Risk Perception for Developing Diabetes

Comparative risk judgments of physicians

ELIZABETH A. WALKER, DNSC, RN[1]
C.K. MERTZ, MRCP[2]
MARIA R. KALTEN, BS[1]
JAMES FLYNN, PHD[2]

OBJECTIVE — To assess personal risk perceptions for developing diabetes among practicing physicians.

RESEARCH DESIGN AND METHODS — Little is known about comparative risk perceptions concerning diabetes among medical experts. We administered the new Risk Perception Survey for Developing Diabetes to 535 nondiabetic physicians. The participants were 86% male, had a mean age of 49 years, and were 66% white and 24% Asian. Almost 37% were considered at higher risk for developing diabetes based on self-reported risk factors. Over 91% of respondents were either internal medicine or family medicine physicians.

RESULTS — Of the four subscales, Comparative Disease Risk and Environmental Risk indicated moderate risk perceptions, whereas Personal Control scores indicated a robust sense of control over developing diabetes. Optimistic Bias scores showed a tendency toward participants' being optimistic that they were less likely to develop diabetes. Based on self-reported risk factor categories, a comparison of scores between physicians at higher risk ($n = 196$) and those at lower risk ($n = 313$) for developing diabetes showed greater comparative disease risk perception among the higher risk physicians ($P < 0.01$), as well as greater perception of diabetes risk ($P < 0.001$). Nearly 50% of higher risk physicians, however, reported an optimistic bias that they were less likely to develop diabetes than other people of their same age and sex. Women ($n = 75$) reported greater perception of environmental risks than men ($P < 0.001$). Asian respondents ($n = 126$) reported greater perception of environmental risk ($P < 0.001$) and greater worry about developing diabetes ($P < 0.0001$) than white respondents ($n = 355$). Regression analyses showed that scores for nondiabetes comparative disease risks (0.39) and level of optimistic bias (0.31) were predictive of diabetes risk perception ($P < 0.0001$).

CONCLUSIONS — The data gathered on physicians' perception of their personal risk for developing diabetes and other comparative risk judgments provided an expert comparison for future analyses of at-risk or lay individuals' perceptions of diabetes risk. Effective communication of diabetes risk among physicians, patients, and the general public relies on knowledge of and sensitivity to group differences in these perceptions.

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Diabetes is a chronic metabolic disorder that increases the risk of blindness, neuropathy, and other chronic complications when left uncontrolled (1,2). The hallmark of diabetes care is self-management, accomplished through adjustment of medication, diet, and exercise, measures that often use self-monitoring of blood glucose as a guide (3). Adoption of health-protective behaviors, such as seat belt use or diabetes self-management, has been associated with several mediators, as described in models of health behavior (4,5) in which recognition of significant health risk is important for the adoption of preventive behaviors. Although some studies in chronic disease have shown an association with or the predictive value of individuals' health beliefs, including perception of risk, to adherence to preventive behaviors (5), results of other studies have been inconsistent (6,7). Possible explanations for these inconsistencies are that risk perception measures may not be sensitive or specific enough to capture the multiple dimensions of perception of disease risk or else the models for statistical analyses may have been faulty (8,9). New strategies for conceptualizing and measuring perceptions of risk are needed to inform effective communication of risk for the prevention and treatment of chronic disease.

Although disease risk is often characterized as unidimensional with a specific range of probability, risk is a complex term with multiple dimensions. Risk can be presented as the probability of or vulnerability to a disease, and also as the consequence or seriousness of a disease (5). Risk can also be presented as something dreaded (a lack of control, fatality) or unknown (effect delayed or unobservable) (10). Comparative risk judgments about diseases or environmental hazards provide a broader context for understanding personal risk of a specific disease (8,10). Most individuals have complicated lives and must cope with more than one health problem in the context of potential environmental hazards. Clinicians and behavioral scientists may understand more about promoting preventive behaviors related to diabetes if layers of this complexity are explored.

Personal risk perceptions differ among groups; for example, wide gaps exist between experts' (e.g., scientists, health professionals) perceptions of risk and the lay public's perceptions of the same disease risk or hazard (11–14). Walker (15) described this "conceptual

From the [1]Albert Einstein College of Medicine, Diabetes Research Center, Bronx, New York; and [2]Decision Research, Eugene, Oregon.

