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Risk Taking From the Participant's Perspective: The Case of Driving and Accident Risk

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Although perceived health risk plays a prominent role in theories of health behavior, its empirical role in risk taking is less clear. In Study 1 ($N = 129$), 2 measures of drivers' risk-taking behavior were found to be unrelated to self-estimates of accident concern but to be related to self-ratings of driving skill and the perceived thrill of driving. In Study 2 ($N = 405$), out of a wide range of potential influences, accident concern had the weakest relationship with risk taking. The authors concluded that although health risk is a key feature in many theories of health behavior and a central focus for researchers and policy makers, it may not be such a prominent factor for those actually taking the risk.

Keywords: risk-taking behavior, risk perception, traffic accidents, self-protective behavior, speeding

There are many activities that individuals engage in that have potentially negative outcomes for their health. People willingly expose themselves to such activities as mountain climbing, smoking, drinking alcohol, eating high-cholesterol diets, driving, and having unprotected sex. Though there has been an increase in the awareness of the risks associated with health-threatening activities over recent years, it has been argued that there has not been a corresponding decrease in risk-taking behavior relating to those activities (Rotheram-Borus & Koopman, 1991; Schacter, 1982; Stewart & Brook, 1983). Gibbons and Gerrard (1995) noted that "the lack of a (logical) relation between risk awareness and risk behavior has puzzled many researchers who have been trying to figure out why it is that young people often choose to engage in various activities that they know put them and their health at risk" (p. 505). We would argue that the same argument applies beyond a specific age group.

The puzzle would appear to be based on the assumption that people are aware of the risks that they run and that this awareness should be a good predictor of behavior. One solution to this puzzle could be as follows. Although many health behavior models focus on perception of the health threat as the main predictor of behavior, we will investigate the alternative possibility that the health threat itself may be a relatively poor predictor of behavior compared with other influences, such as the benefits of engaging in the risky behavior.

A number of theories have attempted to predict risk-taking behavior with respect to personal health. As noted by Goldberg, Halpern-Felsher, and Millstein (2002), general health models, such as the health belief model (Rosenstock, Strecher, & Becker, 1994), the protection motivation theory (Floyd, Prentice-Dunn, & Rogers, 2000), the theory of planned behavior (Ajzen, 1991), and stages of change (Prochaska et al., 1994), do include both perceived benefits and costs in their framework. However, Goldberg et al. also noted that the focus of these theories has been on the costs of risk-taking behavior. When benefits are considered, then, it is more often the case that it is the perceived benefits of the recommended health action that are considered rather than the perceived benefit of the risk taking itself. In other words, there is a relative absence of research that focuses directly on the perceived benefits of engaging in risky behavior. For some domains, this relative paucity of data on perceived benefits has in part been addressed. For example, in drinking behavior (Christiansen, Roehling, Smith, & Goldman, 1989; Goldberg et al., 2002) and tobacco use (Parsons, Siegel, & Cousins, 1997), there is an acknowledgment of the role of perceived benefits. However, for most other areas, the perceived benefits of risk taking have been ignored. The main thrust of the present work is motivated by the hypothesis that although perceived costs may deter behavior, they are less likely to account for the engagement with the activity in the first place. For example, some people might be deterred from smoking cigarettes on the basis of the perceived health risk, but this factor is unlikely to provide an adequate account of the behavior of those people who choose to engage in the activity. Failing to be deterred has no necessary connection with engagement in an activity. To account for the active engagement in risk taking, an understanding of the perceived benefits may be critical.

There are also processes that could diminish the impact of perceived costs on behavior. For example, it has been found that people tend to underestimate the likelihood that negative events will happen to them. This is known as unrealistic optimism and has been demonstrated in many different domains, such as having a heart attack, being fired (Chambers & Windschitl, 2004), getting divorced (Lin & Raghubir, 2005), or being involved in a road accident (Horswill, Waylen, & Tofield, 2004; McKenna & Albery, 2001).

