1 General background

Protection motivation theory was originally (Rogers 1975) proposed to provide conceptual clarity to the understanding of fear appeals. A later revision of protection motivation theory (Rogers 1983) extended the theory to a more general theory of persuasive communication, with an emphasis on the cognitive processes mediating behavioural change.

Protection motivation theory was first developed within the framework of fear-arousing communication. In fear-arousing communication research a central issue has been whether fear-arousing communications can in themselves influence cognitions, attitudes, behavioural intentions and health behaviour, or whether the effects are of a more indirect nature. In the Yale Programme of Research on Communication and Attitude Change (Hovland et al. 1953) a systematic study was made of the way in which, and the conditions under which, communication is effective in changing beliefs, attitudes and behaviour. This research was based on the fear-drive model. The point of departure of the fear-drive model is that fear acts as a drive that motivates trial and error behaviour. If a message evokes fear in the receiver, the receiver is motivated to reduce this unpleasant emotional situation. If the message contains reassuring behavioural advice, following this advice is a way to reduce the threat. If execution of the advised behaviour leads to a reduction of fear, this behavioural response is reinforced and the chance of following the advised behaviour is enhanced. If the execution of the advised behaviour does not lead to a reduction of fear, maladaptive coping reactions, such as denial of the threat or avoidance of the fear-evoking message, may be used as ways of avoiding the fear arousal.
The fear-drive model assumes that a non-linear, parabolic relation exists between the level of evoked fear and preparedness to follow the advised, adaptive, behaviour (Janis 1967). A medium level of evoked fear leads to maximal adoption of the advised behaviour. At a medium level of evoked fear, cognitive responses that promote the adoption of the advised behaviour are more prominent than cognitive responses that promote the adoption of maladaptive cognitive responses, like denial of the threat. The balance between the adoption of adaptive and maladaptive responses in reaction to fear-arousing communications has been elaborated in the parallel response model (Leventhal 1970). In the parallel response model danger control is distinguished from fear control. Danger control refers to the process of selecting (behavioural) responses aimed at reducing the actual danger (e.g. adopting the advised behaviour), while fear control refers to the process of selecting responses aimed at reducing the emotional threat (e.g. avoiding threatening messages or denying the threat). In comparison to the fear-drive model, which assumes that in fear-arousing communications the level of evoked fear plays a direct role in the adoption of adaptive behaviours, in the parallel response model the cognitive reaction of the individual in terms of fear control or danger control plays a prominent role in the adoption of adaptive behaviours.

Results on the relation between fear-arousing communications and the adoption of adaptive responses has led to unequivocal results. Sutton (1982) has studied some assumptions from the fear-drive model by reviewing the results of 40 studies – from Janis and Feshbach (1953) to Mewborn and Rogers (1979) – on the effectiveness of fear-arousing communications. Sutton concludes that a linear relation exists between the level of evoked fear and the adoption of the advised behaviour. There is no evidence of a non-linear relation between level of evoked fear and adoption of the advised behaviour. Sutton concludes that enhancing the effectiveness of the advised behaviour enhances the adoption of the advised behaviour. Level of evoked fear and the judged effectiveness of the advised behaviour have an independent influence on the adoption of the advised behaviour.

2 Description of the model

The obtained results of various studies into the effectiveness of fear-arousing communications led to the conclusion that level of evoked fear has a linear relation with the adoption of adaptive responses. In fear-evoking health communications, level of fear arousal may lead to an enhancement of the perceived severity of the disease and the perceived vulnerability to the disease. This effect of fear-arousing communication is elaborated upon in protection motivation theory (PMT) (Rogers 1975). Since the original formulation protection motivation theory has been revised several times (Maddux and Rogers 1983; Rogers 1983; Tanner et al. 1991). A schematic representation of PMT is given in Figure 4.1.

Protection motivation theory (Rogers 1983) is partially based on the
Figure 4.1 A schematic representation of protection motivation theory.
work of Lazarus (1966) and Leventhal (1970) and describes adaptive maladaptive coping with a health threat as the result of two appr
processes: a process of threat appraisal and a process of coping appr
in which the behavioural options to diminish the threat are evaluated.
appraisal of the health threat and the appraisal of the coping reac
result in the intention to perform adaptive responses (protection moti
on) or may lead to maladaptive responses. Maladaptive responses
those that place an individual at a health risk. They include behav
that lead to negative consequences (e.g. smoking) and the absence
behaviours, which eventually may lead to negative consequences (e.g.
participating in breast cancer screening and thus missing the opportu
of early detection of a tumour).

According to PMT the threat appraisal process evaluates the compo
that are relevant for an evaluation of the threat. In the case of he
behaviour these are, for example, estimates of the chance of con
a disease (perceived vulnerability or susceptibility) and estimates of
seriousness of a disease (perceived severity). Perceived vulnerability
perceived severity of a disease are expected to inhibit the probability
maladaptive responses. Advantages of maladaptive behaviour (e.g. sav
time by not participating in breast cancer screening) facilitate the proba
of a maladaptive response. Fear arousal indirectly enhances the protec
tivation by heightening perceived severity of the disease and percei
vulnerability to the disease.

The coping appraisal process evaluates the components that are rel
vant for the evaluation of the coping responses. These components are
individual's expectancy that carrying out recommendations can remo
the threat (response efficacy) and the belief in one's ability to execute
recommended courses of action successfully (self-efficacy). Self-effic
was added to the original model (Rogers 1975) in 1983 and is tak
from the social learning theory of Bandura (1977, 1986). According
protection motivation theory, adaptive behaviour (protection motivat
is enhanced by the belief that the behaviour is effective in reducing the
threat (response efficacy) and by the expectation that one can successf
execute the advised adaptive behaviour (self-efficacy). The costs of th
adaptive behaviours limit the protection motivation.

Protection motivation is the result of the threat appraisal and the copi
appraisal. Protection motivation is a mediating variable whose function
to arouse, sustain and direct protective health behaviour. It facilitates
adoption of adaptive behaviours and can best be measured by behaviour
intentions. Not all components of the model are measured in all studi
The main components of the model that are used in most studies a
shown in Table 4.1.

