Risk Perception and Self-Protective Behavior

Joop van der Pligt
University of Amsterdam, The Netherlands

Most models of health-related behaviors are based on the assumption that people estimate the seriousness of a risk, evaluate the costs and benefits of action, and then select a course of action that will maximize their expected outcome. Risk refers to the possibility of loss and is generally conceived of as consisting of two components: the probability and the severity of negative outcomes. This article focuses on the probability component. First, the role of perceived risk in models of health behavior will be discussed. Possible biases in risk-perception and the role of perceived risk as a determinant of protective behavior are the next issue. This is followed by some methodological considerations about how to measure perceived risk and investigate its role as a behavioral determinant. Next, we turn to optimistic biases in comparative risk appraisal and briefly discuss both antecedents and consequences of optimism. Finally, we discuss some implications of these findings for programs aiming to change health-related behavior and increase protective action.

Keywords: Risk perception, Health behavior, Preventive behavior, Unrealistic optimism.

Increased knowledge of the possible consequences of a variety of behavioral practices has led to a situation in which a wide range of behaviors have been labelled risky. Designing programs to persuade people to take preventive, risk-reducing action requires a detailed understanding of their decision making. This has led to a significant increase in research attempting to understand how people perceive risks, the accuracy of their perception of these risks, and the role of perceived risk as a behavioral determinant.

The present article first describes the central role of perceived risk in models of health behavior. These models will be briefly summarized, followed by a brief overview of research on the accuracy of people’s perception of risks and some methodological considerations concerning the measurement of perceived risk and the use of correlational data to assess the relationship between perceived risk and preventive behavior. Next, we turn to comparative risk appraisal, i.e., how do people see their risks as compared to others? Biases in comparative risk appraisal and their effects on behavior will be discussed. Finally, some implications of these findings for health education and intervention programs will be briefly summarized.

The Role of Perceived Risk in Models of Health Behavior

A risk behavior can be defined as an action entailing the possibility of a loss. Risk is generally conceived as consisting of two components: the likelihood and the severity of losses or negative outcomes. Most of the prevailing models of health behavior are based on decision theory, and assume that risk behaviors represent conscious actions. Subjective expected utility theory (Edwards, 1954) is an example of a normative decision theory developed to analyze decisions and assess their rationality (see also von Winterfeldt & Edwards, 1986; Yates, 1990). Decision theory specifies a number of steps to be taken when making a decision: (a) identify the possible options; (b) identify the consequences that might follow from each of these options; (c) evaluate the desirability or value of
each consequence; (d) estimate the likelihood of each consequence associated with a specific option; and (e) combine these steps according to a rational decision rule. Decision theory thus provides a model, based on the maximization of expected utility, that serves as a rational or normative basis for making health-related decisions. The theory is rational in the sense that it aims to prescribe a course of action that is consistent with the decision maker’s goals, expectations and values.

This general scheme underlies most models of health behavior. One of these is Fishbein and Ajzen’s theory of reasoned action, which is premised on a value-expectancy theory of behavior. According to this theory, behavioral intentions are a function of attitudes and social norms. Attitudes are assumed to be based on the summed products of the likelihood of positive and negative consequences of behavioral alternatives and the evaluation of these consequences. The assumption is that attitudes will be most favorable towards alternatives with a relatively high number of positive outcomes and a relatively low number of negative outcomes. The theory of reasoned action has been applied to a wide variety of health-related behaviors such as smoking cigarettes, dieting, alcohol consumption, wearing seatbelts, and birth control measures. Kirsch (1983) points out that, although impressive findings have been obtained with the Fishbein and Ajzen model, a substantial amount of the research has been conducted on college students. More recent years have seen a growing number of applications of the model in field settings and research tends to rely less on college students. This research generally supported the theory. Overall, the model provides adequate predictions of health behavior and has received extensive empirical support (see Sheppard, Hartwick, & Warshaw, 1988, for a meta-analysis). This support tends to be stronger for behaviors that are under complete volitional control.

