order to promote safer behaviour (Rogers, 1983). Threatening information comprises of information that presents a problem that has serious negative consequences to which the target person is believed to be susceptible. That is, *severity* and personal *susceptibility* information are both necessary to arouse fear. Consider, for example, the case of testicular cancer, which is generally considered to be a very serious disease. However, it might be a threatening and fear-arousing disease for (young) males, but surely not for females, because the first are susceptible to it while the latter are not. In the last 45 years several theoretical models have been formulated to explain the effects of fear appeals on precautionary motivation and self-protective action, among those are the drive reduction model (Hovland, Janis, & Kelley, 1953; Janis, 1967; McGuire, 1968, 1969), the parallel response model (Leventhal, 1970), the protection motivation theory (Rogers, 1975, 1983) and the extended parallel process model (Witte, 1992). In general, these models assume that threatening information is only effective in inducing attitude and behaviour changes if members of the target population have positive coping beliefs.

Thus, a *multiplicative* relationship between threat perceptions and coping perceptions in processes of behaviour change is postulated. That is, only if threat perceivers believe that the recommended action can avert the threat (i.e. response efficacy; Rogers, 1975; cf. Bandura's (1986) operational definition of outcome expectancies) and they feel confident to perform the recommended action (i.e. self-efficacy; Bandura, 1986; Rogers, 1983), they are willing to perform the recommended threat-averting action. Leventhal (1970) and Witte (1992) defined this appraisal process as danger control: a cognitive process in which threat perceivers evaluate the presented threat (including assessments of threat seriousness and personal susceptibility) and suggested coping responses (including assessments of response efficacy and self-efficacy). Moreover, this specification of the cognitive constituents of danger control strongly resembles intention formation processes suggested by the theory of planned behaviour (Ajzen, 1988) and social cognitive theory (Bandura, 1986), including outcome expectations (specified as beliefs about severity, susceptibility and response efficacy) and self-efficacy expectations as the main determinants of intention to take self-protective action (cf. Milne, Sheeran, & Orbell, 2000).

Conversely, if threat is high but coping appraisal is low, feelings of helplessness will be high, which will result in increased feelings of fear and attempts to reduce the unpleasant experience of fear through avoidance and denial, while maintaining or even intensifying the risk behaviour generating the threat (Rogers, 1983). This route of action in response to a fear appeal has been defined as fear control: an affective response directed at reducing fear arousal that is maladaptive because it is not aimed at effectively averting the presented threat (Leventhal, 1970; Witte, 1992; cf. Lazarus' distinction between problem-focused and emotion-focused coping responses to stressful events, see Lazarus, 1966; Lazarus & Folkman, 1984).

Empirical background

In contrast to these theoretical notions about the relationship between threat appraisal and coping appraisal in responses to fear appeals,

empirical support for the postulated multiplicative relationship between threat and coping variables on measures of precautionary action has been weak or, at best, inconsistent (Eagly & Chaiken, 1993; Ruiter, Abraham, & Kok, 2001; Witte & Allen, 2000). For example, in a review of protection motivation theory, Rogers and Prentice-Dunn concluded: 'Threat and coping variables have been found to interact in about *one half of the studies* in which both variables have been tested' (1997, p. 119, emphasis added).

In addition, Witte and Allen (2000) performed a meta-analysis on the fear appeal literature and provided support for an additive model in which threat is positively related to danger control and fear control, and coping is positively related to danger control and negatively related to fear control. Twenty-three studies were available for testing the interaction between threat and coping on measures of danger control (i.e. attitude, intention, behavior). Support was found for the main effects of threat and coping, but not for the interaction between the two variables. Subsequent effects-coded analyses suggested that the additive model better fitted the data than the multiplicative model. This was indicated by a data pattern in which the high threat–high coping combinations were more persuasive than the high threat–low coping combinations, which were more persuasive than the low threat–low coping combinations.

These same analyses were not reported for fear control responses (e.g. defensive avoidance, message derogation, perceived manipulation), but a meta-analysis on these responses with 13 studies showed independent, but inversely related main effects of threat and coping on fear control responses: more threat leads to more fear control while more coping leads to less fear control. No support was reported for the interaction between threat and coping variables on fear control responses. Finally, a weak but significant negative correlation ($r = -.18$, $p < .05$) was found between danger control and fear control responses suggesting that both coping modes may interfere with each other, but operate largely independent of each other (see Leventhal, 1970).