Originally, perceived severity, vulnerability and response efficacy we
hypothesized to combine multiplicatively to arouse protection motiva
tion (Rogers 1975). This multiplicative relation was proposed because
protection motivation would be aroused if the value of any of the thr
Table 4.1 The main components of protection motivation theory

<table>
<thead>
<tr>
<th>Component</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Severity</td>
<td>How severe are the consequences of the disease?</td>
</tr>
<tr>
<td>Vulnerability</td>
<td>How probable is it that I will contract the disease?</td>
</tr>
<tr>
<td>Response efficacy</td>
<td>How effective is the recommended behaviour in avoiding the negative consequences?</td>
</tr>
<tr>
<td>Self-efficacy</td>
<td>To what extent am I able to perform the recommended behaviour successfully?</td>
</tr>
<tr>
<td>Protection motivation</td>
<td>Am I intending to perform the recommended behaviour?</td>
</tr>
<tr>
<td>Protective behaviour</td>
<td>Performing the recommended behaviour</td>
</tr>
</tbody>
</table>

components were zero. This combinatorial rule, however, failed repeatedly to receive empirical support (see Rippetoe and Rogers 1987, for an exception). In the revised version of the theory, Rogers (1983) rejected the multiplicative combinatorial rule in favour of an additive model, which included the main effects of severity, vulnerability, response efficacy and self-efficacy. Whether the multiplicative or additive model is correct under specific circumstances remains an empirical question.

3 Summary of research

PMT has been used as a framework for influencing and predicting various behaviours, such as persuading consumers to use less energy (Hass et al. 1975), promoting water conservation (Kantola et al. 1983), increasing intentions to engage in behaviours related to the prevention of nuclear war (Wolf et al. 1986), increasing assertive behaviour in interpersonal communication (Maddux et al. 1986), increasing precautionary measures to prevent burglary (Wiegman et al. 1992) and increasing earthquake preparedness (Mulilis and Lippa 1990).

PMT has also been widely applied to health-related behaviours. In these studies PMT has frequently been used as a framework for health education interventions designed to influence health behaviour. Typically various pamphlets are used, in which the content of the health education is varied on a number of dimensions, which, according to PMT, mediate adaptive, protective health behaviour. The main fields of application to date are reducing alcohol use, enhancing healthy lifestyles, enhancing diagnostic health behaviours and preventing disease.

3.1 Reducing alcohol use

Stainback and Rogers (1983) used PMT as a framework for the design of persuasive messages that described the unpleasant consequences of abusive drinking to junior high school students. Two components of PMT were varied in the messages by various descriptions of the severity of the consequences of drinking and the probability that these consequences will
occur. The third component, efficacy of not drinking in preventing unfavourable consequences, was held constant across messages by stating that teenage abstinence was the best way to avoid the negative consequences of drinking. Manipulation checks revealed that the high-fear group (who received messages describing severe consequences and a high probability of occurrence) rated the severity of the consequences of drinking and the likelihood of experiencing these consequences as greater than the low-fear group (who received messages describing no severe consequences and a low probability of occurrence). Immediately after exposure to the information the high-fear condition produced stronger intentions to remain abstinent than the low-fear condition. Results were, however, short-lived because in the study the provision of a counter-argument significantly weakened the effects of the high-fear condition, resulting in equal intentions to abstain in both the high-fear and the low-fear groups.

The study of Stainback and Rogers (1983) does not provide information about the relative importance of PMT components in predicting intentions to abstain. Some clues about their relative importance in predicting alcohol drinking intentions are provided by the study of Runge et al. (1993). Responses of a community sample of elderly persons with no alcohol abuse problems were compared with responses of inpatients who had alcohol abuse problems. The results indicated that the hospital sample felt more vulnerable to the dangers of alcohol abuse than did the community sample. Hospitalized individuals reported lower response efficacy for moderate drinking than did their community counterparts. No differences were observed for the severity of consequences of alcohol abuse.

3.2 Enhancing healthy lifestyles

Stanley and Maddux (1986) investigated the usefulness of a combined protection motivation and self-efficacy theory as a framework for the design of persuasive messages aimed at promoting exercise behaviour. In a between-subjects factorial design, written persuasive communications were provided to undergraduate students. The persuasive communications varied (low versus high) on response efficacy, self-efficacy and outcome value. Manipulation checks revealed that the self-efficacy manipulation had a significant effect on self-efficacy expectation with respect to participation in the exercise programme, the response efficacy manipulation had a significant effect on the perceived response efficacy and the outcome manipulation had a significant effect on the perceived outcome value. Subjects in the high response efficacy condition reported stronger behavioural intentions to participate in the exercise programme than did the subjects in the low response efficacy condition. Subjects in the high self-efficacy condition reported stronger behavioural intentions to participate in the exercise programme than the subjects in the low self-efficacy condition. Response efficacy was the best single predictor of the intention to exercise \( R^2 = 0.26 \), but self-efficacy was also a significant predictor.
of the intention to exercise ($R^2 = 0.17$) and it added significant predict-
ability to response efficacy ($R^2$ total = 0.35).

Wurtele and Maddux (1987) used a factorial design to test the relative
effectiveness of persuasive appeals for increasing exercise, which varied
on four components of PMT (severity, vulnerability, response efficacy and
self-efficacy). Manipulation checks revealed a significant main effect of
components described in the persuasive appeals with regard to, respectively,
the severity of the consequences of not exercising, the vulnerability to
cardiovascular problems, the efficacy of exercising for preventing cardio-
vascular problems and the perceived ability to begin and continue with a
regular programme of exercise. Analysis revealed a predicted main effect
of perceived vulnerability and a predicted main effect of perceived self-
efficacy on intentions to exercise. Perceived severity of the consequences
of not exercising and perceived response efficacy were not related to
exercise intentions and behaviour. Self-efficacy expectancy emerged from
multiple regression analysis as the most powerful predictor of intentions
to exercise.

Fruin et al. (1991) presented high school students with information about
the role of exercise in preventing cardiovascular disease. In the informa-
tion, three components specified by protection motivation theory (response
efficacy, response costs and self-efficacy) were manipulated in a factorial
design with two levels (high versus low) for each variable. Manipulation
checks found significant differences between the high and low conditions
for each message variable. High self-efficacy information resulted in stronger
endorsement of the behavioural intention to exercise. In this study informa-
tion in the messages about response efficacy and response costs did not
significantly influence the intention to exercise.

In another type of study, Wurtele (1988) provided information about
osteoporosis to female students. In this study a factorial design was used
to test the effectiveness of written communications varying in the described
vulnerability to osteoporosis of female students and varying in the described
effectiveness of increasing the amount of calcium in the diet to prevent
osteoporosis. Manipulation checks revealed that the subjects exposed to
the high-vulnerability essay reported stronger beliefs in their vulnerability
to developing osteoporosis than did subjects in the low-vulnerability condi-
tion. Subjects in the high response efficacy condition reported significa-
antly stronger beliefs in the effectiveness of a calcium-enriched diet for
preventing osteoporosis than did the subjects in the low response efficacy
condition. For intentions to increase the amount of calcium-rich food in
the diet, vulnerability emerged as the best predictor, accounting for 23
per cent of the variance. Response efficacy entered as the second best
predictor, accounting for an additional 5 per cent of the variance.