Ajzen (1991) argued that many behaviors are not under (total) volitional control. In other words, people could have positive attitudes towards certain behaviors but simply lack the resources to carry out the behavior. For instance, one could have a positive attitude towards going on a diet but simply fail to do so due to limited ability to sustain the behavior. Ajzen termed this factor “perceived behavioral control” and incorporated it in his revised model of the theory of reasoned action. This factor is closely related to Bandura’s (1989) concept “self-efficacy,” i.e., the subjective belief of the individual to be able to carry out a specific behavior (e.g., sticking to a diet, stopping smoking, reducing alcohol intake, using contraceptives, etc.). Ajzen’s theory of planned behav-

The Health Belief Model (HBM) is probably the framework most widely used to explain preventive health behavior (see, e.g., Janz & Becker, 1984). The model is also based on value-expectancy approaches to human decision making, and focuses on behaviors that are under an individual’s control. The model is primarily concerned with conscious decisions about the utility of specific actions and distinguishes five factors that are assumed to determine the adoption of protective action. These are: (a) perceived susceptibility or vulnerability to developing a specific health problem, (b) perceived severity of that problem, (c) perceived benefits of behavioral action(s), (d) perceived barriers and/or possible negative consequences of the action(s), and (e) specific cues to action, such as symptoms, mass media communications, or a health education campaign (see Janz & Becker, 1984). Preventive action is assumed to be most likely when perceived severity, susceptibility, and perceived benefits are high, while the costs of behavioral change are low.

The Health Belief Model has been found useful in understanding and predicting preventive health behavior, and has been applied to issues such as polio vaccination, preventive dental care, hypertension control, smoking behavior, medical check ups, and dieting. In their review Janz and Becker (1984) conclude that the research provides considerable support for the model. Most studies found a positive association between susceptibility and preventive behavior, but several negative results have also been reported. It needs to be added, however, that most research of the HBM is retrospective as opposed to prospective. Calnan and Moss (1984) emphasized that in retrospective studies it is often impossible to determine whether beliefs shape behavior or whether people adapt their beliefs to be consistent with their behavior. Another criticism of the model is that it is less specific about how to measure the various factors included in the model. More recent research shows that empirical support has been mixed, especially with respect to the role of perceived risk or susceptibility (see, e.g., Ronis, 1992). The utility of the HBM has also been questioned when dealing with relatively severe health threats (see, e.g., Montgomery, Joseph, Becker, Ostrow, Kessler, & Kirsch, 1989).

Weinstein’s (1988) “precaution adoption process” is also based on behavioral decision theory, and assumes a
series of steps preceding the adoption of preventive action to reduce the threat of negative consequences for one's health. First, people have to realize that a specific risk exists. Second, they have to realize that the risk is significant and can affect people. Third, they have to realize that they are vulnerable to the risk. After these necessary requirements, behavioral changes will be a function of the perceived severity of the consequences for one's health and the efficacy and costs of preventive behavior.

As argued before, all these models are based on decision theory. Not surprisingly, they show considerable overlap. For instance, HBM's perceived susceptibility, perceived severity, and the perceived benefits and costs of behavioral change are all part of the subjective risk-benefit analysis underlying attitudes in the models proposed by Fishbein and Ajzen. Perceived barriers are closely related to Ajzen's concept “perceived behavioral control.” Kirsch (1983) and others also pointed out that the elements of the HBM can easily be mapped onto the theory of reasoned action.

The approaches described in this section illustrate that most models of preventive health behavior incorporate the recognition of one's own risk-status or vulnerability as an important condition for adopting behaviors that reduce these risks. One assumption of these models is that people are able to adequately assess the risks associated with their behavior. In the next section we turn to that issue.

Accuracy of Perceived Risk

There is a substantial amount of research on biases in risk perception showing that the estimation of risk tends to be a complex process that depends on factors such as the context in which the risk information is presented, the way the risk is being described, and also on personal and cultural characteristics. Although we know a lot about possible biases in the perception of risk, almost none of the relevant research findings have been applied to the study of health-related behavior. Moreover, most research on health behavior seems to assume that people are aware of the risks they face, and that their perception of risk is accurate.

