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Unrealistic Optimism About Susceptibility to Health Problems: Conclusions from a Community-Wide Sample

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A mailed questionnaire was used to obtain comparative risk judgments for 32 different hazards from a random sample of 296 individuals living in central New Jersey. The results demonstrate that an optimistic bias about susceptibility to harm—a tendency to claim that one is less at risk than one's peers—is not limited to any particular age, sex, educational, or occupational group. It was found that an optimistic bias is often introduced when people extrapolate from their past experience to estimate their future vulnerability. Thus, the hazards most likely to elicit unrealistic optimism are those associated with the belief (often incorrect) that if the problem has not yet appeared, it is unlikely to occur in the future. Optimistic biases also increase with the perceived preventability of a hazard and decrease with perceived frequency and personal experience. Other data presented illustrate the inconsistent relationships between personal risk judgments and objective risk factors.

KEY WORDS: risk perception; susceptibility; optimism; risk factors.

INTRODUCTION

The beliefs people hold about their susceptibility to harm are key variables in theories of self-protective behavior, including the Health Belief

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Model (Janz and Becker, 1984; Rosenstock, 1974), Fishbein and Ajzen's Theory of Reasoned Action (Ajzen and Fishbein, 1980; Fishbein and Ajzen, 1975), Subjective Expected Utility Theory (Edwards, 1954; Sutton, 1982), and Rogers' Protection Motivation Theory (Rogers, 1975, 1983; Rogers and Mewborn, 1976). The importance of such beliefs has been demonstrated in numerous studies of health behavior (for reviews see Becker *et al.*, 1977; Janz and Becker, 1984).

Yet people are seldom given personalized information about their susceptibility. They gain information about people in general from the mass media and information about peers from social interactions, but they have to infer their own risk status (cf., Tyler and Cook, 1984). The discrepancies between actual and perceived risk that result need not be random. In fact, when people fail to take precautions—to use automobile seat belts, to stop smoking, or to adopt low fat diets, for example—their inaction is often attributed to an optimistic bias: "It won't happen to me."

Recent studies, looking at a wide range of hazards, have confirmed that people do tend to claim that they are less at risk than their peers (Drake, 1984; Larwood, 1978; Perloff and Fetzer, 1986; Weinstein, 1980, 1982, 1984; Zakay, 1983, 1984). These researchers have described mechanisms that could produce this unrealistic optimism and have discussed hazard characteristics that may explain why some risks evoke so much more optimism than others. These mechanisms and characteristics are described later in this Introduction.

The studies just cited share a serious limitation; all gathered their data from college students, and it is not at all obvious that the findings apply to the rest of the population. For example, optimism about avoiding life's problems may well be age dependent. Many authors have suggested that the high rates of drinking, automobile accidents, and criminal victimization suffered by teenagers and young adults reflect risk-taking behaviors encouraged by perceived invulnerability. Although research on psychological time perspective does not reveal a simple relationship with age (Doob, 1971; Svenson, 1984), it has been claimed that adolescents have a more limited time perspective than adults (Ausubel, 1954; McCandless, 1970). If they tend to focus on the present, adolescents may be less realistic about future problems. There are also survey data showing that young people are more likely than older people to believe that the future will be better than the present (Hultsch and Bortner, 1974; Watts and Free, 1978).

Egocentrism, one of the factors that seem to produce optimistic biases, is more pronounced in adolescence than later in life (Elkind, 1967; Enright and Lapsley, 1979). Because of egocentrism, people tend to think of the actions they take to prevent harm but fail to ask themselves whether their peers may also take these precautions (Weinstein, 1984; Weinstein and

Lachendro, 1982). For all these reasons, unrealistic optimism about susceptibility to harm might be limited to the young.

College students are a biased sample of the population in other respects. They are likely to be healthier, to become better educated, and to come from wealthier homes than the average person their age. Thus, they may be correct when they claim that their chances of experiencing harm are less than average.

Given these concerns about the conclusions that can be drawn safely from past research, the primary goal of the present investigation was to assess the extent of unrealistic optimism in a representative community sample, one containing individuals differing widely in age, education, and occupational status.

The second goal of this research was to explore further the types of events that evoke optimistic biases in order to gain insight into the causes of this phenomenon. At least three different processes have been suggested. One idea is that unrealistic optimism represents defensive denial (Kirscht *et al.,* 1966), an attempt to avoid the anxiety one would feel from admitting a threat to well-being.[3] If this idea is correct, hazards that are more serious or life-threatening should elicit more optimism than minor risks. However, since some serious risks may seem too unlikely to be threatening, a second measure of threat, the amount people worry about a hazard, may be an even better predictor of denial. Thus, problems that are rated high in *seriousness* and in *others' worry* should, according to this thinking, lead people to claim that they are below average in risk.[4] Although the notion of defensive denial may be familiar, studies to date provide little support for the idea that it is responsible for unrealistic optimism in risk judgments (Weinstein, 1980, 1982).