Address correspondence and reprint requests to Elizabeth A. Walker, DNSC, RN, Associate Professor of Medicine, Director, Prevention and Control Division, The Diabetes Research and Training Center, Albert Einstein College of Medicine, 1300 Morris Park Ave., Belfer Bldg., Rm. 701, Bronx, NY 10461. E-mail: walker@aecom.yu.edu.

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Abbreviations: ADA, American Diabetes Association; RPS-DD, Risk Perception Survey for Developing Diabetes.

A table elsewhere in this issue shows conventional and Système International (SI) units and conversion factors for many substances.

gulf" between experts and lay individuals as a source of difficulty in communicating risk. This difference in perception can be a barrier to risk communication between health care providers and patients (16).

The goal of this study was to assess practicing physicians' personal risk perceptions for developing diabetes and its complications and other comparative risk judgments. The specific aims of the study were to describe the personal risk perceptions of nondiabetic physicians and to make these data available for subsequent comparison with data from other target groups, such as at-risk populations or the lay public. Appropriate risk communications for providers and those at risk for diabetes can be developed using these results.

RESEARCH DESIGN AND METHODS

— The Risk Perception Survey for Developing Diabetes (RPS-DD) is a new survey for assessing multiple dimensions of perceived risk for developing diabetes. During the survey development phase, a panel of clinical diabetes experts, risk perception experts, and health psychologists reviewed all items of the survey for content and face validity. A pilot test was completed with 74 nondiabetic, overweight, middle-aged community individuals (17). The survey was revised minimally to enhance validity, reliability, and ease of use. For the current physician study, the revised RPS-DD was completed by 535 physicians at a series of continuing education conferences before their educational sessions. Each conference occurred in the northeastern U.S., except for one taking place in Canada. This voluntary survey was identified as a research effort supported by the Diabetes Research and Training Center of the Albert Einstein College of Medicine. Physicians participated anonymously and were eligible only if they did not have diabetes. Subjects' ($n = 535$) mean age was 48.9 ± 9.8 years and 86% ($n = 460$) were men. The majority were white (66.4%), with Asians (23.6%), blacks (4.3%), and Hispanics (2.6%) also represented. The mean self-reported BMI was 25.4 ± 3.4 kg/m^2. The medical specialties represented among participants were internal medicine (61%), family medicine (30%), and endocrinology (7%).

Physicians reported personal risk factor information on the survey, including the items on the American Diabetes Association's (ADA's) Diabetes Risk Test (18). For the purposes of this study, the participants were then classified into two groups: those at lower risk for diabetes and those at higher risk for diabetes, according to these self-reported data. Calculation of BMI was done using the standard method based on height and weight. General criteria used for assigning "higher risk of diabetes" status included *1*) age 20–44 years, BMI ≥ 27 kg/m^2, and reported little or no exercise; *2*) age 45–64 years with BMI ≥27 kg/m^2 or reported little or no exercise; or *3*) age 65 years and over with BMI ≥27 kg/m^2 or a family member having had diabetes or the participant having had a baby weighing >9 pounds (17). Using these criteria, 37% ($n = 196$) of the sample were determined to be at higher risk for diabetes.

Survey characteristics. The survey comprises 53 items and has four subscales and other individual items to address various dimensions of risk perception. Completion of the survey takes ~12 min. Most responses are in a Likert-scale format, with response categories based on previous research in instrument development for risk perception (19). Internal consistency reliability for the four subscales was assessed in this new population with Cronbach α coefficients. These subscales are based on factors identified in published risk perception research not related to diabetes (8,10). Individual survey items assess other possible dimensions of perceived risk, such as worry about developing diabetes (2 items) and knowledge of diabetes risk factors (11 items), but they were not regarded as subscales for this exploratory study about multiple dimensions of perceived risk for developing diabetes among physicians. Analyses were completed using the statistical software package SAS, version 7.0 (SAS Institute, Cary, NC).

