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Unrealistic pessimism about risk of coronary heart disease and stroke in patients with type 2 diabetes

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Abstract

Objective: We examined the accuracy of type 2 diabetes (T2D) patients' risk estimates of developing coronary heart disease (CHD)/having a stroke as a consequence of diabetes and their mood about these risks.

Methods: Patients reported their perceived risks of developing CHD/having a stroke and rated their mood about these risks using a self-report measure. Using an objective risk calculator, they were then told their actual risk of CHD and stroke and their mood was re-assessed.

Results: Patients' estimates of their risk of CHD/stroke were grossly inflated. A negative relationship between disease risk and mood was also seen where higher risk of actual and perceived CHD/stroke was related to worse mood. A positive relationship between mood and extent of perceptual error was further observed; the more inaccurate patients' perceptions of CHD/stroke risk were, the better their mood. Mood improved after patients were given accurate risk information.

Conclusion: T2D patients are unrealistically pessimistic about their risk of developing CHD/stroke. These risks and the extent of perceptual risk error are associated with mood, which improves upon providing patients with accurate risk information about CHD/stroke.

Practice implications: These results have implications for the routine communication of risk to T2D patients.

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1. Introduction

Type 2 diabetes (T2D) is a chronic illness characterised by persistent elevation of blood-glucose concentration for which there is no known cure. Diabetes is increasing in prevalence; an estimated 3 million people will have the disease in the UK by 2010 [1]. Patients self-manage the condition by engaging in lifestyle modification (e.g. following a healthy diet, testing blood glucose and taking exercise and medication). The purpose of these behaviours is to control blood-glucose levels and avoid diabetes-related complications, rather than cure the illness.

Cardiovascular disease is the leading cause of death *among* people with diabetes [2]. In a UK prospective mortality study the incidence of cardiovascular mortality in middle-aged diabetes patients was five times greater than among those without diabetes [3]. Consequently, diabetes has been defined as "a state of premature cardiovascular death" (4, p. 28).

Communicating risk of cardiovascular disease to T2D patients is important for several reasons. Firstly, the recent National Service Framework for diabetes [5] sees patient empowerment, i.e. patients' ability to make well informed decisions about their illness, as a key standard [6]. Empowerment assumes that patients have access to accurate information about their illness, including the risks and consequences of the condition. It further assumes that such information will form the basis for diabetes self-care behaviours aiming to achieve tight blood-glucose control. Tight blood-glucose control has

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been shown to reduce cardiovascular death in people with T2D [7]. Secondly, psychological health behaviour models suggest that higher risk perceptions may be associated with greater intentions to adopt precautionary health behaviours [8–10].

There are two bodies of psychological literature aimed at understanding how people think about risk. On the one hand, the optimistic bias literature argues that people reliably believe that they are less likely than others to experience a variety of negative events, ranging from heart disease to divorce [11,12]. Behind this phenomenon is the belief that if something has not happened yet, it is unlikely to happen in the future [13,14]. A second body of research into beliefs about risks surrounding major illnesses has produced divergent results. Diseases that are feared with poorly understood causes and out of people's personal control are perceived as riskier and concern people more than illnesses which are perceived as less dramatic [15]. For example, work in the area of breast cancer and genetic screening, has consistently shown that healthy women are unrealistically pessimistic about their risks of developing breast cancer whether or not they have a familial risk of cancer [16–19]. Similarly, women rate their chances of dying from breast cancer higher than heart disease [20], although the mortality rate for heart disease in women is nine times greater than that of breast cancer [21]. On the other hand, beliefs about health risks associated with less feared, better understood and more controllable causes, such as cardiovascular disease, are underestimated [20].

In the studies outlined above, participants were healthy volunteers reporting hypothetical risks, rather than chronically ill patients with a real chance of developing further specific illnesses. In a single study of patients with either hypertension or diabetes, Frijling et al., asked patients to self-report their 10 year risk of developing myocardial infarction and stroke [22]. Forty-five percent of those who were able to estimate their cardiovascular risk overestimated this by more than 20%.