Beck and Lund (1981) exposed dental patients in a factorial design to
persuasive communications designed to manipulate their beliefs about the
seriousness of periodontal disease (high versus low) and their susceptibility
to it (high versus low) in order to enhance patients' dental brushing and
flossing behaviour. Dependent measures in this study were amount of fear arousal, perceived seriousness of periodontal disease, perceived vulnerability to periodontal disease, response efficacy of a number of dental hygiene behaviours, self-efficacy in performing a number of dental hygiene behaviours, intentions to engage in the recommended actions and the patient’s dental hygiene behaviour. The last measure was taken later by an additional telephone interview. Manipulations checks revealed that both the severity manipulation and the vulnerability manipulation were successful in influencing respectively the perceived seriousness and the perceived vulnerability to periodontal disease. Regression analysis revealed that the only predictor of the intention to floss was the self-efficacy towards dental flossing. Additional regression analysis revealed that perceived seriousness of periodontal disease and self-efficacy of flossing were related to actual flossing behaviour.

3.3 Enhancing diagnostic health behaviours

Rippetoe and Rogers (1987) used written messages containing a high versus low threat essay (by varying the described severity of and vulnerability to breast cancer), a high versus low response efficacy essay and a high versus low self-efficacy essay. Manipulation checks revealed that the subjects who read the high-threat message perceived breast cancer as a more severe disease and perceived themselves as more vulnerable to breast cancer than did the subjects in the low-threat group. Stronger beliefs in the efficacy of breast self-examination were elicited in women exposed to the high response efficacy message when compared to those in the low response efficacy condition. Women who read the high self-efficacy message had stronger confidence in their ability to perform breast self-examination correctly than did women in the low self-efficacy condition. In this study the effects of the persuasive messages on both adaptive (e.g. intention to perform breast self-examination) and maladaptive (e.g. wishful thinking) coping reactions were studied. Subjects in the high-threat condition reported more adaptive and maladaptive coping compared to the subjects in the low-threat condition. Compared to the subjects in the low response efficacy group the subjects in the high response efficacy group reported more adaptive coping (intentions to perform breast self-examination) and less maladaptive coping (like fatalism) in response to the threat of breast cancer. Compared to the subjects in the low self-efficacy condition the subjects in the high self-efficacy condition reported more adaptive coping (intention to perform breast self-examination and rational problem-solving) and less maladaptive coping (feelings of hopelessness). Path analysis revealed that response efficacy was the major predictor of the intention to perform breast self-examination. Perceived severity of breast cancer and perceived self-efficacy in performing breast self-examination were also predictors of the intention to perform breast self-examination.

Brouwers and Sorrentino (1993) provided students with information
about a fictitious disease (Crevelling's disease) in order to enhance the use of a diagnostic test, the Crevelling's identification (CID) test. Students were presented with one of four versions of an information pamphlet varying on two dimensions: level of threat and level of effectiveness of the CID test. The high-threat essay described Crevelling's disease as an extremely debilitating illness which was most prevalent in unmarried students aged 15 to 24. The low-threat essay described Crevelling's disease as a disease with no long-term effects to which blue-collar workers aged 46 to 55 were most vulnerable. The high-efficacy essay stressed the effectiveness of the CID test and the ease with which one could do the test, while the low-efficacy essay stressed the inconsistent findings of the CID test and emphasized the difficulties associated with carrying out the procedure. Manipulation checks revealed that the essays were successful in manipulating perceived severity, perceived vulnerability and perceived response efficacy in the predicted direction. Results showed that highly threatening and highly efficacious information was effective in enhancing preventive behaviour, i.e. a request for a CID test kit. Unfortunately, in this study no data are provided on the relative role of the components of protection motivation theory in predicting the recommended preventive behaviour.

3.4 Prevention of disease

Van der Velde and van der Pligt (1991) tested the predictive value of the components of protection motivation theory with respect to AIDS-related behaviour. In their study, perceived severity and perceived vulnerability with respect to HIV infection, response efficacy of condom use and self-efficacy (the extent the subjects would be able to persist in using condoms) were measured in a sample of 231 people with multiple sex partners in the six months preceding the study. The study revealed that perceived response efficacy and perceived self-efficacy were significantly related to the intention to use condoms consistently.

Tanner et al. (1991) used protection motivation theory as a framework in the provision of information to students about sexually transmitted diseases. Subjects received one of the following versions of materials about responsible sexual behaviour: (a) high-threat information, (b) low-threat information, (c) high-threat information followed by coping response information, (d) low-threat information followed by coping response information, (e) coping response information, (f) a control group who received no information. The study revealed that in comparison with the coping response only information condition, the high-threat/coping response information condition was more effective in generating intention to use condoms. The authors conclude from this finding that this study provides support for an ordered protection motivation model, in which threat appraisal occurs prior to coping appraisal. The authors provided no information about the relative effectiveness of PMT components in predicting the recommended preventive behaviour.
4 Development

To date, with regard to health-related behaviours, the main fields of application of protection motivation theory are reducing alcohol use, enhancing healthy lifestyles, enhancing diagnostic health behaviours and prevention of disease. With respect to reducing alcohol use, to date in only one study (Stainback and Rogers 1983) were the effects of persuasive messages studied. In these messages, however, only two components of PMT (the severity of the consequences of drinking and the probability that these consequences will occur) were varied. Only short-lived intentions to remain abstinent were produced in the high-fear group. The study by Runge et al. (1993), however, indicated that hospitalized individuals with alcohol abuse problems reported a lower response efficacy for moderate drinking than did their community counterparts. Future research could produce more effective messages by including more components of PMT in messages aimed at reducing alcohol use.

With respect to enhancing healthy lifestyles various studies aimed at promoting exercise behaviour indicated that messages containing information to enhance self-efficacy (Stanley and Maddux 1986; Wurtele and Maddux 1987; Fruin et al. 1991) or response efficacy (Stanley and Maddux 1986) were effective in promoting exercise behaviour. To date studies have mainly been performed using students as experimental subjects. Future development could be aimed at generalizing the results obtained with students to specific at-risk groups (e.g. subjects at risk of heart disease) or to groups with specific difficulties (e.g. cardiovascular patients).