RESULTS

— The descriptive data for four main survey subscales, including the number of items, the response format, mean scores (±SD), and internal consistency reliability coefficients for the sample are included together in this section to enhance understanding of results using this new survey. The Comparative Disease Risk subscale (15 items; $\alpha = 0.86$) measures perceived risk across 15 diseases and conditions; on a scale of 1 ("almost no risk") to 4 ("high risk"), a higher score indicates greater perceived risk. The mean subscale score of 1.85 ± 0.46 out of 4.0 indicates a relatively slight perceived risk across diseases. The Comparative Environmental Risk subscale (nine items; $\alpha = 0.83$) measures perceived environmental risks; using the same response set as above, a higher score indicates greater perceived environmental risk. The mean subscale score of 1.79 ± 0.45 indicated, on average, less perceived personal risk from the environment than for the comparative diseases in this sample. In the Optimistic Bias subscale (two items; $\alpha = 0.64$), a higher score describes more perceived risk for developing diabetes, which corresponds with a response of less optimistic bias and more realism or pessimism about developing diabetes. On a scale of 1 (more bias) to 4 (less bias), the mean score of 2.38 ± 0.64 indicated a modest tendency toward optimistic bias. For the Personal Control subscale (four items; $\alpha = 0.67$), a higher score indicates greater perceived personal control over developing diabetes in this sample. The mean score of 3.18 ± 0.52 indicated a perception of greater personal control. The Diabetes Risk Knowledge section, including 11 items on risk factors for type 2 diabetes, is summed for the number of correct responses. The average number of correct responses in this sample was 8.86 out of a possible score of 11. Physicians tended to be more knowledgeable about lifestyle risk factors, such as diet or sedentary lifestyle, and less knowledgeable about risks to specific ethnic groups. In particular, only 35% of physicians knew that being Asian increased one's risk of developing diabetes.

Table 1 ranks by mean score the 15 diseases or conditions from the Comparative Disease Risk subscale. The proportion of subjects who responded that they were personally at high risk for each disease or condition and the combined proportion who responded either moderate or high risk are also given. Heart disease, high blood pressure, arthritis, and cancer had higher mean scores for perceived personal risk to health than did diabetes and other diseases and conditions, including several chronic complications of diabetes. With a mean subscale score of 1.85 ± 0.46, the majority of respondents reported either "almost no risk" or "slight risk" of these 15 diseases or conditions.

A similar ranking for the nine Comparative Environmental Risk subscale items is also shown in Table 1. Driving/

Table 1—*Comparative disease risk and comparative environmental risk in 535 nondiabetic physicians*

	Mean scores*	Proportion responding "high risk"	Proportion responding "moderate" or "high risk"
Comparative Disease or Condition Risks			
Heart disease	2.48	11.4	45.4
High blood pressure	2.42	13.1	43.6
Arthritis	2.33	7.5	38.2
Cancer	2.21	5.4	32.1
Diabetes	2.03	4.9	27.7
Stroke	2.00	3.7	21.1
Hearing loss	1.97	5.8	23.0
Infections needing medical treatment	1.88	3.2	20.0
Impotence (men only)	1.84	2.7	17.1
Osteoporosis	1.61	2.4	13.1
Blindness	1.56	1.5	7.5
Asthma	1.47	3.6	10.0
Kidney failure	1.43	1.1	5.0
Foot amputation	1.24	0.6	2.5
AIDS	1.20	0.6	2.8
Comparative Environmental Health Risks			
Driving/riding in auto	2.52	5.4	51.4
Air pollution	2.05	3.6	24.5
Violent crime	1.90	1.7	15.7
Pesticides	1.85	2.6	14.9
Extreme weather	1.80	2.2	15.5
Household chemicals	1.71	1.3	12.0
Secondary cigarette smoke	1.67	3.7	13.6
Medical X rays and radiation	1.46	0.6	6.6
Street/illegal drugs	1.13	1.1	2.2

*Mean scores are based on response scale ranging from 1 ("almost no risk") to 4 ("high risk").

riding in an automobile was perceived by half (51.4%) of the subjects as a "moderate" or "high" environmental risk, in contrast to street/illegal drugs, which were described by only 2.2% of subjects as a moderate or high risk. With a mean subscale score of 1.79 ± 0.45, the majority of respondents reported either "almost no risk" or "slight risk" from nine environmental hazards, except for the risk of driving/riding in a car.