Furthermore, although threat information and coping information are essential for effective communication to occur, literature reviews and meta-analyses suggest that coping beliefs are stronger and more consistently associated with positive intentions to perform the recommended action than perceived susceptibility and especially perceived severity (Bandura, 1997; Eagly & Chaiken, 1993; Floyd, Prentice-Dunn, & Rogers, 2000; Milne et al., 2000; Schwarzer, 1992; Sutton, 1982). More specifically, empirical data on the topic of performing breast self-examination suggest that threatening information about breast cancer motivates both adaptive (e.g. intention to perform breast self-examination) and maladaptive (e.g. avoid thinking about breast cancer) action, whereas coping information is essential in determining whether adaptive or maladaptive action is undertaken in response to the threat (Prentice-Dunn, Floyd, & Flournoy, 2001; Rippetoe & Rogers, 1987).

Thus, while threat variables have been found to be poor or less specific predictors of precautionary motivation compared to coping variables, it is unclear that this can be explained in terms of the proposed interaction between both classes of variables.

A multiplicative or additive relationship: does it matter?

Despite the opposing empirical evidence, the multiplicative relationship between threat variables and coping variables receives strong support in theoretical models describing the effects of fear appeals as well as in practical applications based on these models (i.e. threatening persuasive communications). But, indeed, whether both classes of variables are multiplicatively or additively related to each other has serious implications for designing persuasive communications. If an additive model were valid, rather than a multiplicative model, then this suggests that persuasive communications do not necessarily need threat information to convince people into more healthy behaviour. Coping information may then be sufficient to engender precautionary motivation (as suggested by the main effect of coping appraisal in an additive model). At the same time, by avoiding threat information in persuasive messages defensive reactions to subsequent persuasive messages (as suggested by the main

effect of threat information in an additive model) may be prevented. In contrast, if a multiplicative model were more valid, threat information should be a necessary component of persuasive messages. This model suggests that people will only consider a change in their regular behaviour if they somehow feel threatened by the consequences of their current behaviour. Precautionary action may then be undertaken, but only if people believe they have the necessary tools to avoid the presented threat (high coping appraisal). Thus, to answer the above question, in order to create effective persuasive messages it matters to gain reassurance about how threat information and coping beliefs are related to each other in predicting motivation to behavioural change.

Further empirical evidence: overview of the study

In the present study we sought for further empirical evidence concerning the relationship between threat information and coping appraisal in processes of fear control and danger control. This question has only been partly studied as the vast majority of fear appeal studies, especially those that tested protection motivation theory (Rogers, 1975, 1983), strictly focused on the role of coping appraisal in danger control processes. The role of coping appraisal in fear control processes has been much less studied (cf. Witte & Allen, 2000). Breast cancer and the performance of breast self-examination were selected as research topics because breast cancer is the most important cause of cancer-related death among Dutch women, but educational campaigns are only directed to women between 50 and 75 years of age who are urged to undergo a mammography once every two years. In contrast to other countries such as the United States of America and Belgium, the Netherlands does not have a strong policy in urging young women to perform monthly breast self-examination. Young females are thus relatively unbiased to the topic of performing breast self-examination, which increases the internal validity of the experimental setting described next.

Method

Participants and design

In total, 130 female first-year undergraduates of Universiteit Maastricht were recruited by means of sign-up forms that asked for participants in a series of behavioural science studies. Participants left their names and telephone numbers on the sign-up forms and were later invited to the laboratory by a female experimenter. Upon arrival, they received no other information than that they would read some texts and should answer some questions. They were then randomly assigned to one of two threat conditions (threat: low versus high). Participants were paid 4.50 Euro (about US$4.50) for their participation.