Risk assessment is known to be ''primarily determined not by facts but by emotions'' (23, p. 745), yet Frijling et al. did not record patients' emotional reactions to these risks. One's emotional response to the risk of illness plays an important role in one's motivation to engage in illness-preventive behaviours. For example, a degree of fear may increase motivation in this respect [24]. On the other hand, excessive fear and anxiety may cause people to ignore [25] or forget [26,27] risk information.

Previous work on risk and mood has measured negative emotions about health risks, such as fear and anxiety [19,28,29] on the assumption that Dwelling on one's risk of illness is unlikely to elicit positive emotions. On the other hand, there is some evidence that unrealistic optimism may cause false reassurance [30].

Although diabetes is associated with increased risks of developing CHD and stroke, there is currently no work examining patients' awareness of or emotional reaction to these risks. Furthermore, apart from the work of Frijling et al., there are no data examining whether diabetes patients' risk estimates are optimistic or pessimistic, in line with the genetic screening literature. This study examines the discrepancy between patients' perceptions of risk and their actual risks of CHD and stroke and evaluates their emotional reactions to these risks.

2. Methods

2.1. Design

In a within participants design, patients' perceptions of risk of CHD and stroke were compared to their actual risks of CHD and stroke. In correlational work, the relationship between mood and both actual and perceived risks of CHD and stroke were also investigated.

2.2. Participants

People with a T2D diagnosis, aged <80 years, with no cardiovascular, cerebrovascular or psychiatric co-morbidity and able to understand English were eligible to participate. Of the 143 who expressed an initial interest, 95 agreed to participate. The older (M age = 64.01 S.D. = 8.67), predominantly White ($N = 86$) sample had diabetes an average 5.55 (S.D. = 5.36) years. Demography and medical history are shown in Table 1.

2.3. Apparatus and materials

2.3.1. Physiological measurement and risk assessment

Version 2 of the United Kingdom Prospective Diabetes Study (UKPDS) Risk Engine [31] downloaded on a PC and a standard printer were used to estimate and print patients' actual risk of CHD/stroke. The UKPDS Risk Engine is a risk calculator for people with type 2 diabetes, which was developed using data from 5300 who took part in the UKPDS, the largest prospective study of type 2 diabetes in the UK. The Risk Engine is a simple reliable tool for individual risk prediction of CHD/stroke in uncomplicated diabetes [32]. The risk is generated

Table 1
Patients' demographic and medical background

N	95
Male/female (*N*)	42/53
Age (M, S.D.)	64.09 (8.67)
Diabetes duration (M, S.D.)	5.55 (5.36)
Years of formal education (M, S.D.)	11.65 (2.61)
Ethnicity (*N*)	
White	86
Asian	5
Afro-Caribbean	4
HbA1c (M, S.D.)	7.33 (1.41)
Total cholesterol (M, S.D.)	4.41 (1.92)
HDL cholesterol (M, S.D.)	1.03 (0.32)
Systolic/diastolic blood pressure (M, S.D.)	138/76 (21/10)
Diabetes control (*N*)	
Diet	24
Tablets	52
Insulin	4
Tablets + insulin	15
Smoking status (*N*)	
Non-smoker	51
Ex-smoker	34
Current smoker	10

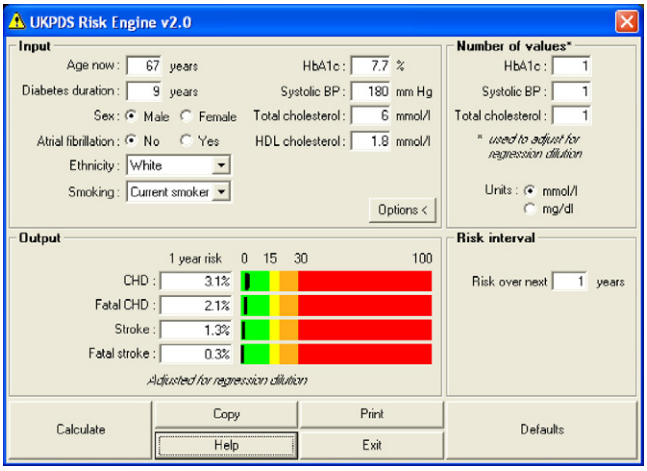


Fig. 1. The UKPDS Risk Engine (adapted with permission from UKPDS paper 56).

instantly after a number of variables are entered onto the screen (see Fig. 1). Total and HDL cholesterol were measured using a Roche Reflotron Plus desktop analyser and blood pressure was measured by a digital Omron meter.