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One potential consequence of such beliefs is that if people underestimate their personal risk, then they have less incentive to protect themselves against those risks (Weinstein, 1989). If people consider themselves less vulnerable to risk than others, then this could explain why increased public awareness of societal risks has not automatically led to marked decreases in personal risk-taking behavior. For example, Tyler and Cook (1984) found that mass media communications of crime resulted in an increase in individuals' perception of the magnitude of the societal problem, but there was no change in their perception of their personal vulnerability. Similarly, it has been found that communications on AIDS resulted in an increase in individuals' estimates of the societal problem, but there was no associated change in perceptions of personal vulnerability (Spears, Abraham, Abrams, & Sheeran, 1992).

In the present investigation, we assessed the extent to which concern about threats to health was related to risk-taking behavior and compared the magnitude of this relationship with alternative influences on risk-taking behavior. The aim of the study was to examine the idea that although the risk of negative outcome may be very much on the minds of researchers and policy makers, it may not be such a key concern of those actually participating in the activity. To explore this issue, we hypothesized that perceived benefits would significantly account for risk-taking behavior even when the perceived cost of the health threat has been taken into account.

We chose to investigate an everyday risk-taking activity that is responsible for the loss of more preretirement years than any other factor (Evans, 1991)—namely, driving. Although driving is a daily activity for many people, it is associated with the possibility of a severe negative consequence: the chance of being injured in a car crash. Despite the risk of accidents, drivers behave in ways that have been demonstrated to inflate their accident risk, such as traveling too fast (Wasielewski, 1984), following the car in front too closely (Evans & Wasielewski, 1983), overtaking dangerously (Wilson & Greensmith, 1983), and committing driving violations (Parker, Reason, Manstead, & Stradling, 1995).

Study 1

One of the most consistently powerful predictors of accident involvement in the literature is speeding (e.g., Wasielewski, 1984; Wilson & Greensmith, 1983), and Walton and Bathurst (1998) reported that drivers are well aware of this, rating speeding as a main factor in unsafe driving. Nevertheless, many drivers are willing to break the legal speed limit. We therefore decided to use drivers' speed choice as a measure of everyday risk taking.

We used a video-based simulation test to measure drivers' speed preferences (Horswill & McKenna, 1999). In the video measure, participants were shown a driver's-eye view of a series of road situations and estimated to what extent they would travel faster or slower than the driver in the video. Horswill and McKenna (1999) validated the measure by showing that test performance was related to speed-related accident involvement as well as to known gender and age differences in speeding behavior.

In addition, we wanted to determine whether the findings generalized beyond speeding to other accident-related risk taking. An eight-item questionnaire measure of driving violations, developed by Parker et al. (1995), was found to predict accident involvement. These violations included breaking traffic laws and deviant driving behavior.

Our aim was to explore the extent to which attitudes to the health threat in driving were related to drivers' risk taking in comparison to the influence of other factors. In assessing the health threat, we developed two measures of accident concern. One assessed the personal likelihood of accident involvement, and the other included an affective component, worry about being involved in an accident.

Two alternative influences on drivers' risk taking, thrill and self-perceived skill, were explored. The thrill component was used to examine the extent to which there might be an intrinsic pleasure associated with risk taking. The self-perceived skill component followed the work of Svenson (1981), who found that most drivers perceive that they are more skillful than the average driver. It has been argued that perceived superiority benefits self-esteem (Taylor & Brown, 1988), and so we explored the hypothesis that this perceived superiority may be associated with risk taking.

Method

Sample. Participants were members of the public who had indicated their willingness to be tested in the laboratory during an earlier survey on driving. A total of 129 drivers were tested (75 men and 54 women). The mean age of participants was 28.6 years, and participants drove an average of 12,579 miles (20,244 km) per year over the previous 3 years. The mean time since passing the U.K. driving test was 9.36 years. They were paid £20 for participating.

Procedure. Participants attended the laboratory to perform an hour-long battery of tests relating to driving, which included the instruments relevant to the current study. Participants completed the video speed test before the questionnaire. The video speed test involved presenting participants with seven road scenes filmed from the driver's point of view (Horswill & McKenna, 1999). At a predetermined point in each scene (clear road ahead), the experimenter paused the video. Participants then indicated on a response sheet to what extent they personally would be driving faster or slower than the vehicle in the video. For example, if they would normally drive 10 miles per hour (mph; 16 km per hour [kph]) faster, then they would write down "+10."