Another possibility is that people claim they are less at risk than their peers in order to enhance or maintain their self-esteem (e.g., Weinstein, 1984). To do this they may tend to engage in downward comparisons, comparing themselves with people particularly high in risk (Hakmiller, 1966; Perloff and Fetzer, 1986; Wills, 1981; Wood *et al.*, 1985), or they may overestimate skills that would help them avoid risk [e.g., driving ability (Svenson *et al.*, 1985)]. But failure to avoid a hazard threatens our self-esteem only if the threat is perceived to be controllable. For a preventable hazard, high vulnerability suggests that the person is incapable of protecting himself or

[3]We use denial here to indicate a response to a particular, threatening situation, not to denote a personality trait that is consistent across situations.

[4]If unrealistic optimism results from denial, people might also deny that they worry about a hazard. Thus, to obtain a better measure of threat, respondents were asked how much people in general worry about each hazard, not how much they themselves worry.

herself. This relationship between perceived vulnerability and self-esteem leads to the prediction that the more *preventable* the hazard (preventable by individual action), the greater will be the tendency to claim below-average risk. This prediction has been confirmed in the studies that have examined this variable (Weinstein, 1980, 1982; Zakay, 1984). Falling victim to a problem that is preventable can also lead to social censure (Jones *et al.*, 1984). Since people may wish to believe that they are not at risk when the threat of social stigma is involved, it was expected that the higher a hazard is rated in *embarrassment,* the stronger should be the claim that one's own risk is below average. There is no previous research using embarrassment as a predictor of optimistic bias.

A different line of reasoning suggests that cognitive errors may be a source of optimistic biases. Any factor that makes us think our own risk is low could lead us to claim that we are below average in risk if we fail to recognize that the same factor may apply to others as well (Ross and Sicoly, 1979; Weinstein, 1982). From this point of view, hazards rated low in *frequency* could lead to optimistic biases in comparative risk judgments because we forget that the hazards are just as unlikely to strike our peers. Similarly, lack of *experience* with a problem may make it difficult to imagine how it might affect us and lead us to claim that our own risk is below average [see also the concept of "availability" (Tverksy and Kahneman, 1974)]. Both these predictions have received empirical support (Hoch, 1985; Weinstein, 1980, 1982).

Finally, previous work (Weinstein, 1982) has suggested that people use their past experience to predict their future vulnerability. For many hazards, people seem to hold the mistaken belief that if they have not yet experienced the problem, they are exempt from future risk *(absent/exempt).* Such a belief may arise when people believe the problem has a hereditary basis and will appear early in life if it is going to appear at all (e.g., juvenile diabetes and asthma). In other cases (e.g., tooth decay) people may believe that vulnerability is a constitutional matter, so if the problem has not appeared, their bodies must be resistant. Furthermore, some problems may seem to be caused by one's behavior or personality (e.g., obesity and drug addition), and people may conclude that the absence of a problem at their age means that they do not have the weakness of character that allows it to develop.

The present study uses a correlational design to examine these hypothesized relationships between hazard characteristics and optimistic tendencies. It also compares the findings of the present, community-wide investigation with previous tests of these hypotheses (Weinstein, 1980, 1982) in which college students served as subjects.

The third and final goal of the present research is to study the relationships between an individual's personal risk perceptions and his or her stand-

ing on objective risk factors. Although risk factors for many hazards are well known, even to the general public, there is not necessarily a correlation between a person's status on the risk factor and the perception of risk. For example, even though most people acknowledge that seat belts reduce the risk of injury in automobile accidents (Knapper *et al.*, 1976; Newport, 1981), several studies have reported no relationship between reported belt use and perceived susceptibility to injury in an automobile accident (Svenson *et al.*, 1985; Weinstein, 1984). A previous investigation (Weinstein, 1984) observed that college-student subjects did take family history into account in determing their own susceptibility to illness, but the risk-affecting *actions* they took or failed to take seldom were related to perceived risk status. The present study examines this issue in a more diverse population.

METHOD

Study Population

The participants in this study were adult residents (18-65 years of age) of households listed in the New Brunswick, New Jersey, telephone directory. This single directory covered 15 different municipalities in central New Jersey, ranging from upper-middle income suburbs to older, lower-income cities. The racial composition of these communities also varied; the proportion of blacks, for example, ranged from 0 to 25%.