A number of conclusions can be drawn from research on risk perception. Perceptions of risk vary considerably among people and frequently show little correspondence to epidemiological findings or accident statistics; moreover, quantitative risk judgments are prone to a number of biases. First, small probabilities are overestimated, and large probabilities are underestimated. Second, risks that are more cognitively “available” due, for example, to personal experience or media coverage tend to be overestimated. This can be related to the availability heuristic (Tversky & Kahneman, 1974) which refers to the tendency for an event to be judged more probable to the extent that it is more easily pictured or recalled. Thus, estimates of the likelihood of “sensational” risks such as the risk of contracting AIDS or being involved in an air crash tend to be too high, while estimates tend to be too low for more common and/or less sensational risks such as heart disease or being involved in a traffic accident. Various studies showed that there is a general tendency for people to underestimate their risk (see, e.g., Cleary, 1985). Generally, however, people have a reasonable idea of the relative risks of various activities and behaviors. Major errors seem to occur primarily in estimates of the magnitude of the risks. This relative accuracy of perceived risk seems to support the central role of this concept in models of health behavior.

Most research on biases in perceived risk focuses on cognitive factors, and tends to ignore motivational factors that may influence the perception of risk. Although people seem quite aware of the relative risk of specific activities or behaviors, things tend to change when this knowledge is applied to their own behavior. For instance, many smokers accept the association between smoking cigarettes and disease, but do not believe themselves to be personally at risk (Pechacek & Danaher, 1979). Motivational explanations of this perceived invulnerability tend to focus on the need to reduce feelings of fear and anxiety. Support for the role of these mechanisms is provided by research showing more biased risk estimates in situations of increased threat. For instance, Bauman and Siegel (1987) showed that men with a risky life style who deny or underestimate their risk of an HIV-infection, experienced lower anxiety.

Summarizing, research shows that estimations of perceived risk tend to be biased. These biases primarily concern the magnitude of risk, people seem to have a reasonable idea of the relative risk of various behavioral practices. This picture changes when motivational factors come into play. Unfortunately, knowledge about the impact of motivational factors on perceptions of risk is rather limited.

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Perceived Risk and Behavior

As argued before, much research effort has been directed to understand the factors that determine beliefs about perceived risk or susceptibility, and to understand the relationship between perceived risk and protective behavior (see also Weinstein, 1988). Perceptions of risk are often found to be positively related to preventive health behavior (see, e.g., Cummings, Jette, Brock, & Haefner, 1979; McCusker, Stoddard, Zapka, Zorn, & Mayer, 1989). However, in some instances, measures of perceived risk are found to be negatively related to preventive behavior (e.g., Temoshok, Sweet, & Zich, 1987). Research on the HBM also indicates that the relationship between perceived risk and behavior can be opposite to the predicted direction (see, e.g., Becker, Nathanson, Drachman, & Kirsch, 1977; Langlie, 1977). Several findings suggest that an increased sense of risk – combined with low expectations of success in dealing with the risk – may provoke a helplessness reaction, and hence, decreases intentions to behave adaptively (Beck & Frankel, 1981). This is supported by Rogers and Mewborn (1976) who found a negative relation between perceived risk and behavioral intentions only when recommendations for preventive behavior were presented as relatively ineffective. Similar results were obtained in a study on cigarette smoking (Maddux & Rogers, 1983).

To illustrate the mixed findings concerning the relationship between perceived risk and preventive action we will briefly summarize the results on one specific behavior, i.e., seatbelt usage. As argued by Stasson and Fishbein (1990) there is little support for the hypothesis that perceived risk is related to seatbelt use. Both early reviews (Fhaner & Hane, 1973) and more recent research (e.g., Svenson, Fishhoff, & McGregor, 1985; Stasson & Fishbein, 1990) indicate no relationship between perceived risk and seatbelt use. Fhaner and Hane (1974) found correlations ranging from −.02 to .13 between a composite perceived risk score and seatbelt usage. Moreover, Jonah (1984) reported that perceived accident risk was not related to past seatbelt use nor to intentions to wear seatbelts in the future. Foss (1985) also failed to find a relationship between perceived accident risk and parents' use of safety restraints for their children. Finally, Jonah and Dawson (1982) failed to find a relationship between seatbelt usage and the perceived risk of being fined for not wearing a seatbelt. Stasson and Fishbein (1990) concluded that a variety of risks (accident likelihood, likelihood of being fined, likelihood of self or child being injured) do not seem to be directly related to seatbelt usage. Moreover, they argue that models incorporating other psychological variables such as attitudes and perceived social pressure provide better predictions of actual seatbelt use. More recent research on driving violations by Parker, Manstead, Stradling, and Reason (1992) confirms this view. Stasson and Fishbein conclude that perceived risk affects future intentions, but only indirectly through subjective norms and attitudes associated with seatbelt usage. Moreover, they argue that attempts to increase seatbelt usage should target all relevant beliefs that determine attitudes and subjective norms concerning seatbelt use, rather than just focusing upon increasing risk awareness.