In the driving violations questionnaire (Parker et al., 1995), participants were asked how often they engaged in eight driving violations. Participants responded on a 6-point frequency scale ranging from 0 (*never*) to 5 (*nearly all the time*). The violations were as follows: (a) Drive especially close to the car in front as a signal to its driver to go faster or get out of the way; (b) become impatient with a slow driver in the outer lane and overtake on the inside; (c) cross a junction knowing that the traffic lights have already turned against you; (d) angered by another driver's behavior, you give chase with the intention of giving him or her a piece of your mind; (e) disregard the speed limits late at night or very early in the morning; (f) drive even though you realize you may be over the legal blood-alcohol limit; (g) have an aversion to a particular class of road user and indicate your hostility by whatever means you can; and (h) get involved in unofficial races with other drivers.

Two measures of accident concern were assessed. In the first, participants rated the extent of their agreement or disagreement (on a 9-point scale) with the following statement: "I sometimes feel worried that I will be involved in an accident." In the second, participants were asked, "How likely are you to be involved in accidents in the future compared with the average driver?" Responses were given on an 11-point scale ranging from 1 (*much less likely*) to 11 (*much more likely*), with the midpoint labeled as *average*.

Two alternative measures of possible influences on risk taking were assessed. In the first, participants rated the extent of their agreement or

disagreement (on a 9-point scale) with the following statement: "I often get a thrill from driving." In the second, participants were asked, "How skillful do you think you are compared with the average driver?" Responses were on an 11-point scale ranging from 1 (*much less likely*) to 11 *(much more likely*), with the midpoint labeled as *average*.

Results

Overall scores for the risk-taking measures were calculated by averaging the items (video speed test: $M = +3.65$ mph [5.87 kph], $SD = 4.97$ mph [8.00 kph], Cronbach's alpha = .73; violations questionnaire: $M = 0.75$ on a 0–5 scale, $SD = 0.62$, Cronbach's alpha = .80). The violations score was skewed (skewness = 1.79), and this skew was reduced by performing a logarithmic transform (skewness = 0.65). However, given that the results were virtually identical with or without this transformation, we have presented the findings using the untransformed variable.

Inspection of the distributions of four influence items indicated the absence of ceiling or floor effects (thrill item: $M = 4.09$ on a 0–8 scale, $SD = 1.75$; accident worry item: $M = 4.72$ on a 0–8 scale, $SD = 1.93$; self-rating of own driving skill: $M = 6.90$ on a 1–11 scale, $SD = 1.35$; self-rating of own accident liability: $M = 5.32$ on a 1–11 scale, $SD = 1.76$). The correlations between the risk-taking measures and the influences can be seen in Table 1.

To determine whether the thrill item accounted for significant variance in risk taking not accounted for by the accident worry item, we conducted hierarchical regressions for each of the risk-taking measures. In each regression, the risk-taking measure was the dependent variable, and the accident concern item was entered first as a predictor. The thrill item was entered as a predictor in the second block. For each risk-taking measure, thrill could account for variance in risk taking beyond that accounted for by the accident worry variable: video speed test, $\Delta R^2 = .04$, $\beta = .21$, $t(125) = 2.33$, $p < .05$; violations questionnaire, $\Delta R^2 = .10$, $\beta = .32$, $t(126) = 3.80$, $p < .05$. For each risk-taking measure, thrill could account for variance in risk taking beyond that accounted for by self-rated accident liability: video speed test, $\Delta R^2 = .04$, $\beta = .20$, $t(123) = 2.21$, $p < .05$; violations questionnaire, $\Delta R^2 = .10$, $\beta = .33$, $t(123) = 3.78$, $p < .05$. However, when thrill was entered in the first block and accident worry/self-rated accident liability was entered in the second, neither accident worry nor self-rated accident liability could account for significant variance in any of the two risk-taking measures beyond that accounted for by thrill.