2.3.2. Self-reported risk measurement and risk communication tools

Patients used a visual analogue risk scale ranging from 0 to 100% adapted from materials used for communication of breast cancer risk [19]. A completed example explaining how to use the scale was also given (see Fig. 2). A set of smiley faces (100 on A4 paper) and a 10 slice pie chart were used to explain risk.

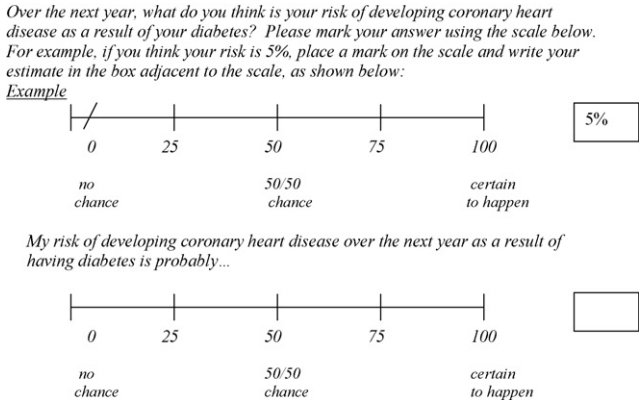


Fig. 2. Example of scale used to assess risk (adapted from McCaul et al. [19]).

2.3.3. Mood assessment

The Positive Affect Negative Affect Scale (PANAS) [33] was used to assess mood. This prompts participants to use a 5 point (1: 'very slightly/not at all' to 5: 'extremely') scale in rating 10 positive (e.g. excited, inspired) and 10 negative (e.g. distressed, scared) adjectives, to describe current mood. Participants were instructed to rate the extent to which they felt these emotions when thinking about their risk of CHD/stroke.

2.4. Procedure

The study received ethical clearance from the local NHS Ethics Committee. Eligible patients were recruited either from hospital diabetes clinics or through local GP surgeries by letter and asked to return a slip if they wanted to take part. Interested