Unfortunately, most studies dealing with the relationship between perceived risk and behavior do not control for previous behavior. Weinstein (1984) argued that people seem able and willing to incorporate knowledge about their family history, personality, and physical or physiological attributes into their perceptions of risk or vulnerability, but seem much poorer at recognizing the relationships between their own actions and the risks they run. Contrary to Weinstein's (1984) findings, Whitley and Henn's (1991) results support the expected relationship between past behavior and risk appraisal. Women who had protected themselves more against pregnancy in the prior six month gave lower probability estimates of getting pregnant in the next year. In accordance with these findings and the assumption that people behave rationally when assessing their risk, Otten and van der Pligt (1992) expected that risky behavior in the past leads to higher risk appraisals for future negative events. Overall, their findings revealed a clear relationship between past behavior and risk appraisal, and between past behavior and future behavior. Their results also showed that risk appraisal is related to future behavior, but in some cases this was in the opposite direction (higher perceived risk was associated with increased levels of risk in future behavior). When predicting future behavior on the basis of both risk appraisal and previous behavior the effect of risk appraisal on future behavior disappeared, while past behavior remained a strong predictor of future behavior.

Their results thus again suggest a modest role of risk appraisal as a determinant of future behavior. Moreover, the finding that perceived risk tends to be higher for people who expect to behave more risky in the future confirms the mixed findings about the relationship between perceived risk and behavior reported earlier in this article. This could be related to the fact that the relationship between perceived risk and behavior is primar-
ily tested with correlational data and to the way perceived risk is measured. To these issues we will turn next.

**Some Methodological Considerations**

As argued before, a major assumption shared by many models of health behavior is that preventive behavior is the result of the wish to reduce one's risks. This assumption has an explicit temporal order; i.e., initial perceptions of risk are expected to influence subsequent behavior. As argued by Weinstein, Rothman, and Nicolich (1995) the above assumption not only implies that perceived risk influences future behavior, but also that perceived risk is shaped by prior behavior. The previous sections presented some evidence concerning the modest role of perceived risk as a behavioral determinant when controlling for past behavior.

Weinstein et al. (1995) reviewed 60 studies focusing on the relationship between perceived risk and precautionary behavior and concluded that a high proportion of these studies suffered from serious methodological and conceptual problems. Nearly all studies relied on correlational data. Weinstein et al. not only refer to the failure to control for prior behavior but also to other problems. These include the misinterpretation of correlations from cross-sectional studies as bearing upon the perceived risk-preventive behavior hypothesis, when they actually provide information about the accuracy of risk-perceptions. This is for instance the case if people engage in risky practices, claim their risk to be low and intend to continue their risky behavior. In such a case risk perception is clearly inaccurate. According to Weinstein et al. (1995) many researchers use these correlations incorrectly to test the hypothesis that the perception of risk causes the behavior, while they provide information about the accuracy of perceived risk.

In this context it is also important to point at the distinction between **unconditional** and **conditional** risk estimates. Unconditional risk estimates refer to the subjective probability that a negative consequence will occur, based on whatever factors individuals take into account (e.g., perceptions of control, the perceived efficacy of preventive actions). Conditional risk refers to the probability of adverse consequence for one's health if no preventive action is taken, or their probability if a specific (preventive) action is taken. A conditional risk estimate thus requires people to indicate their risk given their present behavioral practices, or changes in these practices.