Procedure

Respondents came to the laboratory in groups of two to four people. Each participant was seated in a separate cubicle that was equipped with a chair, table and computer. All information was provided through the computer. After some explanation about the length of the experiment and the use of the computer, the experiment began with a message about breast cancer that contained the manipulation of threat. After reading the message, fear arousal was measured to check for the successful manipulation of threat information. Next, measures of reactions towards the threatening messages were taken to measure fear control responses. Then a message appeared on the screen, which stated that: 'Performing a breast self-examination means that you check your breasts for changes every month. Now, some questions will be asked about performing a monthly breast self-exam.' This was followed by a questionnaire measuring reactions towards the recommended action to perform monthly breast self-examination to measure danger control. Finally, expectations about the effectiveness (i.e. response efficacy) and feasibility (i.e. self-efficacy) of breast self-examination in detecting breast cancer were assessed to measure coping appraisal.

After leaving the cubicles, approximately 30 minutes later, participants were extensively debriefed by the female experimenter. They were particularly told that their chances of getting breast cancer during their younger years

are very small, and that in case they perform breast self-examination and feel any irregularities they should not immediately attribute these to breast cancer, but in case of sustained uncertainty should consult their family physician. The experimenter was particularly alert to any signs of current fears as expressed by the participants. No such signs were perceived and none of the participants regretted participating. If questions were asked the experimenter was able to answer them adequately. Participants also received a booklet about breast cancer and an instruction card on how to perform breast self-examination. The Dutch Cancer Society uses both as standard materials in their educational programme about breast cancer. Participants were urged to read the booklet and instruction card to correct any misinterpretations of the information provided in the experimental study, paid for their participation and were asked to be silent about the topic and objectives of the study.

Manipulation

To arouse different levels of fear, threat information was varied (see also Ruiter, Kok, Verplanken, & Brug, 2001). The low-threat message described the participant's susceptibility to breast cancer as low, for example, by stating that 'Breast cancer is a form of cancer that is most common among women older than 50 years of age', and by describing the Dutch medical examination programme for breast cancer, which invites biannually all women between 50 and 70 years to undergo a mammography. The severity of breast cancer was ignored by providing boring, biological information about the development of breast cancer along with pictures of cell divisions.

In contrast, the high-threat message told the respondent that she was susceptible to getting breast cancer already in her younger years. This was mainly done by introducing the topic of breast cancer by means of a photograph of a peer group member on the computer screen who ostensibly stated that she discovered breast cancer herself after participating in the same study last year (in the low-threat message the same picture was used, but the girl stated that the present study was part of a research project she was carrying out). Furthermore, the severity of breast cancer was emphasized by describing breast cancer as a very serious disease with significant physical and emotional consequences that often ends in death. This written information was illustrated with photographic material showing pictures of women that had undergone amputation of one of the breasts. Both messages were equal in length and contained the same number of photographs.

Measures

Fear arousal The amount of fear participants experienced after reading the message about breast cancer was measured by four mood adjectives, which are generally used in fear appeal research (cf. Mewborn & Rogers, 1979; Witte, Berkowitz, Cameron, & McKeon, 1998): 'To what extent did you feel: (i) afraid; (ii) frightened; (iii) worried; and (iv) uncomfortable while reading the text about breast cancer?' (1 = not at all–9 = very much). These items were combined in a scale of fear arousal with high internal reliability (Cronbach's alpha = .96).

Fear control Fear control responses were operationalized via measures of defensive avoidance, message derogation and perceived manipulation (see Witte et al., 1998). One item measured the extent to which participants avoided the issue of breast cancer (i.e. 'When I read the message about breast cancer my first reaction was that I did not want to think about breast cancer', 1 = totally disagree, 9 = totally agree). To measure the extent to which participants criticized the threat message, two items (i.e. 'The information about breast cancer was . . . overblown, exaggerated', 1 = not at all, 9 = very much) were combined in one index of *message derogation* ($r = .72$, $p < .001$). Finally, two items (i.e. 'The information about breast cancer tried to . . . manipulate my feelings, strain the truth', 1 = totally disagree, 9 = totally agree) were combined to measure the extent to which participants thought the threat message deliberately manipulated their feelings (*perceived manipulation*; $r = .49$; $p < .001$).