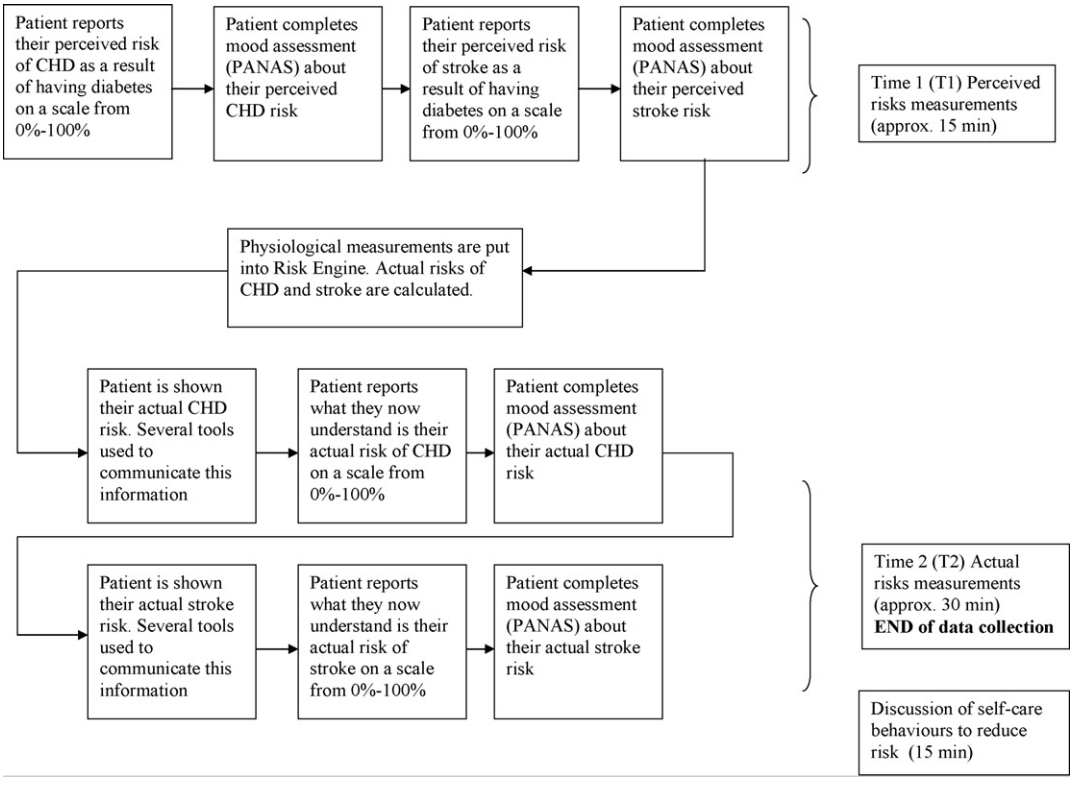


Fig. 3. Diagram of measurements obtained during the consultation with patients.

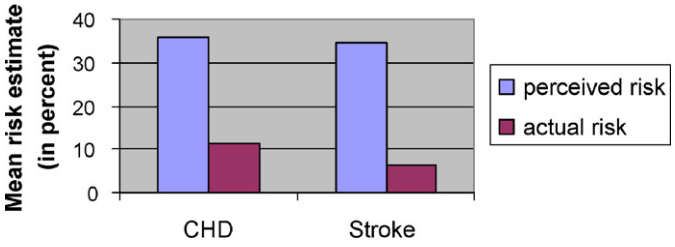


Fig. 4. Mean perceived and actual risks of developing CHD and stroke in patients with type 2 diabetes.

patients were phoned by a research nurse who explained the study in detail and answered questions. At the end, an appointment for a consultation was arranged.

Consultations took place within a hospital setting and lasted about an hour. After giving consent in writing, patients reported their perceived risk of developing CHD as a result of diabetes using the scale shown in Fig. 2. They then completed the PANAS questionnaire to assess mood about their perceived risk of CHD. The same procedure was repeated for perceived stroke risk and mood (see Fig. 3).

The research nurse then took medical details, measured pulse and blood pressure and took a small sample of blood for total and HDL cholesterol. Each field of the UKPDS Risk Engine was completed and the patient's actual individual risk of CHD/stroke was obtained (see Fig. 1).

The printout and various risk tools were used to communicate actual risk of non-fatal CHD. Patients then completed the same scale, as used previously, to report their understanding of their CHD risk. The PANAS was completed immediately afterwards. This procedure was repeated for non-fatal stroke estimates (see Fig. 3). Before the end of the consultation, patients were given the opportunity to discuss self-care behaviours to reduce their risk of CHD and stroke.

3. Results

3.1. Analytic strategy

Data ($N = 95$) on participants' self-reported perceptions of CHD and stroke risk (Fig. 3, 'Time 1') and their actual risks of these illnesses (Fig. 3, 'Time 2') were collated and statistically analysed using SPSS for Windows v.12. PANAS mood ratings were also collated, having calculated overall positive and negative mood scores. We report three analyses:

- Results of related *t*-tests to assess discrepancies between perceived and actual risks of CHD and stroke.
- Correlational findings (using Pearson's *r*) on the relationship between perceived/actual risk estimates and patient mood.
- Results of related *t*-tests to show how patients' mood changed as a function of being told their actual risks of CHD/stroke.

3.2. Findings

3.2.1. Patient perceived vs. actual risk of CHD/stroke

Mean perceived and actual risks of CHD/stroke are shown in Fig. 4.

Patients' perception of CHD risk was about 3.5 times greater ($t_{(95)} = 8.59$, $p < .001$) and of stroke risk was about 5.5 times greater ($t_{(94)} = 11.03$, $p < .001$) than actual risk.