Although most models of health behavior refer to conditional risk estimates, most research tends to rely on unconditional risk estimates (e.g., "How likely is it that you will get . . .", followed by the health risk(s) under study). The major drawback of unconditional risk estimates is that it is unclear what set of factors people take into account when answering this general questions. Weinstein et al. (1995) also point to the importance of measures that assess risk while referring to the continuation of current behavior. Of all the studies they reviewed, only one study employed a conditional risk estimate.

Recently, Ronis (1992) stressed the necessity to measure health risks in ways that are clearly conditional on behavior, and argued that preventive behavior and attitudes towards this behavior would be more accurately predicted from conditional than from unconditional measures of health risks. He found support for this in a study focusing on judgments about a hypothetical disease and in a study on dental flossing behavior.

As argued by van der Velde, van der Pligt, and Hoekjans (1995), using a **conditional** measure of perceived risk instead of an **unconditional** measure has several advantages. First of all, a conditional risk measure more closely resembles the original construct of vulnerability as developed by Rogers (1975) and Becker (1974). According to their reasoning people are inclined to take preventive action if they believe that inaction significantly increases their risk as compared to taking preventive action. Thus, people should perceive a high susceptibility to the disease given inaction. Similarly, people would be less inclined to take preventive action if they think they are likely to get the disease even if they would take action. In the latter case perceived risk is not likely to be related to preventive behavior. General, unconditional risk measures do not provide the possibility to disentangle these alternatives, hence the need for a conditional measure of risk. Another drawback of an unconditional measure of risk concerns the direction of causality between unconditional risk estimates and behavioral intentions. This direction is unclear because respondents may use their behavioral intentions to anticipate future levels of risk. Finally – and most importantly – a conditional risk estimate seems to be less dependent upon differences in actual risk status (based on past and present behavior), and is therefore more likely to be related to behavioral intentions in a consistent and interpretable manner.

Finally, Weinstein et al. (1995) also point to a further problem of correlational analysis, i.e., the fact that the
adoption of protective measures is likely to change over time. Generally, it will take some time for people to take precaution, and eventually precaution adoption declines. When the amount of protective behavior in a population has become rather stable and future behavior is well-predicted from present behavior no other independent variable will add much to the predictive power.

Summarizing, perceived risk is generally assumed to be an important determinant of (preventive) behavior. A number of biases affect the accuracy of perceived risk. Cognitive biases such as the availability heuristic have an effect on the perceived magnitude of risk but generally people have a fairly accurate view of their relative risk, hence the inclusion of perceived risk in most models of health behavior. More attention should be paid to motivational factors influencing the perception of risk, such as the tendency to deny risks and/or avoid threatening information about risks. Generally, research findings concerning the impact of perceived risk on behavior are mixed. Some authors argued that the hypothesis that perceived risk is a determinant of protective behavior should be rejected or thoroughly reexamined (see, e.g., Gerrard, Gibbons, Warner, & Smith, 1993). With Weinstein et al. (1995) we would like to argue that this skepticism may be premature. Too many studies in this field of research reported correlations that are questionable or incorrect. Weinstein et al.’s review provides many examples and is supported by a recent review of research findings on AIDS-related behaviors, showing that an overwhelming majority of studies in this domain report uninterpretable results concerning the relationship between perceived risk and preventive behavior (Gerrard, Gibbons, & Bushman, 1994). As argued before, the mixed findings concerning this relationship are also likely to be due to variations in the measurement of perceived risk. We would like to recommend a more precise, conditional measure of perceived risk. All in all, it seems premature to conclude that perceived risk is not important as a predictor of health behavior. Perceived risk seems a necessary but not a sufficient condition for behavioral change.

The modest correspondence between perceived risk and behavior could also be related to the fact that people not only focus on their absolute level of risk but rely on comparative risk appraisal. To that issue we turn next.