Self-rated skill could account for significant variance in both risk-taking measures beyond the variance accounted for by the accident worry variable: video speed test, $\Delta R^2 = .10$, $\beta = .33$, $t(125) = 3.73$, $p < .05$; violations questionnaire, $\Delta R^2 = .07$, $\beta = .28$, $t(125) = 3.11$, $p < .05$. In addition, self-rated skill could account for significant variance in both risk-taking measures beyond the variance accounted for by self-rated accident liability: video speed test, $\Delta R^2 = .11$, $\beta = .33$, $t(125) = 3.82$, $p < .05$; violations questionnaire, $\Delta R^2 = .06$, $\beta = .25$, $t(125) = 2.87$, $p < .05$. However, when self-rated skill was entered in the first block and accident worry/self-rated accident liability was entered in the second, neither accident worry nor self-rated accident liability could account for significant variance in any of the two risk-taking measures beyond that accounted for by self-rated skill.

Table 1
Pearson Correlations Between Driver Influences and Risk-Taking Measures in Study 1

Risk-taking measure	Worried about accidents	Rating of own accident liability	Thrill from driving	Rating of own driving skill
Video speed test	−.07	.06	.20*	.32**
Violations questionnaire	.04	.04	.33**	.25**

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

Discussion

Both the thrill seeking and the self-rated skill items could account for variance in risk taking that accident concern could not. In this study, there appeared to be little association between health threat and risk taking in comparison to other factors. One explanation for these results could be frequency of reinforcement. Evans (1991) estimated that the average driver has an accident once every 10 years, indicating that accidents are rare on a personal level. However, the benefits of risky driving, such as thrill and perceived superiority, could be experienced more regularly and hence may influence the risky behavior more than the perceived health threat.

In attempting to assess risky behavior, we have endeavored to combine a questionnaire approach with a methodology designed to provide environmentally rich contextual cues: digital video simulation. It is noteworthy that the pattern of results replicated across methodology.

One potential limitation of Study 1 is the dependence on single-item measurement scales that have traditionally been frowned on because, other things being equal, longer tests are generally considered superior, with more items leading to greater internal consistency. As Nunnally (1978) has noted, if the average correlation among items remains the same, then the main method of making a test more reliable is to add more items. However, several defenses of single-item scales have been offered. It has been noted, for example, that single-item scales are more efficient and cost-effective and have more face validity (Nagy, 2002). For these reasons, there has been increasing interest in their use for health screening (Kirsch, Passick, Holtsclaw, Donaghy, & Theobald, 2001; Pomeroy, Clark, & Philp, 2001; Watkins, Daniels, Jack, Dickinson, & van den Broek, 2001). In addition, several authors have defended the psychometric properties of single-item scales (Gardner, Cummings, Dunham, & Pierce, 1998; Nagy, 2002; Robins, Hendin, & Trzesniewski, 2001; Wanous, Reichers, & Hudy, 1997). However, single-item scales do have weaknesses, such as a greater dependence on the particular wording of the items, that could lead to poor reliability. Study 2 was designed to complement the single-item scales with work using multiple-item scales.

Study 2

In Study 2, we constructed a new questionnaire that was designed to produce multiple-item scales of a number of alternative influences on drivers' risk-taking judgments. A wide range of influences was considered, including such factors as the pressure to reduce journey times, the mood of the driver, and the presence of passengers. Many of these influences are associated with neg-

ative outcomes that are not a threat to health, such as being stopped by the police or concern about fuel consumption. It has been found, for example, that police presence has an effect on drivers' speeding behavior (Rothengatter, 1988). The aim of this study was to determine whether these alternative influences relate to drivers' risk-taking behavior more than concern about health risk.

Method

Sample. Four hundred five participants took part in the study, and all had passed the U.K. driving test. There were 209 men and 188 women (with 8 of unknown gender), the mean age was 31.4 years, the mean mileage was 9,340 miles (15,031 km) per year, and the average number of years driving was 12.0. Two hundred twenty-four participants were recruited via local companies and were not paid. They were asked to complete the questionnaire and return it in a prepaid envelope (62% response rate). The remainder of the participants were members of the university who completed the questionnaire while taking part in other studies for which they were either paid or given course credit.

Procedure. A questionnaire was designed to investigate other possible factors that might influence speeding behavior. Twenty-one items were developed around seven possible influences. These were (a) legal constraints; (b) the mood state of the driver (hereafter referred to just as "mood"); (c) the presence of passengers ("passengers"); (d) the need to reduce journey time ("journey time"); (e) economic considerations, such as wear and tear and fuel consumption ("economics"); (f) thrill seeking ("thrill"); and (g) concern about accidents ("accident worry"). There were three items relating to each of these seven factors (see Table 2 for a listing of the items used). The response to each item was on a 9-point frequency scale ranging from 0 (*never*) to 8 (*always*).