With respect to enhancing diagnostic health behaviours, results showed that highly threatening and highly efficacious information was effective in enhancing preventive behaviour (Rippetoe and Rogers 1987; Brouwers and Sorrentino 1993). To date, however, these results were obtained in a specific group (students) in one study (Brouwers and Sorrentino 1993) using a fictitious disease. Future research should be aimed at other subjects and should try to apply protection motivation theory to enhance diagnostic health behaviours in specific risk groups.

In general it can be stated that future research should be aimed at the application of PMT to the enhancing of health behaviours in specific groups at risk. An example of the direction future research may take is provided by the study of van der Velde and van der Pligt (1991), who tested the predictive value of components of PMT with respect to AIDS-related behaviour in people with multiple sex partners. Adding persuasive messages designed according to PMT to these kind of applied field studies will further promote the development of PMT.

5 Operationalization of the model

5.1 Operationalization of messages

In one of the earliest analyses of the relation between fear arousal and persuasion (Hovland et al. 1953), fear appeals were characterized as
communications describing the unfavourable consequences that might result from failure to adopt the recommendations in the message. This broad definition has led to various operationalizations of fear appeals. In studies using PMT as a framework for the design of the persuasive messages the components of the threat appraisal process (severity and vulnerability) have been operationalized in various ways. Some research has tried to operationalize the severity of the risk in the message, by arguing, for example, that excessive drinking produces either severe injury or minor irritation to the internal organs (Stainback and Rogers 1983). A typical example of various operationalizations of the severity of the threat in the message is offered by Rippetoe and Rogers (1987). In their study, high-threat and low-threat essays were compared. The high-threat essay described 'breast cancer in graphic detail, contained vivid descriptions of radical chemotherapy side effects and a radical mastectomy and emphasized college-age women's vulnerability to breast cancer because of stress and diets with increased fat. This essay was accompanied by graphic colour photographs of two young women with extremely advanced breast cancer' (Rippetoe and Rogers 1987: 599). The low-threat essay 'described breast cancer as a less severe disease with few physical or emotional consequences. It also emphasized the rarity of the disease among college-age women and college-age women's decreased vulnerability to the illness. This essay was accompanied by black and white photographs of the normal, healthy breasts of a young woman' (p. 599).

Response efficacy has been operationalized by, for example, essays arguing that there is no effective method to treat a disease or that a simple medical treatment cures it. For example, Brouwers and Sorrentino (1993) used persuasive messages based on PMT. In their study a pamphlet describing a fabricated medical condition (Crevelling's disease) and its associated adaptive diagnostic response (the Crevelling's identification test, a urine analysis test that can be done in the home after 12 hours of fasting) were used. The high response efficacy essay 'stressed the effectiveness of the Crevelling's Identification Test and its ability to detect the beginning signs of Crevelling's disease infection accurately.' The low response efficacy essay stressed 'the inconsistent and unreliable findings of the Crevelling's Identification Test' (Brouwers and Sorrentino 1993). In another study (Rippetoe and Rogers 1987: 599) the high response efficacy essay 'stressed the importance of breast self-examination and its efficacy in detecting breast cancer early, thus increasing life expectancy.' The low response efficacy essay argued that 'breast self-examination was not effective in detecting breast cancer early enough to increase life expectancy.'

The last component of persuasive messages based on PMT relates to the self-efficacy that is needed to perform the recommended action successfully. It must be argued in the message that the individual has the ability to complete successfully the recommended action. For example, in a high self-efficacy essay, Rippetoe and Rogers (1987) provided information that emphasized a woman's ability to perform breast self-examination correctly and to incorporate it in her health routine. The low self-efficacy
essay focused on the difficulty of doing a good breast self-examination and the difficulty of actually detecting a lump. Brouwers and Sorrentino (1993) stressed in the high self-efficacy essay the ability and ease with which one could successfully do the test. The low self-efficacy essay emphasized the difficulties associated with carrying out the procedure, such as time calibration of each step and problems reading instruments involved in the process.

5.2 Operationalizations of measures of social cognitions

PMT (Rogers 1983) assumes that a fear appeal initiates a corresponding cognitive mediating process. In order to identify the corresponding cognitive mediating process several measures have been used. Although the exact content of the questions aimed at measuring the cognitive mediating process is, of course, dependent upon the content of the message, a general outline and some examples of questions that can be used are formulated below. Usually items are formulated in order to measure the subjects' beliefs in: (a) the severity of the threat, (b) their vulnerability to the threat, (c) the response efficacy, (d) their self-efficacy in performing the advised behaviour and (e) the intention to perform the advised behaviour. The items can be worded to enable responses on five-point scales, enabling the subjects to specify the answer that best corresponds to their opinion.

Items referring to the severity of the threat are directly or indirectly aimed at assessing the respondents' belief in the severity of the disease. Sometimes questioning is rather direct (e.g. 'I believe Crevelling's disease is a very serious illness'; Brouwers and Sorrentino 1993). Sometimes more items are used and the psychometric properties of the scale used to assess the severity are determined (Boer et al. 1993). In this study perceived severity of breast cancer was assessed with three questions ('I think that breast cancer is a more serious disease than other diseases that I know', 'Despite the advances of medical science breast cancer remains as serious as it was in the former days', 'I think breast cancer is a serious disease'). Questions could be answered on a three-point scale with the response alternatives 'yes', 'don't know' and 'no'. The internal consistency of the scale was, however, rather low (Cronbach's alpha = 0.35).

In assessing the vulnerability to the threat one may emphasize either the vulnerability (e.g. 'Due to my present lifestyle and age, I feel personally vulnerable to contracting Crevelling's disease'; Brouwers and Sorrentino 1993) or one may emphasize the chance of contracting the disease (Boer et al. 1993). In this study perceived susceptibility to breast cancer was assessed with two questions ('It is rather probable that I will ever get breast cancer' and 'The chance that someone of my age in comparable conditions gets breast cancer is rather large'). Questions could be answered on a three-point scale, with the response alternatives 'yes', 'don't know' and 'no'. Both questions correlated reasonably (r = 0.35, p < 0.0001).

Response efficacy of the recommended behaviour can also be assessed
Protection Motivation Theory

with one item ('The Crevelling's Identification Test is a very accurate and informative procedure that will identify whether or not Crevelling's disease is present'; Brouwers and Sorrentino 1993), but other researchers prefer to use a formulation that is more in line with the traditional way consequences of behaviour are measured (see Fishbein and Ajzen 1975). In these studies, consequences are linked to the recommended behaviour and it is assessed whether the subject thinks the consequences are the likely outcome of the recommended behaviour. In the Boer et al. (1993) study, response efficacy of mammographic screening was assessed with four questions ('Participation in the mass screening on breast cancer leads to . . . (1) certainty about my health status, (2) reassurance, (3) early detection if something is wrong, (4) the detection of small abnormalities'). Questions could be answered on a three-point scale with the response alternatives 'yes', 'don't know' and 'no'. The four items formed a reliable scale (Cronbach's alpha = 0.67).