Using the self-reported risk factor data, a comparison of subjects at higher risk ($n = 196$) and those at lower risk ($n = 313$) for diabetes produced significant differences between the two groups. For example, the groups differed in Comparative Disease Risk ($t = 3.07$, $P < 0.01$), with the higher risk group reporting greater perceived risk, and in Personal Control ($t = 2.08$, $P < 0.05$), with the lower risk group reporting greater perceived personal control about developing diabetes. The higher risk group reported greater worry about developing diabetes ($t = 3.35$, $P < 0.001$). There were significant differences between the lower and higher risk respondents for the optimistic bias subscale ($t = 4.63$, $P < 0.0001$), with the higher risk group reporting less optimistic bias. In other words, the latter group was perhaps more pessimistic or realistic about the risk of developing diabetes. However, half of the physicians in the higher risk for diabetes category agreed with the statement, "Compared to other people of my same age and gender, I am less likely than they are to get diabetes."

Figure 1 shows the results of two composite survey items in which respondents were asked to rank four diseases, including diabetes, by the degree of their "dread" for having each disease and the disease's perceived "fatality" (i.e., the likelihood that the disease directly or indirectly leads to death). Cancer, stroke, AIDS, and heart disease were judged to be both more dreaded and more fatal than diabetes by the majority (60–95%) of respondents. Asthma and osteoporosis each ranked considerably lower compared with diabetes than the other diseases, with <15% of physician respondents considering them more dreaded than diabetes and <10% considering them more fatal than diabetes.

The effect of ethnicity/race could be explored in only a limited way in this study, as the numbers of black and Hispanic physicians in the sample were too small to use in the analyses. We thus compared self-described Asian ($n = 126$) and white physicians ($n = 355$). As calculated from self-report data, Asian respondents had a significantly lower BMI than white respondents (24.1 vs. 25.98 kg/m^2; $t = 5.94$, $P < 0.0001$). Asian physicians described greater worry for developing diabetes ($t = 5.80$, $P < 0.0001$) and higher perception of environmental risks ($t = 3.85$, $P < 0.001$) than white respondents. However, 44% of Asian physicians ($n = 56$) did not believe that Asian-Americans were at increased risk for diabetes; 73% of white physicians reported the same misinformation.

Regarding sex differences, the sample included 75 women and 460 men. Significant differences in scores based on sex included greater perceived risk of heart disease ($t = 4.27$, $P < 0.0001$), blindness ($t = 2.26$, $P < 0.05$), and kidney failure ($t = 3.30$, $P < 0.001$) among men, and greater perceived risk of osteoporosis among women ($t = 7.07$, $P < 0.0001$). Among the environmental risks, women scored significantly higher than men for the comparative environmental risk subscale ($t = 3.51$, $P < 0.001$) and specifically for risk from air pollution ($t = 5.12$, $P < 0.0001$), pesticides ($t = 3.42$, $P < 0.001$), household chemicals ($t = 2.99$, $P < 0.01$), and driving/riding in an automobile ($t = 2.04$, $P < 0.05$).

Regression analyses were used to examine the factors contributing to experts' perception of their risk for developing diabetes. The independent variables used to predict diabetes risk perception were respondents' risk category for diabetes, their scores for Personal Control, a modified Comparative Disease Risk (eliminating the item for diabetes risk perception), Optimistic Bias, and Diabetes Risk Knowledge score. These five independent