Materials

Three forms were prepared, each containing a completely different set of life hazards. The 32 problems covered (11, 11, and 10 different problems on forms A, B, and C, respectively) appear in Table I. Each of the problems included in a given form was rated on eight different scales. *Comparative risk* questions were worded as follows: "Compared to other men/women my age, my chances of getting [problem] in the future are: much below average, below average, a little below average, average for men/women my age, a little above average, above average, much above average. " For chronic problems, such as diabetes, arthritis, and cancer, people who already suffered from the problems were not asked to estimate future chances. In analyzing the comparative risk judgments, the seven possible responses were assigned numerical values ranging from -3 to $+3$.

Next, the *seriousness* of the problems was rated on a 5-point scale: 1, not at all serious; 2, slightly serious; 3, serious; 4, very serious; 5, extremely serious or fatal. *Preventability* was assessed on a 4-point scale: 1, people can't do anything to reduce their risk; 2, people can reduce their risk a little;

Table I. Comparative Risk Judgments for Health Problems and Other Hazards

Hazard description	Mean[a]	SD
Drug addiction	−2.17***	1.63
Drinking (alcohol) problem	−2.02***	1.47
Attempting suicide	−1.94***	1.69
Asthma	−1.36***	1.38
Food poisoning	−1.25***	1.43
Poison ivy rash	−1.19***	1.73
Sunstroke	−1.17***	1.53
Nervous breakdown	−1.15***	1.56
Homicide victim	−1.14***	1.50
Gallstone	−.84***	1.23
Deaf	−.82***	1.49
Pneumonia	−.80***	1.29
Lung cancer	−.77***	1.77
Skin cancer	−.77***	1.44
Cold sores	−.77***	1.53
Senile	−.76***	1.23
Laryngitis	−.71***	1.40
Gum disease	−.69***	1.49
Tooth decay	−.58***	1.38
Insomnia	−.57***	1.65
Ulcer	−.55***	1.40
Mugging victim	−.54***	1.45
Diabetes	−.53**	1.77
Overweight 30 or more pounds	−.40	2.09
Influenza (flu)	−.31**	1.07
Stroke	−.29	1.40
Serious auto injury	−.27*	1.24
Heart attack	−.24	1.55
Arthritis	−.24	1.52
Falling and breaking a bone	−.10	1.27
High blood pressure	−.02	1.57
Cancer	.08	1.33

[a]A mean less than zero indicates an optimistic tendency to claim that one's risk is less than average. Comparative risk judgments could range from −3 ("much below average") to +3 ("much above average"). Significance levels refer to *t* tests of the hypothesis that the mean is different from zero. N = 87–104.

*$p < .05$.
**$p < .01$.
***$p < .001$.

3, people can reduce their risk a lot; 4, completely preventable. Past *experience* was rated on a 5-point scale: 1, don't know anyone this has happened to; 2, has happened to acquaintances; 3, has happened to close friends or relatives; 4, has happened to me once; 5, has happened to me more than once.

Respondents were also asked whether furture risk can be determined from past experience (*absent/exempt*): "If you haven't had this problem by the time you're my age, it's not likely to happen to you: 1, disagree

2, agree somewhat; 3, agree." Perceived *frequency* was evaluated in the following manner: "Out of one hundred people, how many would you guess experience each of these problems at some time in their lives?" The choices given were "less than 1, 1, 2, 5, 10, 20, 40, 60, 80, over 90." Responsents were also asked how much people worry (*other's worry*) about these problems happening to them: 1, not at all worried or concerned; 2, feel some slight worry; 3, feel moderately worried; 4, quite worried or concerned. A last rating scale asked whether people feel *embarrassed* or reluctant to admit that they have this problem: 1, not at all embarrassed; 2, some slight embarrassment; 3, moderately embarrassed; 4, quite embarrassed.

The survey also asked respondents to describe their status on a number of well-known or widely accepted risk factors for some of the problems on the form they completed. The risk factors included are listed in Table IV. Finally, information about age, sex, education, and occupation was solicited. Occupation was converted to occupation status using the National Opinion Research Center (1983) occupational prestige scale.

Procedure

A combination phone–mail technique was employed. A random procedure was used to select both the individual telephone listings to be called and the particular individual within the household who would be asked to take part in the study: the oldest female, oldest male, youngest female, or youngest male. It has been reported that this procedure for choosing a respondent in a given household yields a sample very similar to that obtained from the more arduous process of listing all household residents and selecting at random from this list (Frey, 1983).