Self-efficacy refers to the belief of the subject that the recommended behaviour can be executed successfully. In this respect one can use single-item measures or multiple-item measures with known psychometric properties. A representative single-item measure comes from the study of Brouwers and Sorrentino (1993), who assessed self-efficacy by asking the subject to indicate agreement or disagreement with the statement: 'I feel confident in my ability to accurately do the Crevelling's Identification Test at home.' A representative sample of items that might be used in a multiple-item measure comes from the Boer et al. (1993) study. They assessed women's self-efficacy with respect to participating in breast cancer screening by asking their agreement with seven questions ('It is difficult for me to participate . . . (1) because I am nervous for the examination, (2) because of my bad health status, (3) because I fear the examination, (4) because I am afraid of the X-rays that are used, (5) because the examination is carried out during working hours, (6) because of the time it takes, (7) because of the transport to the site of the examination'). Questions could be answered on a three-point scale with the response alternatives 'yes', 'don't know' and 'no'. The items formed a reliable scale (Cronbach's alpha = 0.71).

Protection motivation is usually indicated by the intention to perform the desired behaviour. An example is provided by a study by Boer et al. (1993). In this study, the intention to participate in breast cancer screening was assessed with one question ('Do you intend to participate in the mass screening for breast cancer?'). The question could be answered on a six-point scale with the extremes 'definitely yes' and 'definitely no'.

It must be noted that the above descriptions of items are of course indicative. Depending on the topic, tailor-made questions have to be asked. This means that, a priori, no guarantee can be given about the psychometric properties of the scales that are used in the study. For this reason it is wise to pretest the formulated questions on a small group of subjects, before starting with the main research.
6 Application of the model

Based on the promising results of experimental projects (De Waard et al. 1984; Verbeek et al. 1984), mass screening with mammography was introduced in the Netherlands in 1989 to promote the early detection of breast cancer in women aged 50 to 70 years. In the current national screening programme women will be screened with mammography every two years. The expected effect of regular screening on later breast cancer mortality can only be accomplished if an appropriate percentage of the women from the target group use and keep using screening services.

Health education on mass screening with mammography might be an important instrument in attaining the desired level of participation. An integrative theory on the role of various cognitive factors in preventive health behaviour is provided by PMT. Health education aimed at influencing perceived vulnerability, response efficacy and self-efficacy expectancy may be effective in achieving and maintaining participation in the breast screening programme. In some studies perceived vulnerability to breast cancer was a significant predictor of participation in breast cancer screening (Calnan 1984; Lerman et al. 1990; Fulton et al. 1991). In other studies, response efficacy with regard to mammography was a major influence for the majority of women who participated in the mammogram programme (Rutledge et al. 1988; Fulton et al. 1991). Rutledge et al. (1988) made a qualitative analysis of data from small focus groups of women invited to participate in a breast screening programme to assess whether or not providing factual information would increase participation. They suggested that emotional fears having to do with impending expectations of ill health were the basis of non-participation. Providing positive reassurance to dispel those fears might improve acceptance (Leather and Roberts 1985). Based on the available evidence it was suggested that educational efforts on breast cancer screening would perhaps be more effective if directed at informing women that mammography can detect breast cancer in the absence of breast symptoms rather than increasing a woman's perception of her vulnerability by emphasizing the prevalence of breast cancer and its risk factors (see also Vernon et al. 1990). This suggestion is supported by empirical evidence on the relative importance of cognitive factors in preventive behaviour related to cancer (Seydel et al. 1990). A study was conducted to test the effects of health education based on protection motivation theory about breast cancer screening by mammography.

6.1 Materials and methods

Design

In a quasi-experiment, with an experimental group and a control group, it was tested whether health education on mass screening for breast cancer leads to improved information acquisition and subsequent changes in expectancies.
Subjects
The experimental group consisted of women from the city of Arnhem (the Netherlands) who were invited by letter by the East Netherlands Foundation for Cancer Screening to be screened with mammography. In the experimental group 386 women were invited to participate in the experiment and eventually 68 per cent filled in a questionnaire ($n = 261$).

The control group consisted of women from the city of Enschede (the Netherlands), where at the time of data collection no mass screening for breast cancer had been performed. The 500 women from the control group were randomly selected by municipal services from the municipal administration of the city of Enschede. In the selection process it was ensured that the women were within the same age range as the women from the experimental group (30 to 70 years). Of the women from the control group, 60 per cent filled in the questionnaire ($n = 299$).

Materials
The women in the experimental group received a leaflet titled 'Breast examination', which was sent with the invitation for the breast screening. The leaflet contained information on issues that, according to protection-motivation theory (Rogers 1983), determine protective health behaviour. The leaflet described the relatively high vulnerability of older women to breast cancer and the high response efficacy of mammographic screening as a means of cancer control, and tried to induce feelings of high self-efficacy with regard to participation by explaining that a mammographic breast examination is an easy procedure with only little discomfort.

Procedure
The women from the experimental group received a questionnaire three days after the receipt of the invitation and the leaflet 'Breast examination'. The day before the possible participation in the breast screening the questionnaires were collected. The women in the control group were sent a questionnaire by post, which could be returned in a postage-paid envelope.

Measures
In the questionnaire we measured: (a) knowledge of breast cancer and mass screening for breast cancer based on information from the leaflet 'Breast examination'; (b) general knowledge of breast cancer and breast self-examination; (c) perceived vulnerability to breast cancer; (d) perceived seriousness of breast cancer; (e) response efficacy of mammographic screening; (f) self-efficacy with respect to participation in the screening; (g) intention to participate in the screening; (h) fear of breast cancer; (i) demographic variables.

Questions on knowledge of breast cancer and mass screening were derived from the contents of the leaflet 'Breast examination'. Questions referred to the objective vulnerability to breast cancer, the benefits of early detection and the performance of a mammographic breast examination. Subjects could indicate the correctness of items like 'In the Netherlands
breast cancer is the most frequent form of cancer in women' and 'Mass screening for breast cancer is repeated every two years'. Questions could be answered on a three-point scale, with the response alternatives 'correct', 'don't know' and 'not correct'. The eight items formed a reliable scale (Cronbach's alpha = 0.84).