The Driver Influences Questionnaire was administered as part of a larger driving questionnaire that also consisted of demographic information, driving history, and the driving violations inventory (Parker et al., 1995). In addition, a three-item questionnaire measure of drivers' speed choice was included that has been shown to correlate both with accident involvement and individuals' observed driving speed, and which had a high retest reliability ($r = .70$) after a 2-year interim (French, West, Elander, & Wilding, 1993; West, Elander, & French, 1991; West, French, Kemp, & Elander, 1993). The items were as follows: "How often do you (1) exceed the 70 mph [113 kph] speed limit during a motorway journey, (2) drive fast and (3) exceed the speed limit in built-up areas?" Participants responded on a 6-point scale ranging from 0 (*never or very infrequently*) to 5 (*very frequently or always*).

Results

The internal consistency for each of the seven potential influences was computed to determine whether the three items comprising each influence were measuring the same construct. The internal consistency of the legal constraints, mood, journey time, and thrill influences were reasonable (Cronbach's alpha $> .7$, see Table 2), and so measures for each of these were calculated by averaging all three items for each influence. Internal consistency was poorer for the passengers, economics, and accident worry influences. Inspection of the intercorrelation of the items compris-

Table 2
The Seven Potential Influences on Drivers' Risk-Taking Behavior

Influence	Items comprising influence measures	Cronbach's α	*M* (0–8 scale)	*SD*
Legal constraints	Be extra vigilant for police when you break the speed limit.	.77	3.71	1.90
	Drive faster if there was no legal speed limit.			
	Drive faster in a place where there is unlikely to be police or other speed enforcement.			
Mood	Allow your driving style to be influenced by what mood you are in.	.74	2.94	1.60
	Become angry with other people's driving styles.			
	Drive faster when you are in a bad mood.			
Passengers	Slow down when your passengers appear uncomfortable with your driving speed.	.41	4.15	1.94
	Change your driving style when there are passengers in your vehicle.			
Journey time	Drive faster when you know there would be a considerable savings in journey time.	.82	3.63	1.71
	Drive faster if you are late for an important appointment.			
	Try and get your journey over and done with in the shortest possible time.			
Economics	Drive in such a way as to improve fuel economy (reversed).	.67	3.31	1.89
	Make a conscious effort to drive in such a way so as to reduce wear and tear on your vehicle (reversed).			
Thrill	Get a thrill from driving.	.95	3.10	2.11
	Enjoy the sense of excitement while driving.			
	Feel a sense of exhilaration from driving.			
Accident worry	Feel worried you will be injured in an accident (reversed).	.81	4.83	2.03
	Think about the consequences of being hurt in an accident (reversed).			

ing each of these influences revealed that more reliable scales could be produced by excluding a particular item from each. Inspection of histograms indicated that all the excluded items suffered substantial floor effects. The scores for these influences were therefore calculated by averaging the remaining two items in each case. The final internal consistency for each influence is shown in Table 2. Note that the influence of passengers still yielded a poor internal consistency (probably due in part to a ceiling effect for one of the items). However, analysis revealed that the same pattern of results was obtained for either the single item with no ceiling effect or both items collapsed (we present the analysis based on both items for simplicity).

Overall scores for the risk-taking measures were calculated by averaging the items (speed questionnaire: $M = 2.48$ on a 0–5 scale, $SD = 1.05$, Cronbach's alpha = .73; violations questionnaire: $M = 0.69$ on a 0–5 scale, $SD = 0.51$, Cronbach's alpha = .71). The violations score was skewed (skewness = 1.35), and this skew was reduced by performing a logarithmic transform (skewness = 0.43). However, given that the results were virtually identical with or without this transformation, we have presented the findings using the untransformed variable.

The correlations between the seven driver influences and the two risk-taking measures can be seen in Table 3. The direction of these relationships indicates that drivers who reported taking more risk via the speed and violations questionnaires were more likely to (a) modify their behavior if the legal speed limit was removed, (b) allow their driving style to be influenced by their mood, (c) change their driving when passengers were present, (d) drive faster to decrease journey time, and (e) find driving thrilling. Drivers who reported taking fewer risks via the speed and violations questionnaires were more likely to choose a driving style to improve driving economy and were more concerned about being injured in a road accident.