Once telephone contact was made with an individual in the correct age and sex category, he or she was asked to participate in a study of opinions about health and safety issues. Respondents were told that they would have to complete a questionnaire that would be sent by mail. Those who agreed received one of the three survey forms that had been prepared. Two additional telephone reminders and one additional mailing were used to maximize return rates.

RESULTS

Sample Characteristics

During the initial phone contact, 77.7% of the potential respondents agreed to participate. Of these, 87.1% completed and returned the survey.

Thus, the total survey completion rate (based upon households containing an individual in the required age range and able to read English)[5] was 67.7%. For a survey instrument too long to be administered in a telephone interview, the combination phone–mail technique proved highly effective and is recommended to other investigators. The final sample contained 296 individuals, 49.4% male. Ages ranged from 18 to 65 years. Analyses showed that the completion rate was the same for the four subgroups in the study: oldest female, oldest male, youngest female, and youngest male. Further, the completion rate did not vary with either the mean income or the racial composition of the community in which the individual lived.

On the other hand, it was clear from census data that the sample was better educated than the population from which it was drawn. Nevertheless, none of the correlations between educational attainment and any of the 32 comparative risk judgments was significant (all p's $> .1$).[6] Weighting the data to correct the education-level bias in the sample did not affect any of the mean comparative risk judgments by more than 0.1 unit, so no attempt was made to weight the data in other calculations.

Unrealistic Optimism

If the comparative risk judgments given in this study were unbiased, the mean judgment would be zero for each health hazard. A mean less than zero indicates an optimistic bias, a tendency to claim that one's risk is less than the risk of others of the same age and sex. Thus, the mean comparative risk judgment is a measure of unrealistic optimism; the more negative the mean, the greater the bias. Table I presents the 32 hazards in order of decreasing optimism. It is apparent that respondents displayed a significant optimistic bias about most hazards included in the study. Nevertheless, it is important to notice that the amount of bias varied greatly within this set of hazards.

In subsequent sections we examine (1) the relationships between comparative risk judgments and demographic characteristics, (2) correlations between the attributes of hazards and the degree of optimistic bias they evoke, (3) multiple regression analyses of unrealistic optimism, (4) a comparison of the present data with data from two other similar studies (and reanalysis of the combined data set referring to 69 different hazards), and (5) relationships between individuals' comparative risk judgments and their standing on various risk factors.

[5]If it was determined that an eligible individual lived at that residence, but this person could not be reached after four telephone attempts, a survey was mailed anyway. Such cases are included in the completion statistics.

[6]All significance levels reported in this paper refer to two-talied tests.

Correlations Between Comparative Risk Judgments and Demographic Variables

Age. Little connection was found between age and comparative risk judgments. For only three of 32 hazards (insomnia, $r = .22$, $p < .05$; food poisoning, $r = -.29$, $p < .01$; and deafness, $r = .27$, $p < .05$) was there a significant correlation between age and comparative risk judgments. When the risk judgments for all the hazards included in each form were averaged to form a composite measure of optimism, none of the three correlations with age approached significance, r's $< .1$. To test whether there might be a quadratic (i. e., curvilinear) relationship between age and comparative risk, regression analyses were conducted with both age and age^2 as independent variables. Only 1 of 32 regression equations was found to be significant (food poisioning, $p < .05$). Clearly, age does not have a substantial effect on comparative risk judgments.

Sex. None of the correlations between sex and the 32 comparative risk judgments in the study was statistically significant. Similarly, none of the correlations between the average comparative risk judgment on a given form and respondent sex was significant.

Job Status and Education. Only one significant correlation was observed between comparative risk judgments and occupational prestige (with cancer risk, $r = -.31$, $p < .01$). Job prestige was also uncorrelated with the mean comparative risk judgment on a given form (p's > 0.3). As noted earlier, none of the correlations with educational attainment proved significant. When the comparative risk judgments on a given form were averaged, a small correlation was found between educational level and mean risk judgment on one form ($r = -.22$, $p < .05$) but not on the other two forms (p's $> .2$).