Optimism in Risk Perception

Since Weinstein’s (1980) seminal paper on “unrealistic optimism” a substantial body of research on the perception of health risks focused on comparative risks, i.e., one’s own risk as compared to others. When asked to compare their risk to the “average” person or to comparable others (e.g., in terms of age, gender, and educational background), people tend to estimate their risk of experiencing a negative event as below average. This illusion of (relative) invulnerability has been obtained for a wide variety of health risks, ranging from “catching a cold” to more serious risks such as a heart disease, cancers and AIDS (see, e.g., Weinstein, 1982). Moreover, unrealistic optimism has been obtained for both low and high-risk groups. For instance, van der Velde, van der Pligt, and Hooijkaas (1993) investigated the perception of AIDS-related risks for samples that differed widely in their risk status. Their findings indicated that the groups were aware of their relative risk status: high-risk groups gave higher ratings of their own risk than low-risk groups. However, all groups also showed an optimistic bias and thought that their risks were lower than that of an average person of their age and gender.

This optimism about one’s invulnerability could hinder the adoption and maintenance of preventive behaviors; if health risks apply more to others than to oneself, there is no reason to take preventive action. These possible consequences of optimistic biases, such as unrealistic optimism, resulted in a substantial body of research attempting to better understand the possible causes of this positive illusion and investigate its consequences for preventive behavior. Interestingly, most research focused on the possible antecedents of unrealistic optimism, and little attention has been paid to the assumed effects of optimism on preventive health behavior. Six possible causes have been mentioned in the literature on unrealistic optimism (see van der Pligt, Otten, Richard, & van der Velde, 1993, for an overview). The first is perceived control: When rating one’s own risk status as compared to others, optimism tends to be greater for those risks judged to be under personal control. Research findings also indicate that those who rate the controllability of a specific risk higher also tend to be more optimistic about that risk. This relation between perceived controllability and optimism is confirmed by research on a wide variety of health-related behaviors (see, e.g., Weinstein, 1982; Otten & van der Pligt, 1995). Some even argue (e.g., McKenna, 1993) that unrealistic optimism is simply another manifestation of the illusion of
control, i.e., the tendency to overestimate one's ability to control life's outcomes. McKeon found that only controllable events resulted in optimism. Harris and Middleton (1994), however, found optimism about specific events to be unrelated to ratings of the capacity to control these events.

A second factor that is often related to optimism is the so-called egocentric bias. When people are asked to assess their risks and those of others, they generally have more knowledge about their own protective behaviors than about those of others. It seems that people tend to focus on their own risk-reducing practices and are less aware of personal actions or circumstances that increase their risks. The fact that one's own actions are more available than those of others reduces the awareness that many other people also take protective action. Third, personal experience with a specific risk tends to decrease unrealistic optimism. Personal experience tends to be relatively vivid as compared to statistical information about risks, and enhances both availability and recall. A fourth factor that could produce unrealistic optimism is related to stereotypical or prototypical judgment. People might have a relatively extreme image of high risk groups or those suffering from specific diseases. This extreme prototype is unlikely to fit one's self-image, hence the tendency to infer that the risk primarily applies to others.

A fifth factor is self-esteem maintenance or enhancement. Generally, people seem to think that their own actions, lifestyle, and personality are “better” than those of their peers. This mechanism would explain the fact that people are generally not optimistic about hereditary and environmental health-risks; the latter do not constitute a threat to one's self-esteem. In contrast, a high-risk lifestyle or specific practices could be seen to imply that we are ignorant of what we ought to do or are simply unable to exercise self-control. Both ignorance and the inability to exercise self-control concern one’s ability to cope effectively with life, and have clear links to self-esteem.

The sixth and final factor that could cause optimism is related to coping strategies. Under conditions of high stress or threat, denial is a response often used to protect against anxiety and/or worry. Denial can reduce emotional distress but also reduces the likelihood of preventive actions, which may be necessary to reduce one's risks. According to this explanation, unrealistic optimism is an illusion that can help the individual to adapt the threatening events.

As argued by van der Pligt et al. (1993), most research in this area relies on correlational analyses and further research is needed to assess the precise causal role of these antecedents of unrealistic optimism. As mentioned before, research interest in optimistic biases such as unrealistic optimism is partly based on the assumption that the biases could hinder the adoption of preventive health behavior. More specifically, one of the basic rationales for this research is that comparative optimism could undermine the effectiveness of health education campaigns. Surprisingly only a very limited number of studies focuses on the relationship between comparative optimism about one's risks and preventive action.