3.2.2. The relationship between perceived and actual risk of CHD and stroke and patient mood

We measured risk estimates and mood at two time points:

- Time 1 (T1) after patients had reported perceived risks of CHD/stroke.
- Time 2 (T2) after we had told patients their actual risks of CHD/stroke (Fig. 3).

We correlated perceived (obtained at T1), and actual (obtained at T2), risk estimates of CHD and stroke with overall positive and negative mood ratings measured at T1 and T2, respectively (see Table 2). The higher their perceived risk of CHD and stroke, the more negative their mood (CHD $r = -.34$, $p < .001$; stroke $r = .25$, $p < .05$). At T2, the higher their actual risk of CHD and stroke, the less positive their mood (CHD $r = -.24$, $p < .05$; stroke $r = .24$, $p < .001$). Interestingly, there was a *positive* relationship at T1 between perceived risk and mood for stroke ($r = .25$, $p < .05$). Thus, the higher the perceive risk of stroke, the more positively they rated their mood.

We calculated the discrepancy between actual and perceived risks for each illness. Thus, we subtracted the actual CHD risk (T2) from the perceived risk (T1) and called this 'risk change'. We used the same calculation for stroke data and correlated the 'risk change' scores with mood at T2. Table 2 shows that the greater the difference between patients' perceived and actual risks (''risk change''), the more positive their mood for both CHD ($r = .23$, $p < .05$) and stroke ($r = .48$, $p < .001$).

Table 2
Correlations between perceived, actual and perceived–actual (change) risks of CHD and stroke and mood

	CHD			Stroke		
	Perceived risk (Time 1)	Actual risk (Time 2)	Risk change (perceived estimate − actual estimate)	Perceived risk (Time 1)	Actual risk (Time 2)	Risk change (perceived estimate − actual estimate)
Overall positive mood	.17	−.24*	.23*	.25*	−.34**	.48**
Overall negative mood	.34**	.04	.04	.34**	−.02	.18

$N = 95$, $^{*}p < .05$, $^{**}p < .001$.

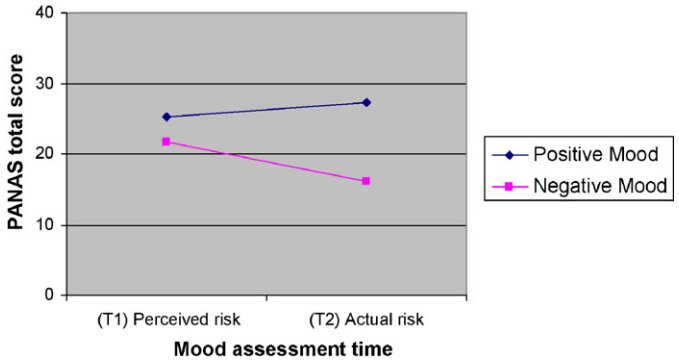


Fig. 5. Mood about perceived [Time 1 (T1)] and actual [Time 2 (T2)] risk of CHD.

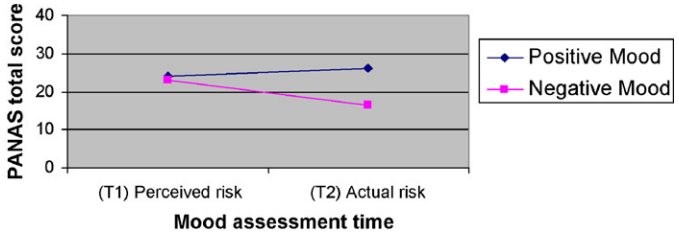


Fig. 6. Mood about perceived [Time 1 (T1)] and actual [Time 2 (T2)] risk of stroke.

3.2.3. Changes in patient mood on receiving actual risk of CHD and stroke

We examined differences in mood between T1 and T2. For both CHD and stroke, overall positive mood increased (CHD: $t_{(91)} = 2.39$, $p < .02$; stroke: $t_{(92)} = 2.16$, $p < .03$) and overall negative mood decreased (CHD: $t_{(93)} = 7.58$, $p < .001$; stroke: $t_{(92)} = 7.92$, $p < .001$) from T1 to T2. These results appear in Figs. 5 (CHD) and 6 (stroke).