Health Problem Attributes Associated with Unrealistic Optimism

If an individual claims that his or her susceptibility to a particular hazard is less than average, we cannot conclude that this is an example of unrealistic optimism. Such a claim may be perfectly correct. The mean comparative risk judgment for the sample of respondents, however, is a measure of bias because this mean should be zero across a population; people who are above average in risk should balance out those who are below average. Consequently, to examine the hazard features that influence the amount of unrealistic optimism elicited by different hazards, the mean comparative risk judgment for each hazard is used as the measure of bias (as this mean decreases, the optimistic bias increases) and the group mean rating is used to measure each of the health problem attributes included in this study. Thus, the hazard is the unit of analysis in these calculations. For

Table II. Correlations Among Mean Health Problem Ratings[a]

	Preventability (M = 2.49; 1.53–3.66)	Absent/exempt (M = 1.25; 1.02–1.77)	Experience (M = 2.54; 1.41–4.40)	Frequency (M = 22.0; 2–90)	Embarrassment (M = 2.00; 1.06–3.48)	Seriousness (M = 3.14; 1.46–4.71)	Others' worry (M = 2.05; 1.26–3.70)
Comparative risk	−.45**	−.82***	.45**	.37*	−.48**	.01	.45**
Preventability		.50**	−.10	.01	.35*	.22	.12
Absent/exempt			−.08	−.04	.47**	−.13	−.35*
Experience				.90***	−.33	−.51**	−.04
Frequency					−.25	−.39*	.03
Embarrassment						.48**	.22
Seriousness							.77***

[a]The grand mean and the range of the means for the ratings of the 32 hazards are given beneath each variable. N = 32.

*$p < .05$.

**$p < .01$.

***$p < .001$.

a measure of perceived frequency, the median rather than the mean rating is used to reduce the influence of occasional extreme values. Conclusions drawn concerning this variable would be unchanged if the geometric mean or log geometric mean were used instead.

Table II presents the correlations among these measures. Consistent with predictions and with previous studies, optimistic biases increase with perceived preventability, with perceived embarrassment, and most strongly, with the belief that one is exempt from risk if the problem has not yet appeared. Optimistic biases decrease with experience, perceived frequency, and the perceived extent of others' worry. Optimism was unrelated to perceived seriousness.

Additional analyses tested the claim (Kirscht *et al.,* 1966) that individuals who regard a problem as particularly serious are more optimistic. When between-subject correlations relating comparative risk judgments to seriousness ratings were calculated for each hazard in this study, eight positive correlations proved significant ($p < .05$), and no negative correlations were significant. Thus, for eight hazards the people who thought a problem is particularly serious were *less* likely to be optimistic about their own susceptibility.

Multiple Regression Analyses

Table II shows that the predictors are not independent, and much of the variance apparently explained by the predictors in Table II is redundant. Multiple regression calculations in which all variables were entered simultaneously into the prediction equation were carried out to determine which variables make unique contributions to the prediction of unrealistic optimism, how much variance can be predicted by this set of variables, and whether this variance is greater than expected from chance alone. Stepwise regression analysis, which is more vulnerable to chance associations, was then used to determine the most parsimonious set of predictors.

There is no evidence in Table II that worry led people to claim below average risk. In fact, since the correlation is positive, the data suggest that worry may be a consequence rather than a cause of beliefs about vulnerability. Because we wished to restrict the regression equation to factors that seemed most plausible as causes of optimism, "others' worry" was not included in these analyses (see Weinstein, 1982, p. 453).

With six independent variables entered simultaneously, the overall regression equation is highly significant [$R^2 = .83$, $F(6,25) = 20.87$, $p < .001$]. In this equation, optimism is greater for hazards high in the variable absent/exempt [$F(1,25) = 31.2$, $p < .001$] and is smaller for hazards with which people have more experience [$F(1,25) = 7.55$, $p < .01$]. In stepwise

regression analysis, the results remain the same, with only absent/exempt and experience entering the prediction equation (p's $< .001$, $R^2 = 0.81$). However, Table II shows that experience and frequency are highly correlated. If experience is removed from the regression equation, frequency takes its place and makes a highly significant contribution ($p < .001$), with the total variance explained decreasing only slightly ($R^2 = 0.78$). Thus, because of this collinearity, the roles of experience and perceived frequency cannot be distinguished in these analyses.

Comparison with Previous Studies

Table III allows a comparison between the results of the present study and those of two previous investigations (Weinstein, 1980, 1982) that had also examined the relationship between the amount of bias associated with different hazards and the attributes of the hazards.