Questions used in the assessment of general knowledge of breast cancer and breast self-examination only referred to issues not discussed in the leaflet. Subjects could indicate the correctness of items like 'Sudden pressure (e.g. a punch on the breast) can cause breast cancer' and 'Breast feeding enhances the risk of breast cancer'. Questions could be answered on a three-point scale with the response alternatives 'correct', 'don't know' and 'not correct'. The five items formed a reliable scale (Cronbach's alpha = 0.71).

Perceived vulnerability to breast cancer was assessed with two questions: 'It is rather probable that I will ever get breast cancer', 'The chance that someone of my age in comparable conditions gets breast cancer is rather large'. Questions could be answered on a three-point scale, with the response alternatives 'yes', 'don't know' and 'no'. Both questions correlated reasonably ($r = 0.35$, $p < 0.0001$).

Perceived severity of breast cancer was assessed with three questions ('I think that breast cancer is a more serious disease than other diseases that I know', 'Despite the advances of medical science breast cancer remains as serious as it was in former days', 'I think breast cancer is a serious disease'). Questions could be answered on a three-point scale, with the response alternatives 'yes', 'don't know' and 'no'. The internal consistency of the scale was rather low (Cronbach's alpha = 0.35).

Response efficacy of mammographic screening was assessed with four questions: 'Participation in the mass screening on breast cancer leads to: (a) certainty about my health status, (b) reassurance, (c) early detection if something is wrong, (d) the detection of small abnormalities.' Questions could be answered on a three-point scale, with the response alternatives 'yes', 'don't know' and 'no'. The four items formed a reliable scale (Cronbach's alpha = 0.67).

Self-efficacy expectation with regard to participation was assessed with seven questions: 'It is difficult for me to participate: (a) because I am nervous about the examination, (b) because of my bad health status, (c) because I fear the examination, (d) because I am afraid of the X-rays that are used, (e) because the examination is carried out during working hours, (f) because of the time it takes, (g) because of the transport to the site of the examination.' Questions could be answered on a three-point scale, with the response alternatives 'yes', 'don't know' and 'no'. The seven items formed a reliable scale (Cronbach's alpha = 0.70).

Intention to participate was assessed with one question ('Do you intend to participate in the mass screening for breast cancer?'). The question could be answered on a six-point scale, with the extremes 'definitely yes' and 'definitely no'.
Fear of breast cancer was assessed with an adapted version of the fear-of-cancer questionnaire (Kutcherreuter et al. 1984). In the adapted version the subject indicates the extent to which negative emotions would be aroused when confronted with the following situations: (a) a television programme on breast cancer, (b) a poster on breast self-examination, (c) an article in a newspaper on breast cancer, (d) an invitation for mass screening on breast cancer and (e) the experience of someone in one's neighbourhood having breast cancer. The subjects could indicate whether confrontation with the situations made them feel tense, nervous, restless or fearful. The items could be answered on a four-point scale, with the extremes 'not' and 'very much'. The 22 items formed a reliable scale (Cronbach's alpha = 0.95).

Demographic variables included characteristics such as age and level of education.

6.2 Results

Equality of groups
The women from the experimental group (mean = 57.1 years) were on average younger than the women from the control group (mean = 59.2 years; t = 4.2, p < 0.0001). The women from the experimental group also had a higher level of education than the women from the control group ($\chi^2 = 21.6$, d.f. = 2, $p < 0.0001$). Finally, the women from the experimental group answered more questions correctly regarding general knowledge on breast cancer and breast self-examination ($F(1,518) = 21.8$, $p < 0.0001$). Because of these differences between the experimental group and the control group the results presented are based on analysis of variance with age, level of education and general knowledge of breast cancer and breast self-examination used as covariates.

Health education
Table 4.2 shows that the applied health education leaflet had a clear effect on the level of knowledge with regard to breast cancer and mammographic screening. However, perceived severity of breast cancer and perceived vulnerability to breast cancer were not influenced by the health education intervention. The health education leaflet led to a significantly higher response efficacy, self-efficacy expectation and intention to participate in the experimental compared to the control condition. However, in each of these cases the differences were small.

Fear of breast cancer
The possible mediating effect of level of fear of breast cancer and the applied health education leaflet was investigated by analysing the effects of the health education leaflet separately for two levels of fear of breast cancer. The median score for the total group of subjects (3.727) was used as the criterion. The group with a relatively low level of fear of breast
Table 4.2. The effects of health education on knowledge about breast cancer screening and on variables derived from protection motivation theory

<table>
<thead>
<tr>
<th></th>
<th>Experimental group</th>
<th>Control group</th>
<th>F(1,460)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>n = 225</td>
<td>n = 235</td>
<td></td>
</tr>
<tr>
<td>Knowledge</td>
<td>6.1</td>
<td>2.9</td>
<td>260.0**</td>
</tr>
<tr>
<td>Severity</td>
<td>2.3</td>
<td>2.4</td>
<td>&lt; 1</td>
</tr>
<tr>
<td>Vulnerability</td>
<td>2.0</td>
<td>2.0</td>
<td>&lt; 1</td>
</tr>
<tr>
<td>Response efficacy</td>
<td>2.9</td>
<td>2.8</td>
<td>4.7*</td>
</tr>
<tr>
<td>Self-efficacy expectation</td>
<td>2.9</td>
<td>2.7</td>
<td>15.0***</td>
</tr>
<tr>
<td>Intention to participate</td>
<td>4.9</td>
<td>4.6</td>
<td>27.6***</td>
</tr>
</tbody>
</table>

Note: In the analysis age, level of education and general knowledge on breast cancer were used as covariates.
*** p < 0.001; ** p < 0.01; * p < 0.05.