4. Discussion and conclusion

4.1. Discussion

Patients with T2D were unrealistically pessimistic about their risks of CHD and stroke as a consequence of diabetes. Perceived risks of CHD and stroke were higher than actual risk by factors of 3.5 and 5.5, respectively. We found several interesting relationships between mood and risk of CHD and stroke; although patients generally experienced negative emotions about their actual and perceived risks of CHD and stroke, we also found that the greater the difference between their perceived and actual risks, the more positive their mood. Mood also improved once we had provided patients with accurate estimates of their CHD and stroke risks.

Our findings echo those seen in the genetic screening literature which has reliably shown women to be unduly pessimistic about their chance of developing breast cancer [17–19]. There are several possible reasons for the inflated estimates of CHD and stroke in our sample. Firstly, diabetes patients are already living with a chronic illness. In doing so, chronic illness and disability are concepts that are more cognitively available and hence more salient and accessible than they would be in healthy student samples [35]. As such, the principle that "if it hasn't happened yet, it won't" which underpins optimistic bias in healthy samples fails in older adults with diabetes. This increased awareness of illness risks may be reinforced in patients' routine consultations with diabetes health-care professionals. The strong relationship between diabetes cardiovascular complications and mortality features regularly in diabetes consultations. It is well known [36] that doctors have the highest trust and credibility in being perceived by patients as providing sound health risk information. Thus, if a trusted source tells a patient that they have a high, but unquantified, risk of cerebrovascular disease, the patient is likely to overestimate that risk. Previous work [32,37] has called for providing patients with individualised, rather than average population, risk information; this study has shown that doing so may reveal interesting differences between their perceived and actual risks. Finally, the breast cancer literature suggests that the more dreaded and feared an illness, the more people will overestimate their risk of developing it [15,20]. Although cardiovascular disease is not perceived as a fearful outcome for most people [20], for diabetes patients, cardiovascular disease may well be a very dreaded and particularly feared outcome of diabetes, which may in turn explain the inflated risk estimates obtained here. Future qualitative work may help answer this question more fully.

The importance of our work lies in the observation that unduly pessimistic patients may be reluctant to self-care, seeing little point self-managing an illness which they see as overly risky. Perceptions of a threat as likely and severe can result in low motivation to deal with the threat [34]. In the case of diabetes, overestimations of risk may de-motivate people to engage in self-care and generate detrimental emotion management behaviours (e.g. compensatory eating) rather than positive health promoting behaviours. This study has hopefully paved the way for further investigation of these possibilities.

Like Frijling et al. [22], we have provided further evidence of cardiovascular risk overestimation in diabetes patients. In that study many patients were unable to provide any estimate of cardiovascular risk, while in contrast, all our patients did so with no difficulty. The use of multiple strategies to help understand risk [23] may have helped our patients make these estimates. If so, this should be used routinely in risk communication.

In extending previous work on risk communication, our study assessed both positive and negative mood associated with perceived and actual risk of illness. In line with social cognition models (e.g. [38]) patients' higher perceived and actual risks of CHD and stroke were, unsurprisingly, related to more negative and less positive mood, respectively. In contrast, the positive relationship between perceived risk of stroke and positive mood was unexpected and suggests that the PANAS may measure motivation to assimilate risk information rather than positive mood [39]. Future work may consider using a different measure of mood.

We also observed that the greater the discrepancy between patients' erroneous perceptions of risk and their actual risk, the

more positive their mood. It could be that when patients realised that their fears about high CHD/stroke risks were unfounded, they were reassured, hence the apparent mood enhancement. It might also be that knowing that they were going to receive individualised information about their CHD and stroke risk, patients artificially inflated their self-reported risk estimates, to try and conform to the generic advice that diabetes is associated with an increased risk of CHD and stroke. Previous work has suggested that people's risk judgements may be modified in anticipation of information that might have a bearing on the accuracy of their risk judgements [40,41].

Finally, we showed patient mood improvement at the point of receiving actual risk information. These findings are in line with a meta-analysis of the genetic counselling literature which showed that correcting at risk women's pessimistic breast cancer risk estimates, led to reductions in anxiety [42]. Providing actual risk information routinely may thus have a doubly positive effect; to correct misconceptions and, at the same time, improve mood.