Table III shows the associations between the mean comparative risk judgments and those hazard event attributes for which ratings were obtained in all three studies. The correlations from these studies, using different subjects and many different hazards, were generally very similar. When the data sets were combined,[7] a regression analysis using all predictors in Table III was carried out [$R^2 = .57$, $F(5,91) = 24.0$, $p < .001$]. The individual variables that were significant in this equation were absent/exempt [$F(1,91) = 55.3$, $p < .001$] and preventability [$F(1,91) = 27.5$, $p < .001$]. However, the high correlation between experience and perceived frequency that is visible in Table II once again obscures the roles of these two variables. In a stepwise analysis, absent/exempt [$F(1,93) = 58.4$, $p < .001$], preventability [$F(1,93) = 30.9$, $p < .0001$], and frequency [$F(1,93) = 13.8$, $p < .001$] enter the regression equation ($R^2 = 0.57$). If perceived frequency is removed, however, experience [$F(1,93) = 11.5$, $p < .,001$] enters in its place, with

[7]Linear transformations had to be performed on some variables before these data sets could be combined. For example, comparative risk was measured on a quite different scale in the 1980 paper than the scale used in the present study. A linear regression using events common to the 1980 and 1982 studies was used to determine the transformation that would bring the 1980 data in line with the 7-point scale used here and in the 1982 paper. Also noteworthy is the change in the variable absent/exempt from a 2-point scale ("disagree" or "agree") in 1982 to a 3-point scale ("disagree," "agree somewhat," or "agree") in the present investigation. This intermediate choice seemed to increase greatly the correlation between this variable and the mean comparative risk judgment. Because this change of scale seemed so important, a new sample of introductory psychology students, the same population used in the 1982 study, was asked to rate all the hazards included in the 1980 and 1982 studies on this new 3-point scale. As seen in Table III, the correlations between this new measure of absent/exempt and the comparative risk judgments in those studies were quite high. Because a few hazards were used in all three studies, they were weighted when the data were combined to keep them from having an excessive influence on the final results.

Table III. Correlations of Mean Comparative Risk Judgments with Health Problem Ratings in Different Data Sets

Absent/exempt[a]	Preventability	Experience	Frequency	Seriousness
	Present study (N = 32[b])			
−.82***	−.45**	.45**	.37*	.01
	Weinstein (1982) (N = 45)			
−.57***	−.36*	.39**	.38**	−.36*
	Weinstein (1980) (N = 24)			
−.75***	−.67***	.42*	.16	−.09
	Combined data set (N = 101)			
−.61***	−.40***	.39***	.33***	−.18

[a]Ratings of absent/exempt for hazards in the 1980 and 1982 studies were obtained later from a separate group of subjects. See footnote 7.
[b]Number of hazards in data set.
*$p < .05$.
**$p < .01$.
***$p < .001$.

little difference in the amount of variance explained (R^2 = 0.56). Other multiple regression analyses of the 1980 data and the 1982 data from Table III found the same variables making unique contributions to the prediction of optimistic biases. Thus, the collinearity problem is restricted to frequency and experience; conclusions about the role played by other predictors are quite reproducible.

A close analysis of the data reveals why preventability proved to be a significant predictor for the combined set of data but not for the 32 problems examined in the present investigation. Although the correlation between preventability and absent/exempt is 0.50 in Table II, it is only 0.08 in the combined data set. The present sample of hazards is missing examples that are rated high on absent/exempt but low on preventability (as asthma, epilepsy, and multiple sclerosis are rated). The present sample is also missing problems that were rated low on absent/exempt but high on preventability (such as back disc problems and divorce). With the more complete set of hazards represented by the combined data set, the regression analysis shows that perceived preventability is a powerful predictor of unrealistic optimism independent of absent/exempt.

Additional, exploratory calculations looked at possible interactions among the predictor variables in the combined data set. When each of the 10 possible two-way interactions was added to a regression equation already containing the five independent variables, moderate but significant increases in R^2 were obtained in four cases: absent/exempt × preventability

($\triangle R^2 = 0.03, p < .01$), preventability × frequency ($\triangle R^2 = 0.02, p < .05$), preventability × seriousness ($\triangle R^2 = .04, p < .005$), and experience × seriousness ($\triangle R^2 = .04, p < .005$). Further study is needed to determine whether these findings are reproducible and what they may tell us about the processes that lead to optimistic biases.

Relationships Between Comparative Risk Judgments and Likely Risk Factors

Table IV presents the correlations between individuals' comparative risk judgments and their self-reported standing on relevant risk factors. A number of the correlations shown in Table IV are quite large, suggesting that the risk judgments are meaningful measures of perceived risk. Nevertheless, many of the correlations in the table are small and nonsignificant; people's views of their risk do not necesssarily reflect the most important risk factors for a given hazard. According to Table IV, people usually do take family history into account in formulating ideas of their risk. In addition, past experience that indicates constitutional vulnerability (e.g., average number of cavities found in previous dental visits) is given substantial weight.