Danger control Measures of attitude and intention towards performing monthly breast self-examination were used to operationalize danger control (see Witte et al., 1998). The *attitude* towards monthly breast self-examination was measured through summarizing the scores on eight semantic-differentials: 1 =

unimportant, 9 = important; 1 = bad, 9 = good; 1 = negative, 9 = positive; 1 = foolish, 9 = wise; 1 = insensible, 9 = sensible; 1 = unpleasant 9 = pleasant; 1 = annoying, 9 = nice; 1 = frightening, 9 = comforting (Cronbach's alpha = .84). The *intention* to perform monthly breast self-examination was measured with two items (i.e. 'I intend to perform a breast self-examination this month', 1 = surely not, 9 = surely yes); 'How likely is it that you will do monthly breast self-examination?', 1 = not at all, 9 = every month). These two items were combined to form an average intention score ($r = .76$, $p < .001$).

Coping appraisal Coping beliefs about performing monthly breast self-examination were measured by averaging the scores on four measures of response efficacy (e.g. 'If I would get breast cancer, the performance of monthly breast self-examination will increase my chances to detect it in an early and treatable stage'; 'Examining my breasts every month is an effective way to discover breast cancer at an early stage', 1 = totally disagree, 9 = totally agree) and four measures of self-efficacy (e.g. 'Suppose you are planning to do a monthly breast self-examination, do you feel confident that you will correctly perform the self-exam?'; 'If I wanted to, it would be easy for me to examine my breasts in the next month', 1 = surely not, 9 = surely yes). The combined scale (e.g. Witte et al., 1998) had a good internal reliability (Cronbach's alpha = .73).

Results

Data were analysed using analysis of variance and regression analysis. One-way analyses of variance with threat (low versus high) as between subjects factor were used to check the manipulation of threat and the effect of threat information on coping appraisal. Next, hierarchical regression analyses tested whether an additive or multiplicative model better fits the effects of threat information and coping appraisal on the measures of fear control and danger control. The main effect terms (threat and coping appraisal) were included into the equation at step 1, the interaction term at step 2. The measure of coping appraisal was treated as a continuous variable, rather than dichotomizing it through a median split procedure, to retain optimal information and power. To ensure that multicollinearity did not affect the results, individual scores on coping appraisal were centred (i.e. by subtracting the mean from each score) and the interaction term was based on these centred scores. Means, standard deviations and intercorrelations for the study variables are presented in Table 1.

Fear arousal

A significant effect of threat was found on the measure of fear arousal, F (1, 128) = 29.14, $p < .001$. Respondents in the high-threat condition reported more fear ($M = 4.77$; SD = 1.99) than respondents in the low-threat condition ($M = 2.98$; SD = 1.78). The threat manipulation was thus successful in arousing different levels of fear.

Coping appraisal

Participants in the low and high threat conditions did not differ significantly on the measure of coping appraisal ($M_{low} = 5.47$, $SD_{low} = 1.03$; $M_{high} = 5.44$, $SD_{high} = 1.14$), F (1, 128) =

Table 1. Means, standard deviations and intercorrelations for study variables

	M	*SD*	*Fa*	*Ca*	*Da*	*Md*	*Pm*	*A*	*I*
Fear arousal	3.86	2.08	1.00						
Coping appraisal	5.45	1.08	–.16	1.00					
Defensive avoidance	3.76	2.20	.17	–.17*	1.00				
Message derogation	3.21	1.74	.41***	–.24**	.31***	1.00			
Perceived manipulation	3.46	1.77	.28**	–.27**	.43***	.62***	1.00		
Attitude	6.01	1.00	.03	.37***	–.22*	–.19*	–.28**	1.00	
Intention	5.16	1.95	.19*	.18*	–.16	.07	–.02	.57***	1.00

Note: $N = 130$; *$p < .05$; **$p < .01$; ***$p < .001$

Means (M), standard deviations (SD) and Pearson intercorrelations of fear arousal (Fa), coping appraisal (Ca), defensive avoidance (Da), Message derogation (Md), Perceived manipulation (Pm), Attitude (A) and Intention (I)

0.03, $p = .86$. This finding offers the possibility to treat coping appraisal as a predictor variable in the analyses reported below, although a measure of coping appraisal preceding the threat manipulation would have been better, of course.