There are some limitations to this work. We studied a small sample of patients with relatively uncomplicated diabetes, using quantitative methods which may not fully explain patients' thoughts and emotions about their risk of cardiovascular disease. Although the PANAS has construct validity [33] our findings should be replicated in future using a different mood measure. Finally, we did not consider the possible effects of patients' gender, age, BMI and blood-glucose control on estimates of cardiovascular risk.

4.2. Conclusion

This study has shown that T2D patients hold over-pessimistic views about their risk of developing CHD and stroke as a result of their illness. We have also shown that perceived and actual risk of cardiovascular disease in these patients are associated with patient mood and that correcting erroneous beliefs about risk may lead to mood improvement.

4.3. Practice implications

The findings have implications for health professional—patient communication of risk as well as the routine education of T2D patients. Patients can hold erroneous beliefs about their diabetes-related risk of CHD/stroke and these erroneous beliefs may lead to negative mood about their vulnerability to CHD and stroke. Correcting inaccurate risk perceptions may be related to subsequent mood enhancement. Some of the reasons behind patients' inaccurate risk knowledge have been discussed and the implications of these findings for patients' motivation to self-care have been noted. We argue that providing patients with individualised risk estimates may help to correct inflated views of their vulnerability to CHD/stroke.

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References

[1] Amos AF, McCarthy DJ, Zimmel P. The rising burden of diabetes and its complications: estimates and projections to the year 2010. Diabetic Med 1997;14:1–85.
[2] Wannamethee SG, Shaper AG, Lennon L. Cardiovascular disease incidence and mortality in older men with diabetes and in men with coronary heart disease. Heart 2004;90:1398–403.
[3] Roper NA, Bilous RW, Kelly WF, Unwin NC, Connolly VM. Cause-specific mortality in a population with diabetes: South Tees diabetes mortality study. Diabetes Care 2002;25:43–8.
[4] Fisher M. Diabetes: can we stop the time bomb? Heart 2003;89:28–30.
[5] Department of Health. National Service Framework (NSF) for diabetes: standards. London: DoH; 2001.
[6] Funnell M, Anderson RM, Arnold MS, Barr PA, Donnell M, Johnson PD, et al. Empowerment: an idea whose time has come in diabetes education. Diabetes Educat 1991;17:37–41.
[7] Prospective Diabetes Study (UKPDS) group. Effect of intensive blood-glucose control with metformin on complications in overweight patients with type 2 diabetes. Lancet 1998;352:854–65.
[8] Milne S, Orbell S, Sheeran P. Prediction and intervention in health-related behaviour: a meta-analytic review of protection motivation theory. J Appl Soc Psychol 2000;30:106–43.
[9] Klein WMP. Comparative risk estimates relative to the average peer predict behavioral intentions and concern about absolute risk. Risk Decis Policy 2002;7:193–202.
[10] Conner M, Norman P. Predicting health behaviour. Maidenhead: Open University Press; 2005.
[11] Weinstein ND. Unrealistic optimism about future life events. J Pers Soc Psychol 1980;39:806–20.
[12] Weinstein ND. Unrealistic optimism about susceptibility to health problems. J Behav Med 1982;5:441–60.
[13] Weinstein ND. Unrealistic optimism about illness susceptibility: conclusions from a community-wide sample. J Behav Med 1987;10:481–500.
[14] Weinstein ND, Klein WMP. Unrealistic optimism: present and future. J Soc Clin Psychol 1996;15:1–8.
[15] Covello V. Risk comparison and risk communication: issues and problems in comparing health and environmental risks. In: Kasperson R, Stallen P, editors. Communicating risks to the public. New York: Kluwer; 1991. p. 79–124.
[16] Lerman C, Kash K, Stefanek M. Younger women at increased risk for breast cancer: perceived risk, psychological well-being and surveillance behaviour. Monogr: Natl Cancer Inst 1994;16:171–6.
[17] Wilcox S, Stefanick ML. Knowledge and perceived risk of major diseases in middle-aged and older women. Health Psychol 1999;18:346–53.
[18] Lipkus IM, Biradavolu M, Fenn K, Keller P, Rimer BK. Informing women about their breast cancer risks: truth and consequences. Health Commun 2001;13:205–26.
[19] McCaul KD, Canevello AB, Mathwig JL, Klein WMP. Risk communication and worry about breast cancer. Psychol Health Med 2003;8:379–89.
[20] Covello VT, Peters RG. Women's perceptions of the risks of age-related diseases including breast cancer: reports from a 3-year research study. Health Commun 2002;14:377–95.
[21] Murphy SL. Deaths: final data for 1998. National vital statistics report 2000;48:1–106.
[22] Frijling BD, Lobo CM, Keus IM, Jenks KM, Akkermans RP, Hulscher MEJL, et al. Perceptions of cardiovascular risk among patients with hypertension or diabetes. Pat Educat Couns 2004;52:47–53.
[23] Palling J. Strategies to help patients understand risk. Br Med J 2003;327:745–8.
[24] Tanner Jr JF, Hunt JB, Eppright DR. The protection motivation model: a normative model of fear appeals. J Market 1991;55:36–45.