Table 4.3. The main effects of level of fear of breast cancer (FB) and the interaction effect between level of fear of breast cancer and health education (HE)

<table>
<thead>
<tr>
<th></th>
<th>Experimental group</th>
<th>Control group</th>
<th>Main effect FB</th>
<th>Interaction FB × HE</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Low FB n = 93</td>
<td>High FB n = 71</td>
<td>F(1,328)</td>
<td>F(1,328)</td>
</tr>
<tr>
<td></td>
<td>Low FB n = 81</td>
<td>High FB n = 93</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Knowledge</td>
<td>6.3</td>
<td>6.3</td>
<td>&lt; 1</td>
<td>&lt; 1</td>
</tr>
<tr>
<td>Severity</td>
<td>2.2</td>
<td>2.3</td>
<td>2.2</td>
<td>2.4</td>
</tr>
<tr>
<td>Vulnerability</td>
<td>1.9</td>
<td>2.0</td>
<td>1.9</td>
<td>2.1</td>
</tr>
<tr>
<td>Response efficacy</td>
<td>2.9</td>
<td>2.9</td>
<td>2.8</td>
<td>2.8</td>
</tr>
<tr>
<td>Self-efficacy expectation</td>
<td>2.9</td>
<td>2.8</td>
<td>2.9</td>
<td>2.7</td>
</tr>
<tr>
<td>Intention to participate</td>
<td>4.9</td>
<td>4.9</td>
<td>4.6</td>
<td>4.7</td>
</tr>
</tbody>
</table>

Note: In the analysis age, level of education and general knowledge on breast cancer were used as covariates.
*** p < 0.001; ** p < 0.01; * p < 0.05.

cancer consisted of women with a score lower than or equal to the median score (n = 181) and the group with a relatively high level of fear of breast cancer consisted of women with a score higher than the median score (n = 163).

Table 4.3 shows that level of fear of breast cancer has a significant effect on the perceived severity of breast cancer, with the high fear of breast cancer group perceiving breast cancer as a more severe disease than the low fear of breast cancer group. Level of fear of breast cancer has a
significant effect on the perceived vulnerability to breast cancer, with the high fear of breast cancer group feeling more vulnerable to breast cancer than the low fear of breast cancer group. Level of fear of breast cancer has an effect on the perceived self-efficacy with regard to participation, with the high fear of breast cancer group feeling less able to participate than the low fear of breast cancer group. Level of fear of breast cancer does not significantly interact with health education, either with regard to the amount of knowledge acquisition, or with regard to the variables derived from PMT.

**Predicting intention to participate in breast cancer screening**

Within-subjects regression analysis was used to determine the relation between the components of the theory and level of protection motivation. Using measures of existing cognitions rather than manipulated independent variables designed to influence those cognitions makes it possible to test the predicted interactions directly. By entering interaction terms in the regression analyses it is possible to determine whether a linear additive model is sufficient or whether a combination between an additive model and a multiplicative model is necessary to predict individual differences in level of protection motivation.

Table 4.4 shows the results of hierarchical multiple regression analyses to predict the intention to participate in breast cancer screening, with the main and interaction effects of the variables derived from protection motivation theory, knowledge of breast cancer screening as learned from the information leaflet and level of fear of breast cancer. Intention to participate in breast cancer screening was first predicted by the main effects

| Table 4.4 Results of hierarchical multiple regression analyses to predict participation-intention from main and interaction effects of protection motivation variables, knowledge and fear of breast cancer |
|---------------------------------|-----------------|-----------------|-----------------|-----------------|
|                                 | **Controls**    | **Experimental** |
|                                 | **Cum.**        | **Cum.**        | **Cum.**        | **Cum.**        |
|                                | *R* | *R*² | *R* | *R*² |
| Severity                       | 0.01 | 0.00 | 0.01 | 0.00 |
| Vulnerability                  | 0.02 | 0.00 | 0.05 | 0.00 |
| Response efficacy              | 0.47 | 0.22 | 0.09 | 0.01 |
| Self-efficacy expectation      | 0.60 | 0.36 | 0.25 | 0.06 |
| Vulnerability × response efficacy | 0.60 | 0.36 | 0.25 | 0.06 |
| Vulnerability × self-efficacy exp. | 0.60 | 0.36 | 0.38 | 0.15 |
| Response eff. × self-efficacy exp. | 0.60 | 0.36 | 0.41 | 0.17 |
| Knowledge information leaflet  | 0.61 | 0.37 | 0.42 | 0.18 |
| Fear of breast cancer          | 0.62 | 0.39* | 0.44 | 0.20* |

*Note: a F(9,201) = 14.4, p < 0.001.

b F(9,192) = 6.7, p < 0.001.*
and then the other variables were added to the regression analysis in the indicated order.

In this study the women from the control group had not yet received health education about breast cancer screening; nor was breast cancer screening currently performed in that region. In these women, 39 per cent of the variance in the intention to participate in breast cancer screening could be predicted from the regression analyses. With respect to the role of the components of PMT in the prediction of the intention to participate, the following results were obtained. Vulnerability to breast cancer did not predict the intention to participate, perceived response efficacy explained 22 per cent of the variance and perceived self-efficacy explained an additional 14 per cent of the variance. The interaction between the components of protection motivation theory (vulnerability, response efficacy and self-efficacy) did not explain additional variance in the intention to participate. Variations in level of knowledge and fear of breast cancer explained the intention to participate in breast cancer screening only to a very limited extent.

The women in the experimental group had received health education about breast cancer screening and were invited to participate in the breast cancer screening. In these women in total 20 per cent of the variance in the intention to participate in the breast cancer screening could be predicted from the regression analyses. Vulnerability did not predict the intention to participate, the perceived response efficacy explained 1 per cent and perceived self-efficacy explained 5 per cent of the variance. The interaction between vulnerability and self-efficacy explained 9 per cent and the interaction between response-efficacy and self-efficacy explained 2 per cent; variations in level of knowledge explained 1 per cent and fear of breast cancer explained 2 per cent.

When the results of the regression analysis in the control group are compared with the results of the regression analysis on the data of the experimental group, it can be assumed that the women in both groups followed different decision rules in evaluating possible participation in breast cancer screening. In the women in the control group (who did not receive any health education and were not at that moment invited to participate), perceived response efficacy and perceived self-efficacy independently had a positive influence on the intention to participate. In the women in the experimental group (who received health education and were invited to participate in breast cancer screening), the decision-making process had concrete consequences. Under these circumstances women who judged themselves less vulnerable to breast cancer and who felt it to be less efficacious for them to participate were less inclined to participate. This means that when the behavioural intention has to be put into practice in the near future perceived self-efficacy plays a more prominent role as a determinant of behavioural intention. Under these circumstances response efficacy plays a less dominant role. In this study no separate analysis could be made of the role of the components in actual participation in the
experimental group. The reason for this is that of the women who participated in this study 97 per cent participated in the screening. This means that the participation pattern showed too little variance to make a useful analysis of the role of the cognitive components in participation in breast cancer screening.

Predicting participation in the next screening round
Because in the first part of this study no useful analysis could be made of the role of the components of protection motivation theory in predicting participation in the first screening round, an extension was added to the study. The goal of the extension was to study the role of the components of PMT in predicting participation in the second screening round (two years later). In this part of the study an analysis was made of the ability of the components of PMT to predict health behaviours over longer periods of time.