Overall, the predictive power of comparative risk appraisal seems extremely modest. Research incorporating both own risks and comparative risks (i.e., level of optimism) shows that the former is modestly related to both behavioral intentions and actual behavior (see, e.g., van der Velde et al., 1992; Otten & van der Pligt, 1992). Comparative risk appraisal does not seem to add to the prediction of behavior over and above perceived (own) risk. It could be that comparative risk appraisal primarily triggers social comparison processes and is not a prime determinant of preventive health behavior.

### Changing Risky Behavior

Changing risky practices is often difficult, and the research presented in this article indicates that providing risk information is generally not sufficient to foster behavioral change. As argued before, other factors such as the efficacy and costs of preventive behavior, social pressure, and perceived self-efficacy play a major role in helping people to change their behavior.

One could argue that a first requirement of programs aiming to increase preventive behaviors is that they convince people of the possible negative consequences of certain practices. It needs to be added that providing threatening, fear-inducing information about the possible risks of behavior can also be counter-productive. As discussed before, in such circumstances motivational factors might lead to a denial of the risks. This obviously poses a problem for health education. A direct confrontational approach could have potentially adverse consequences for those who perceive themselves to be at greater risk. The complicated dual aim of health education programs is to create and maintain a level of anxiety which is sufficient to motivate risk reducing behaviors, while at the same time these levels of anxiety should not be too high. One way to resolve this problem
is to focus on immediate effective consequences of specific behavioral practices. A strategy that emphasizes the more immediate affective consequences of risky behavioral practices seems most appropriate when there is a discrepancy between the feelings associated with the behavior, and the possible consequences of that behavior. This was tested in research on risky sexual practices by Richard, van der Pligt, and de Vries (1995a). They expected that inducing people to think about their feelings after having had unprotected sex with a new or casual partner should affect preventive behavior. Results showed that stressing the immediate risks such as worries, anxiety and regret that could be experienced after unprotected sex, result in an increase in protective action. It thus seems that such an intervention leads to some anxiety but not enough to lead to defensive reactions and/or denial of the risks associated with the behavior (see also van der Pligt & Richard, 1994), and increases the likelihood of preventive behavior: Richard et al. (1995b) found that anticipated affective reactions are also related to other health behaviors such as dieting and drug and alcohol use.

Conclusion

Most models of (health) behavior incorporate perceived risk as an important determinant of behavior. Generally, these models decompose risk into a probability component and a value component (i.e., the likelihood of negative consequences and the evaluation of these consequences). This article focused on the probability component of risk perception. A number of biases affect both absolute and comparative risk appraisal. Generally, the perception of personal vulnerability to health risks seems a necessary requirement for people to consider behavioral change, but it is not sufficient to actually induce people to change risky practices. When tested in the context of other behavioral determinants, perceived risk is a modest predictor of preventive health behavior. This also applies to comparative risk appraisal, i.e., the tendency of people to be optimistic about health risks. Comparative risk appraisal serves a number of functions but does not seem a prime determinant of behavior. It seems premature to conclude that optimism in comparative risk appraisal has a detrimental effect on preventive behavior.

It also seems premature to conclude that perceived risk is not related to the adoption of preventive behavior. The absence of a consistent empirical relationship between these factors seems partly related to shortcomings in the design of many studies investigating this relationship, and on the way perceived risk is measured. More research is needed to assess the precise role of perceived risk as a necessary factor to induce behavioral change. This research should preferably be prospective; too many studies assess perceived risk and behavioral intentions at the same time, which makes it difficult to investigate the predictive power of perceived risk. Second, more attention should be paid to the measurement of perceived risk. The many different ways in which perceived risk and vulnerability are measured make it difficult to compare research outcomes. Most models require a conditional probability assessment; most research, however, relies on a more general measure of unconditional risk. Finally, the tendency to deny more severe risks requires an approach that also focuses on more immediate affective consequences (e.g., regret and worry of risky behavioral practices).

Programs aiming to increase the prevalence of protective behavior should not only provide risk information. It seems essential to develop strategies that also incorporate other beliefs about the costs and benefits of the behavioral alternatives. Moreover these programs should also stress how to change behavior and take preventive action, i.e., increase self-efficacy. This could be done by providing examples and role models of how to effectively change one's behavior.

References


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