Fear control

Regression analyses revealed that threat and coping appraisal contributed significantly to the prediction of all three indices of fear control in the direction predicted by the additive model: threat was positively related whereas coping appraisal was negatively related to measures of defensive avoidance, message derogation and perceived manipulation, respectively. The interaction term was not significant on any of these measures (see Table 2).

Danger control

Table 3 shows that only coping appraisal had a significant contribution to the prediction of attitude and intention. Threat and the interaction term were not significantly related to these two indices of danger control. In line with the additive model, positive increases in coping appraisal were accompanied by positive increases in attitude and intention.

Discussion

The present study examined the role of coping beliefs in responses to threatening information. It was argued that a multiplicative relationship between threat information and coping appraisal would not be indicative of the role of coping beliefs in processes of fear control and danger control. Instead, an additive relationship between threat information and coping appraisal was suggested in which both variables independently relate to measures of fear control and danger control. The data provided strong support for the additive model in processes of fear control, and to a lesser extent in processes of danger control. Threat information was positively related to all three measures of fear control (i.e. defensive avoidance, message derogation, perceived manipulation), whereas coping appraisal was negatively related to these measures. On these measures no support was found for a combined (interaction) effect of threat information and coping appraisal.

Table 2. Summary of hierarchical regression analyses for indices of fear control[a]

	Defensive avoidance				*Message derogation*				*Perceived manipulation*			
	Step 1		*Step 2*[b]		*Step 1*		*Step 2*[c]		*Step 1*		*Step 2*[d]	
Predictor or statistic	*B*	*SE B*	*B*	*SE B*	*B*	*SE B*	*B*	*SE B*	*B*	*SE B*	*B*	*SE B*
Threat	0.95*	0.37	0.95*	0.38	2.05***	0.24	2.05***	0.24	1.40***	0.28	1.40***	0.28
Coping appraisal	–0.35*	0.17	–0.27	0.26	–0.37***	0.11	–0.16	0.16	–0.43***	0.13	–0.29	0.19
Threat × Coping appraisal	–	–	–0.13	0.35	–	–	–0.38	0.22	–	–	–0.25	0.26
Regression constant			3.29	0.26			2.20	0.17			2.77	0.19
R^2	.08		.08		.41		.42		.23		.23	

Notes:
[a] $n = 130$
[b] $MS_{error} = 4.58$
[c] $MS_{error} = 1.80$
[d] $MS_{error} = 2.47$
* $p < .05$, *** $p < .001$

Table 3. Summary of hierarchical regression analyses for indices of danger control[a]

	Attitude				*Intention*			
	Step 1		*Step 2*[b]		*Step 1*		*Step 2*[c]	
Predictor or statistic	*B*	*SE B*	*B*	*SE B*	*B*	*SE B*	*B*	*SE B*
Threat	0.03	0.17	0.03	0.17	0.59	0.34	0.59	0.34
Coping appraisal	0.34***	0.08	0.28	0.11	0.32*	0.16	0.24	0.23
Threat × coping appraisal	–	–	0.12	0.15	–	–	0.15	0.31
Regression constant			6.00	0.12			4.88	0.24
R^2	.14		.14		.05		.06	

Notes:
[a]$n = 130$
[b]$MS_{error} = 0.89$
[c]$MS_{error} = 3.04$
*$p < .05$, ***$p < .001$

The measures of danger control were only significantly related to coping appraisal, and not to threat information. Nevertheless, an additive model seems to be more valid than a multiplicative model as the findings on danger control showed no support for an interaction between threat information and coping appraisal. Moreover, these findings on danger control support notions in the social cognitive literature that, although in some cases threat perceptions have been found to have direct effects on intention when controlling for theory of planned behaviour and protection motivation theory variables, they in general appear to have a more distal effect on motivation than coping perceptions (e.g. Abraham, Sheeran, Abrams, & Spears, 1994; Plotnikoff & Higginbotham, 1995, 1998; see also Ruiter, Abraham, & Kok, 2001). Consequently, a number of authors have suggested that threat recognition prompts action contemplation, whereas perceptions of the efficacy and feasibility of recommended action determine the kind of action that will be undertaken (Bandura, 1997; Rippetoe & Rogers, 1987; Ruiter, Abraham, & Kok, 2001; Schwarzer, 1992).