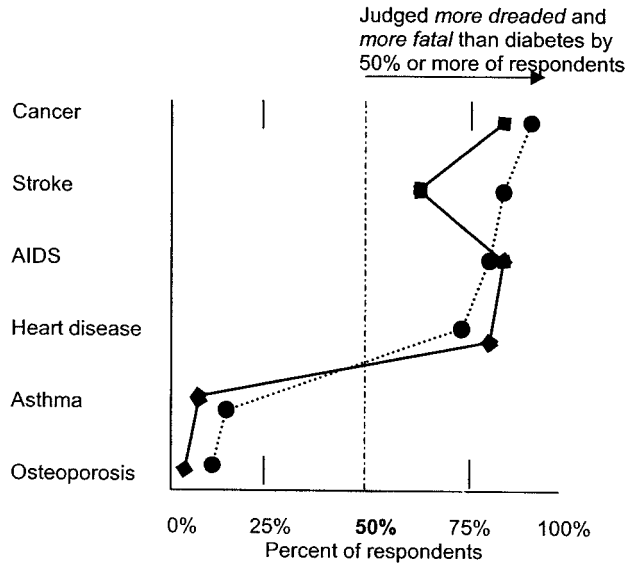

Figure 1—*Percent of physician respondents rating selected diseases as more dreaded or more fatal than diabetes.* ●*, dreaded;* ◆*, fatal.*

variables accounted for 33.7% of the variance in diabetes risk perception ($F = 49.43$, $P < 0.0001$). Perception of nondiabetes health risks and level of Optimistic Bias were the most important variables in predicting diabetes risk perception, with standardized regression coefficients of 0.39 and 0.31, respectively ($P < 0.0001$); this meant that having a greater perception of health risk from other health problems and being more pessimistic/realistic about developing diabetes (i.e., having less optimistic bias) predicted perception of risk for developing diabetes. Interestingly, participants' level of Optimistic Bias appeared to be a more important predictor of diabetes risk perception than whether they were actually at risk for diabetes based on their self-reported risk factors.

CONCLUSIONS — People assign different meanings to the word "risk," with multiple interpretations and factors contributing to expert and lay perceptions of risk (10). The communication of risk is an interactive process used to involve and inform the lay public about expert risk assessments and give voice to existing public perspectives to inform experts. This dialogue between experts and lay individuals is necessary for effective risk communication. Thus discussions regarding the management of diabetes risk must be based on an understanding of the barriers to communication on all sides. With this understanding, an effective dialogue has a greater chance of occurring (20,21). Because an individual's perception of risk for a disease may alter that person's health-protective (i.e., risk-reducing) behaviors, it is an important, complex translation activity to assess the risk perceptions of those involved in the health care dialogue and to develop appropriate and effective risk communications (16,20).

In this study, the RPS-DD was administered to a large sample of medical experts representative of those providing care for patients at risk for diabetes. The four main subscales had acceptable reliability for a newly developed instrument in this expert sample, as they had in the earlier pilot study of a lay at-risk sample (17). We continue to be cautious in interpreting subscales with Cronbach α coefficients <0.80. The experts' mean subscale scores could be interpreted as modest or slight risk perception in assessing 15 diseases and nine environmental conditions. The mean Optimistic Bias score of 2.38 may have reflected a somewhat optimistically biased view about personal risk for diabetes, as 37% ($n = 196$) of the sample also reported specific risk factors for developing diabetes. The mean score for the Personal Control subscale indicated a robust sense of control over developing diabetes, as might be expected in a medical expert sample.

Significant differences within this expert sample were found in several planned comparisons. The categories of "lower risk" and "higher risk" for developing diabetes were designated for these analyses and, although they are somewhat arbitrary categories based on the ADA's public education Diabetes Risk Test (18), they did serve an important function in our attempt to characterize a respondent's actual versus perceived risk. The 196 respondents in the higher risk category did indeed show statistically different responses in the expected direction from the lower risk respondents on several subscales and individual items, including having less personal control over developing diabetes, greater worry concerning diabetes, and greater perceived risk across multiple diseases. There were no significant differences in Diabetes Risk Knowledge scores or in Comparative Environmental Risks ratings between these two groups. This suggests that respondents in the higher risk group were not inherently risk averse, but seem to be making independent evaluations of their diabetes risk.

Optimistic bias is the unrealistic assessment of risk status by individuals who actually have high-risk characteristics (22). Interestingly, there was a highly significant difference between the lower and higher risk groups for the Optimistic Bias score, with the lower risk group appropriately reporting more optimistic bias that they were less likely to develop diabetes when compared with someone of their same age and sex. However, 50% of higher risk physicians also agreed with the same statement that they were less likely than others of their same age and sex to develop diabetes. One could hypothesize that the optimism arises from their medical expertise and/or sense of personal control; however, in our pilot study in a high-risk, overweight, middle-aged community sample (17), the same proportion (i.e., 50%) of nonexperts also expressed this optimistic bias.