Of the 372 women from the experimental group who participated in the first screening round in March 1989, 20 women were not invited to participate in the second screening round in the spring of 1991, because they had grown older than 70. In total, 14 women were not invited to participate in the second screening round, because they were missing from the database, which was provided by the municipal administration to the East Netherlands Breast Cancer Screening Authority. Of the 338 women who were invited to participate in the second screening round, 263 women (78 per cent) participated, while 75 women (22 per cent) did not.

Table 4.5 shows the results of hierarchical multiple regression analyses to predict participation status in the second screening round (two years

<table>
<thead>
<tr>
<th></th>
<th>Cum. R</th>
<th>Cum. R²</th>
</tr>
</thead>
<tbody>
<tr>
<td>Severity</td>
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<td>0.00</td>
</tr>
<tr>
<td>Vulnerability</td>
<td>0.08</td>
<td>0.01</td>
</tr>
<tr>
<td>Response efficacy</td>
<td>0.12</td>
<td>0.02</td>
</tr>
<tr>
<td>Self-efficacy expectation</td>
<td>0.13</td>
<td>0.02</td>
</tr>
<tr>
<td>Intention (protection motivation)</td>
<td>0.16</td>
<td>0.03</td>
</tr>
<tr>
<td>Vulnerability × response efficacy</td>
<td>0.16</td>
<td>0.03</td>
</tr>
<tr>
<td>Vulnerability × self-efficacy expectation</td>
<td>0.16</td>
<td>0.03</td>
</tr>
<tr>
<td>Response efficacy × self-efficacy expectation</td>
<td>0.16</td>
<td>0.03</td>
</tr>
<tr>
<td>Knowledge information leaflet</td>
<td>0.18</td>
<td>0.03</td>
</tr>
<tr>
<td>Fear of breast cancer</td>
<td>0.23</td>
<td>0.05*</td>
</tr>
</tbody>
</table>

* F(10,172) < 1.0, n.s.
later) from main and interaction effects of PMT variables, knowledge about breast cancer screening and fear of breast cancer prior to the first screening round.

Results indicate that participation status in the second screening round could not be predicted from the variables derived from PMT (total explained variance is 3 per cent). Fear of breast cancer contributes most to predicting participation status in the second screening round. Additional analysis indicated that the level of fear for breast cancer was higher among the participants than among the non-participants in the second screening round. This finding supports the idea that a minimal amount of fear or worry promotes compliance in breast cancer screening.

6.3 Discussion

Early detection of breast cancer by means of mammographic screening can, if a desired minimal participation level is reached, lead to a reduction in cancer mortality in the target population (women between 50 and 70 years of age). Effective health education may help to achieve (and maintain) the desired minimal rate of participation. In a quasi-experiment we investigated the effects of health education on knowledge acquisition about mass screening on breast cancer and on expectancies, which according to PMT (Rogers 1983) determine self-protective health behaviour. Protection motivation theory stresses that not only risk appraisal but also response efficacy and self-efficacy expectancy play an important role in the development of protective behaviour.

The applied health education leaflet had a marked effect on the level of knowledge about breast cancer and breast cancer screening. After the health education leaflet the experimental group had a significantly higher response-efficacy with regard to mammographic screening, a significantly higher self-efficacy expectation with regard to participation and a significantly higher intention to participate in the screening. The perceived severity of breast cancer and the perceived vulnerability to breast cancer were not influenced by the applied health education leaflet. This finding gives empirical support to the suggestion of Vernon et al. (1990) that educational efforts would be more effective if directed at informing women that mammography can detect breast cancer in the absence of breast symptoms (benefits of early detection) than at increasing a woman’s perception of her vulnerability.

In this study it was found that in the subjects in the control condition (who did not receive health information about breast cancer screening), response efficacy and self-efficacy were major predictors of the intention to participate in breast cancer screening. In the subjects in the experimental condition (who were informed about breast cancer screening and invited to participate in a breast examination) the interaction between perceived vulnerability and self-efficacy was the major predictor of the intention to participate. The results indicate that the components of PMT that determine
the intention to participate may be dependent upon a phase in the decision-making process.

7 Future directions

The results of research into the effects of health education using PMT as a framework are rather ambiguous. There are some strengths, but also some weaknesses which have to be pointed to. PMT can be seen as a hybrid theory (see Prentice-Dunn and Rogers 1986), in which three components originate from the health belief model (Becker 1974; see Sheeran and Abraham, Chapter 2 in this volume): vulnerability, severity and response efficacy. The fourth component, self-efficacy, originates from social learning theory (Bandura 1977; see Schwarzer and Fuchs, Chapter 6 in this volume).

In evaluating PMT as a social cognition model for preventive health behaviour several criteria can be used. The first criterion refers to the percentage of the variance of the preventive behaviour that can be explained by using the components of PMT as predictors. Applying PMT to the prediction of breast cancer screening in the control group (which received no health education), 36 per cent of the variance in the intention to participate could be explained using the components from PMT. In the women who had received health education about breast cancer screening, 17 per cent of the variance in the intention to participate could be explained using the components from PMT. Based on the multiple correlations that have been found in various studies, it can be stated that PMT can be used as a fruitful model for the prediction of intention to engage in preventive health behaviour.

With respect to the role of the various components in the prediction of preventive health behaviour, the picture emerges that only in those cases where the subjects learn about a new, previously unknown, threat does threat appraisal play a role in the adoption of preventive health behaviours (Wurtele and Maddux 1987; Wurtele 1988; Brouwer and Sorrentino 1993). With respect to the role of response efficacy, various studies provide positive evidence that it plays a role in the adoption of preventive health behaviours (Stanley and Maddux 1986; Rippetoe and Rogers 1987; Wurtele 1988; van der Velde and van de Pligt 1991). Most positive evidence has been found for the role of self-efficacy in the adoption of preventive health behaviours. In several studies it has been found that variations in perceived self-efficacy are important in predicting preventive health behaviour (Beck and Lund 1981; Stanley and Maddux 1986; Rippetoe and Rogers 1987; Fruin et al. 1991; van der Velde and van der Pligt 1991).

An important theme for future research is the dependency of the components of PMT in predicting health behaviour on the phase of decision-making within the individual (see also Schwarzer and Fuchs, Chapter 6 in this volume). The ‘health action process approach’ formulated by Schwarzer (1992) might be a useful approach in this respect (see also Rakowski et al.)
1992, 1993). Another important theme for future research is the stability of measures of social cognitions over longer periods of time. Longitudinal research in specific risk groups using within-subjects research designs seems to be a useful approach to promote the further development of PMT.

Acknowledgements

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References