In addition, negative but weak correlations were found between fear control and danger control responses (see Witte & Allen, 2000), which may suggest that both kinds of control processes run largely independent of each other. Future research should address the relationships between fear control and danger control more extensively. For example, assuming that affective processes such as fear control are more automatic than cognitive processes such as danger control, it could be that fear control processes are more immediate than danger control processes (cf. Ruiter et al., 2001). The former could then interfere with the latter because the former may distract attention from subsequent reassuring messages.

The present study thus provides empirical support for recent notions that threat information and coping beliefs have independent effects on fear control and danger control responses (e.g. Witte & Allen, 2000), but the findings are not without restrictions. For instance, our findings may not generalize beyond the specific behavioural domain of breast cancer detection and the subpopulation of highly educated young women. Future research should examine to what extent the presented findings also hold within other domains of self-protective action and among other subpopulations including men, lower educational levels and other age groups. Furthermore, the present research did not include breast self-examination performance as a dependent variable to measure behaviour. Including breast self-examination performance in the analyses requires a follow-up measure outside the laboratory. However, when including such a variable, sufficient measures should be taken to control for possible negative effects of the threat manipulation when participants have left the controlled setting of the laboratory, which should happen without neutralizing the manipulation. Alternative behavioural measures may be considered that can be observed in the laboratory, such as

registering for a course on how to perform breast self-examination (e.g. Ruiter, Verplanken, de Cremer, & Kok, in press).

In conclusion, our findings regarding defensive responding to threatening information suggest that threatening information should be used with greater caution in persuasion settings, preceded by extensive pilot testing. Furthermore, these messages should be sustained with strong appeals to the effectiveness and feasibility of recommended action to decrease defensive coping and increase adaptive coping. These conclusions thus raise doubt about the renewed interest in fear appeals that we particularly witness in health education practice in the Netherlands. Examples are commercials that show traffic accidents with bloody and deadly consequences. Obviously, programme developers presume that threatening information motivates people to safer behaviour (but see, for example, Ben-Ari, Florian, & Mikulincer, 2000). However, our findings suggest differently as defensive responses seem to be easily triggered by threatening information, whereas threat information does not seem to influence intention formation processes to adopt recommended behaviour. The latter seem to be more strongly influenced by beliefs concerning the effectiveness and feasibility of recommended actions in averting the threat. Furthermore, recent research in computer-tailored education (see Brug & de Vries, 1999) suggests that providing personally relevant information while ignoring vividly presented severity information may be sufficient to motivate people to consider safer and healthier alternative actions.

References

Abraham, C. S., Sheeran, P., Abrams, D., & Spears, R. (1994). Exploring teenagers' adaptive and maladaptive thinking in relation to the threat of HIV infection. *Psychology and Health*, *9*, 253–272.

Ajzen, I. (1988). *Attitudes, personality, and behavior*. Chicago, IL: Dorsey.

Bandura, A. (1986). *Social foundations of thought and action: A social cognitive theory*. Englewood Cliffs, NJ: Prentice-Hall.

Bandura, A. (1997). *Self-efficacy: The exercise of control*. New York: Freeman.

Ben-Ari, O. T., Florian, V., & Mikulincer, M. (2000). Does a threat appeal moderate reckless driving? A terror management theory perspective. *Accident Analysis and Prevention*, *32*, 1–10.

Brug, J., & de Vries, H. (1999). Computer-tailored education. Special issue of *Patient Education and Counseling*, *36*(2).

Eagly, A. H., & Chaiken, S. (1993). *The psychology of attitudes*. Fort Worth, TX: Harcourt Brace Jovanovich.

Floyd, D. L., Prentice-Dunn, S., & Rogers, R. W. (2000). A meta-analysis of research on protection motivation theory. *Journal of Applied Social Psychology*, *30*, 407–429.

Hovland, C. I., Janis, I. L., & Kelley, H. H. (1953). *Communication and persuasion: Psychological studies of opinion change*. New Haven, CT: Yale University Press.

Janis, I. L. (1967). Effects of fear arousal on attitude change: Recent developments in theory and experimental research. In L. Berkowitz (Ed.), *Advances in experimental social psychology* (vol. 3, pp. 166–224). San Diego, CA: Academic Press.