In numerous studies of the construct of optimistic bias, Weinstein and colleagues have found that most people claim that they are less likely to be affected by risks or hazards than their peers (see, for example, 23). Weinstein and colleagues have also demonstrated the resistance of personal risk perceptions to debiasing interventions. For example, in a study of 222 adult New Jersey residents, Weinstein and Klein (24) found there were significant optimistic biases when

comparing individuals' relative risk factors for heart attack and other hazards and their comparative risk judgments about these hazards. Alerting (i.e., educating) subjects about risk factors for heart disease did not alter the perception or risk judgment that they were at less risk for heart attack than other people. Weinstein and Klein have concluded, "People prefer to believe that their risk is below average and are reluctant to believe anything else" (24, p. 139). This presents a clear challenge for effective interventions in risk communication. Data from the physician sample and from the earlier pilot study indicate that optimistic bias related to diabetes appears to be present in both expert and lay at-risk individuals. Whether it is wise to try to manipulate optimistic bias for those at risk for diabetes is unanswered at present; perhaps this optimistic bias somehow mediates improved health outcomes. It remains critical, however, to be aware that optimistic bias exists in both expert and lay populations. Research such as that reported here helps to fill gaps in knowledge about what factors might be targeted, although results from prospective studies are needed to understand the relation among risk perceptions, health behaviors, and improved clinical outcomes.

There is emerging evidence of sex and racial/ethnic differences in perception of health risks (25). For example, in a random sample survey, Flynn et al. (25) conducted a telephone survey of 1,512 U.S. English-speaking adults, 86% of whom described themselves as white, regarding 25 health hazards, including cigarette smoking, AIDS, and nuclear waste. On average, white men in this study scored significantly lower on perceived risk than all other categories of respondents. Women scored significantly higher than men on perceived risk for each of the 25 specified hazards to health. Nonwhite men and women gave comparable responses on risk to the 25 hazards. Differences in sex and ethnicity/race have also been noted in responses to risk communications (26,27). In the present expert study, the significantly greater Comparative Environmental Risk score among Asian respondents compared with whites warrants further study. White men had significantly lower Comparative Environmental Risk scores ($P < 0.01$) than did the Asian men in the sample. The sex differences in environmental risk were comparable in the present study when comparing all men ($n = 460$) and all women ($n = 75$) with men reporting less perceived environmental risk ($P < 0.001$).

The generalizability of the current study's results may be limited by virtue of the self-selection of respondents to attend a medical conference focused on diabetes and to complete a survey; however, the sample did include participants from at least 10 different geographic locations, an impressive 34% ethnic minority representation, and 14% women. For purposes of confidentiality about diabetes diagnosis, we did not attempt to discern a refusal to participate for someone eligible from nonparticipation due to ineligibility for those with diagnosed diabetes. The role of perceived risk of diabetes complications and its impact on health behaviors to prevent diabetes are unclear until data from prospective studies are available.

The results of this study fill a knowledge gap related to expert personal risk perception for developing diabetes. The study goal was to gain relevant information about physician (i.e., medical expert) perceptions of risk for developing diabetes for subsequent comparison with perceptions of at-risk and lay groups. A comparison study of a national random sample of lay respondents is planned for the near future. The RPS-DD was also administered annually from 1998 through 2001 in a subsample ($n = 516$) of the Diabetes Prevention Program cohort (28). When analyses from that study are complete, comparisons of those data from the high-risk DPP sample with the current expert sample described in this study should prove highly informative. Results of these future comparisons will inform the design of interventions to promote primary prevention strategies for diabetes, as well as the development of patient counseling, risk communication, and educational materials for implementing effective diabetes prevention approaches in primary care settings.

Because primary prevention of diabetes is a priority in the research and public health community, effective communication about risk and preventive measures is crucial (29). More effective "risk-talking" behaviors are needed in the dialogue between patient and provider, so that clear messages are sent and received about the diabetes "risk-taking" behaviors in everyday life, such as overeating and sedentary lifestyle. Reliable, valid, and comprehensive measures of risk perception for diabetes must be refined and the emerging data used to frame appropriate messages for at-risk populations.

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