[25] Brown SL. Emotive health advertising and message resistance.. Aust Psychol 2001;36:193–9.
[26] Reed MP, Aspinwall LG. Self-affirmation reduces biased processing of health-risk information. Motiv Emotion 1998;22:99–132.
[27] Lench HC, Levine LJ. Effects of fear on risk and control judgements and memory: implications for health promotion messages. Cogn Emotion 2005;19:1049–69.
[28] van der Velde FW, Hooykaas C, van der Plight J. Conditional versus unconditional risk estimates in models of AIDS-related risk behaviour. Psychol Health 1996;12:87–100.
[29] Harris P, Sparks P, Raats M. Theoretical and applied issues in the provision of absolute and comparative risk information. Risk Decis Policy 2002;7:153–63.
[30] Dillard AL, McCaul KD. Unrealistic optimism in smokers: implications for smoking myth endorsement and self-protective motivation. J Health Commun 2006;11:93–102.
[31] Prospective Diabetes Study (UKPDS) group. The UKPDS Risk Engine: a model for the risk of CHD in Type 2 diabetes. Clin Sci 2001;101:671–9.
[32] Roach P, Marrero D. A critical dialogue: communicating with type 2 diabetes patients about cardiovascular risk. Vasc Health Risk Manage 2005;1:301–7.
[33] Watson D, Clark LA, Tellege A. Development and validation of brief measures of positive and negative affect: the PANAS scales. J Pers Soc Psychol 1988;54:1063–70.
[34] Weinstein N. Perceived probability, perceived severity, and health-protective behavior. Health Psychol 2000;19:65–74.
[35] McCallum D, Hammond S, Covello V. Communicating about environmental risks: how the public uses and perceives information sources. Health Educ Quart 1991;18:349–61.
[36] Tversky A, Kahneman D. Judgment under uncertainty: heuristics and biases. Science 1974;185:1124–31.
[37] Edwards AGK, Hood K, Mathews EJ, Russell D, Russell IT, Barker J. The effectiveness of one-to-one risk communication interventions in health care: a systematic review. Med Decis Making 2000;20: 290–7.
[38] Rogers RW. A protection motivation theory of fear appeals and attitude change. J Psychol 1975;91:93–114.
[39] Green D, Salovey P, Truax K. Static, dynamic and causate bipolarity of affect. J Pers Soc Psychol 1999;76:856–67.
[40] Shepperd J, Oulette J, Fernandez J. Abandoning unrealistic optimism: performance estimates and the temporal proximity of self-relevant feedback. J Pers Soc Psychol 1996;70:844–55.
[41] Taylor K, Shepperd J. Bracing for the worst: severity, testing and feedback as moderators of the optimistic bias. Pers Soc Psychol Bull 1998;24:915–25.
[42] Meisser B, Halliday JL. What is the impact of genetic counselling in women at increase risk of developing hereditary breast cancer? A meta-analytic review. Soc Sci Med 2002;54:1463–70.