Lazarus, R. S. (1966). *Psychological stress and the coping process*. New York: McGraw-Hill.

Lazarus, R. S., & Folkman, S. (1984). *Stress, appraisal and coping*. New York: Springer.

Leventhal, H. (1970). Findings and theory in the study of fear communications. In L. Berkowitz (Ed.), *Advances in experimental social psychology* (vol. 5, pp. 119–187). New York: Academic Press.

McGuire, W. J. (1968). Personality and susceptibility to social influence. In E. F. Borgatta & W. W. Lambert (Eds.), *Handbook of personality theory and research* (pp. 1130–1187). Chicago, IL: Rand McNally.

McGuire, W. J. (1969). The nature of attitudes and attitude change. In G. Lindzey & E. Aronson (Eds.), *Handbook of social psychology* (2nd edn, vol. 3, pp. 136–314). Reading, MA: Addison-Wesley.

Mewborn, C. R., & Rogers, R. W. (1979). Effects of threatening and reassuring components of fear appeals on physiological and verbal measures of emotion and attitudes. *Journal of Experimental Social Psychology*, *15*, 242–253.

Milne, S., Sheeran, P., & Orbell, S. (2000). Prediction and intervention in health-related behavior: A meta-analytic review of protection motivation theory. *Journal of Applied Social Psychology*, *30*, 106–143.

Plotnikoff, R. C., & Higginbotham, N. (1995). Predicting low-fat diet intentions and behaviors for the prevention of coronary heart disease: An application of protection motivation theory among an Australian population. *Psychology and Health*, *10*, 397–408.

Plotnikoff, R. C., & Higginbotham, N. (1998). Protection motivation theory and the prediction of

exercise and low-fat diet behaviours among Australian cardiac patients. *Psychology and Health, 13*, 411–429.

Prentice-Dunn, S., Floyd, D. L., & Flournoy, J. M. (2001). Effects of persuasive message order on coping with breast cancer information. *Health Education Research, 16*, 81–84.

Rippetoe, P. A., & Rogers, R. W. (1987). Effects of components of protection motivation theory on adaptive and maladaptive coping with a health threat. *Journal of Personality and Social Psychology, 52*, 596–604.

Rogers, R. W. (1975). A protection motivation theory of fear appeals and attitude change. *Journal of Psychology, 91*, 93–114.

Rogers, R. W. (1983). Cognitive and physiological processes in fear appeals and attitude change: A revised theory of protection motivation. In J. T. Cacioppo & R. E. Petty (Eds.), *Social psychophysiology: A sourcebook* (pp. 153–176). New York: Guilford Press.

Rogers, R. W., & Prentice-Dunn, S. (1997). Protection motivation theory. In D. S. Gochman (Ed.), *Handbook of health behavior research I: Personal and social* (vol. 1, pp. 113–132). New York: Plenum Press.

Ruiter, R. A. C., Abraham, C., & Kok, G. (2001). Scary warnings and rational precautions: A review of the psychology of fear appeals. *Psychology and Health, 16*, 613–630.

Ruiter, R. A. C., Kok, G., Verplanken, B., & Brug, J. (2001). Evoked fear and effects of appeals on attitudes to performing breast self-examination: An information processing perspective. *Health Education Research, 16*, 307–319.

Ruiter, R. A. C., Verplanken, B., De Cremer, D., & Kok, G. (in press). Danger control and fear control in response to fear appeals: The role of need for cognition. *Basic and Applied Social Psychology*.

Schwarzer, R. (1992). Self-efficacy in the adoption and maintenance of health behaviors: Theoretical approaches and a new model. In R. Schwarzer (Ed.), *Self-efficacy: Thought control of action* (pp. 217–243). Washington: Hemisphere Publishing Corporation.

Sutton, S. R. (1982). Fear-arousing communications: A critical examination of theory and research. In J. R. Eiser (Ed.), *Social psychology and behavioral medicine* (pp. 303–337). Chichester: Wiley.

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

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

Witte, K., Berkowitz, J. M., Cameron, K. A., & McKeon, J. K. (1998). Preventing the spread of genital warts: Using fear appeals to promote self-protective behaviors. *Health Education and Behavior, 25*, 571–585.