For risk factors that refer to individual behaviors, on the other hand, the relationships are less consistent. Cigarette smoking is a powerful risk factor for many illnesses. It is strongly correlated with subjects' judgments of lung cancer risk, has a small correlation with risk judgments for heart attack and cancer in general, and has no significant correlation with the perceived risk of stroke. Furthermore, except for frequency of drinking, none of the other behavioral risk factors is correlated with perceived risk. There is no association between auto safety belt use and perceived risk of injury in an auto accident, between excercise or dietary cholesterol and heart disease risk, or between flossing of one's teeth and vulnerability to gum disease. Even for drinking, the relationship between the behavior and the perceived risk is optimistically skewed. What one finds is that 77% of the people who never drink place themselves in the lowest comparative risk category, but of those who drink alcoholic beverages four or more times a week, only 18% place themselves in *any* of the above average risk categories. In other words people give themselves credit when they do not drink but do not acknowledge that frequent drinking may place them in a higher than average risk category.

DISCUSSION

Several conclusions can be drawn from the preceding results. Unrealistic optimism is prevalent among the population as a whole, not just

Table IV. Correlations Between Individuals' Comparative Risk Judgments and Their Status on Actual or Popularly Accepted Risk Factors[a]

Health hazard	Risk factors	Correlation
Diabetes	Family history of diabetes[a]	.65***
	Overweight (weight/height^2)	.28**
Hypertension	Family history of hypertension	.26*
	Salt consumption (1, not at all; 4, use a lot)	.07
	Job stress (1, very little; 4, a lot)	−.05
	Anxiousness (1, very relaxed; 4, quite anxious)	.15
Cancer	Family history of cancer	.34***
	Cigarette smoker[b]	.23*
Lung cancer	Family history of cancer	.06
	Cigarette smoker[b]	.56***
Gum disease	Flossing teeth (0, never; 4,4 to 7 times/week)	.01
Tooth decay	Candy eaten (days/week)	.12
	Typical cavities/dentist visit	.51***
	Flossing teeth	.12
Arthritis	Family history of arthritis	.27*
Heart attack	Dietary cholesterol (1, normal American diet; 3, much less than average)	−.09
	Strenuous exercise (hr/week)	−.10
	Family history of heart disease	.09
	Cigarette smoker[b]	.26*
	Hard-driving personality (1, easygoing; 4, hard driving)	.19
Stroke	Cigarette smoker[b]	.15
Attemping suicide	Unhappy (1, very happy; 5, unhappy)	.38***
Drinking	Frequency of drinking (0, never; 4, more than once a day)	.42***
Serious auto injury	Hours per week in car	.18
	Safety belt use (percentage of time used)	−.05
Murder victim	Home crime rate (1, below average; 3, above average)	.25**
Mugging victim		
Male	Home crime rate	−.04
	Height (ft)	.01
	Nights out past midnight/week	−.17
Female	Home crime rate	.37**
	Height	.18
	Nights out past midnight/week	−.04

[a]Family history refers to the number of parents and grandparents who had experienced a given problem. N = 79–106 depending on hazard set and missing data. For mugging, N (male) = 55 and N (female) = 50.

[b]Very similar results are obtained if the number of cigarettes smoked per day is used instead of the smoker–nonsmoker distinction.

*$p < .05$.
**$p < .01$.
***$p < .001$.

among college students. Furthermore, optimistic biases are largely unrelated to age, sex, level of education, or occupational prestige. The principal characteristics determining the amount of bias elicited by the 69 different hazards that have been considered were (1) the belief that if the problem has not yet appeared, one is exempt from future risk; (2) the perception that the problem is preventable by individual action; (3) the perception that the hazard is infrequent; and (4) lack of experience with the hazard. If a hazard had such characteristics, people had a strong tendency to conclude that their own risk was less than the risk faced by their peers. A prediction equation including the first three of these factors accounts for 57% of the variance in the amount of unrealistic optimism elicited by different hazards.

The first of these hazard attributes has received little attention in previous discussions of risk perceptions, but it played a very powerful and consistent role in the risk judgments studied here. It is certainly the most important new finding in the present research. For many hazards, an optimistic bias is introduced into comparative risk judgments when people extrapolate from their past experience (not having experienced a problem) to conclude that their future vulnerability is relatively low. Such extrapolation appears more likely when a problem is believed to have a hereditary origin (and to appear in childhood), when a problem is seen to be a matter of bodily resistance, or when it is thought to have a behavioral or emotional origin.

Interestingly, not one of the 32 events in the present study scored higher than the midpoint ("agree somewhat") on the three-step absent/exempt scale. In spite of this restricted range, the correlation with optimistic bias was strong and the regression coefficient was quite large. Clearly, it does not take a strong belief in the idea that past experience predicts future vulnerability to produce an optimistic bias. If people have not yet experienced a problem, the belief that there is even a slight correlation between the past and the future apparently leads them to conclude that in their own case the past is highly predictive; they are unlikely to experience future harm. The beliefs people hold about the links between the present and the future are often mistaken, and people seem to forget that few of their peers may have any experience with the problem either.

The very high correlation between absent/exempt and unrealistic optimism across hazards may raise the notion that respondents were unable to distinguish between these two variables, with the high correlation being an artifact of subject confusion. In contrast, the present discussion has suggested that extrapolation from past experience to future risk adds an optimistic bias to comparative risk ratings, but is certainly not their sole determinant. To examine this question the two ratings were correlated within hazards (a between-subject correlation rather than a between-hazard correlation). The median correlation was found to be only .13 (range, $-.15$ to .39), making the artifact interpretation unlikely.

It is also possible that subjects found the differences between experience and absent/exempt confusing. Whereas experience refers to the individual's own history, absent/exempt asks about the perceived link between past experience and future susceptibility. That respondents were able to distinguish between these variables is indicated by the near-zero correlation in Table II and by the fact that when the ratings given by different individuals are correlated within a hazard, the median correlation is only .14 (range, −.12 to .31).

The absent/exempt variable may explain why the expected decline in unrealistic optimism with age was not observed in this study. The absent/exempt ratings of the hazards on a given form were averaged and analyzed by a linear model containing the variables age and form. The effect of age proved highly significant [$F(1,234) = 16.0$, $p < .001$], and age explained 11.6% of the variance (pooled $r = .34$). This finding suggests that older people are more likely to rely on past experience to predict the future. If they have not yet experienced a hazard, they are more prone than younger people to decide that they are below average in risk. Such optimism-increasing thinking may have offset other age-related changes that would have decreased optimism. In discussing the lack of age effects, however, it is important to bear in mind that we are speaking about comparative risk judgments. Thus, older respondents were just as likely as younger respondents to assert that they were less at risk than *same-aged* peers. It may well be that older adults see the absolute risk levels they face as being much higher than those faced by younger people.

Once again, the data failed to support the defensive denial interpretation of unrealistic optimism. The seriousness of a hazard was not correlated with the amount of bias found in this study, and high scores on the alternative measure of threat, other's worry, were associated with less optimism, not more.

The role of perceived preventability in increasing optimistic biases has been discussed in other papers (Weinstein, 1980, 1982, 1984; Zakay, 1984). The consistent findings with respect to this variable do not, however, lead to any clear conclusions about the origin of unrealistic optimism. The hypothesis that this characteristic should be important can be derived both from notions of self-esteem maintenance and from the idea of cognitive limitations (Weinstein, 1980).

The variable embarrassment did not prove to add any explanatory power beyond that already provided by preventability and absent/exempt. This result was somewhat surprising, given the strong social stigma associated with the health problems at the top of the list in Table I. Either their bias is adequately explained by these other variables, or the embarrassment rating scale failed to measure the element of social censure that accompanies such problems.

The present data were also unable to disentangle the roles of experience and perceived frequency because these two variables were too highly intercorrelated. In fact, it appears that little more can be learned from correlational studies such as those summarized in Table III. Researchers interested in understanding the origin of optimistic biases and ways of minimizing these biases will need to emphasize experimental designs in future investigations.

Finally, Table IV demonstrates that risk judgments are only occasionally based on important risk factors. In some cases, the absence of a significant correlation may reflect ignorance: subjects may have been unaware that cigarette smoking is a risk factor for stroke. In many other cases, however, people certainly do know that the risk factor is important. Nevertheless, they fail to use it in any consistent way to formulate a notion of their own vulnerability to harm. The results in Table IV generally support the findings reported by Weinstein (1984) that family history is considered and that behavioral risk factors are usually not considered (at least, not considered in a consistent way) in arriving at personal risk judgments. However, the differences from hazard to hazard may be as important as the similarities. To study the origin of risk perceptions in more detail, we would benefit from more thorough studies of specific hazards.

The data in Table IV have direct implications for prevention programs. Clearly, it is not sufficient that the public knows what the major risk factors are. Health promotion programs need to go further. They must try to make certain that people actually apply this risk-factor information to themselves and form personal risk perceptions that reflect their standing on these risk factors. An intervention derived from this line of reasoning proved sucessful in increasing automobile seat belt use (Weinstein *et al.*, 1986).

People often seem quite ingenious in finding reasons for believing that their own risk is less than the risk faced by their peers. Programs that hope to encourage appropriate self-protective behaviors need to be equally ingenious in understanding the origins of this unrealistic optimism and in finding approaches that help people gain a more accurate picture of their own susceptibility to harm.

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