To determine whether the non-health-threat influences accounted for significant variance in risk taking not accounted for by the accident worry factor, we conducted hierarchical regressions for both of the risk-taking measures as in Study 1. In each regression, the risk-taking measure (the speed or the violations questionnaire) was the dependent variable, and accident worry was entered first as a predictor. The alternative influence item was entered as a predictor in the second block. All of the non-health-threat influences could account for variance in the speed questionnaire beyond that accounted for by accident worry: legal constraints, $\Delta R^2 = .35$, $\beta = .59$, $t(393) = 14.79$, $p < .05$; mood, $\Delta R^2 = .18$, $\beta = .42$, $t(394) = 9.32$, $p < .05$; passengers, $\Delta R^2 = .13$, $\beta = .36$, $t(393) = 7.58$, $p < .05$; journey time, $\Delta R^2 = .39$, $\beta = .63$, $t(396) = 16.19$, $p < .05$; economics, $\Delta R^2 = .06$, $\beta = .25$, $t(395) = 4.92$, $p < .05$; thrill, $\Delta R^2 = .12$, $\beta = .35$, $t(394) = 7.50$, $p < .05$. The same was true for the violations questionnaire: legal constraints, $\Delta R^2 = .35$, $\beta = .59$, $t(398) = 14.57$, $p < .05$; mood, $\Delta R^2 = .31$, $\beta = .56$, $t(400) = 13.46$, $p < .05$; passengers, $\Delta R^2 = .07$, $\beta = .27$, $t(398) = 5.51$, $p < .05$; journey time, $\Delta R^2 = .38$, $\beta = .62$, $t(401) = 15.72$, $p < .05$; economics, $\Delta R^2 = .02$, $\beta = .13$, $t(400) = .2.46$, $p < .05$; thrill, $\Delta R^2 = .15$, $\beta = .38$, $t(399) = 8.22$, $p < .05$.

Table 3
Pearson Correlations Between Driver Influences and Risk-Taking Measures in Study 2

Influence	Speed questionnaire	Violations questionnaire
Legal constraints	.59**	.59**
Mood	.41**	.55**
Passengers	.32**	.25**
Journey time	.62**	.61**
Economics	.27**	.14**
Thrill	.34**	.38**
Accident worry	.13**	.07 (*ns*)

** $p < .01$.

One possibility is that the accident worry factor, though it appeared to have less influence on risk taking than did the other influences, nevertheless accounted for separate variance from them. We examined this by using a direct entry multiple regression. With the speed questionnaire measure as the dependent variable, we found that the accident worry factor remained significant when the effects of all the other influences had been controlled for, $\Delta R^2 = .02$, $\beta = .16$, $t(379) = 3.99$, $p < .05$. We found the same when driving violations was the dependent variable, $\Delta R^2 = .02$, $\beta = .13$, $t(384) = 3.15$, $p < .05$. The accident worry factor, therefore, accounted for variance separate from the other influences.

It is worth noting that we also subjected the 21-item questionnaire to a principal components analysis (seven components with a varimax rotation). The components produced mapped onto our specified influences, except the journey time and legal constraints items, which loaded onto the same factor (the 3 items that we dropped from our analysis loaded onto a component with an eigenvalue less than one and so would have been excluded anyway). When these components were converted to variables by taking the mean of the items in each factor, we obtained the same pattern of results as the analysis we have presented. That is, the accident worry component had a smaller correlation with the risk-taking measures than any of the other components, which also could all account for separate variance in risk taking.

Discussion

The results from Study 2 suggest that even when several alternative influences were considered, concern about accident involvement remained the worst predictor of risky driving. The best predictors out of the factors examined were legal constraints and journey time. Mood and thrill were also good predictors of risk-taking behavior. The findings indicate that in the domain of driving, the level of concern about health threats has relatively little differential effect on risk-taking behavior when compared with other potential influences on behavior. Overall, non-health-related costs (legal constraints, economics) played a significant role along with perceived benefits (thrill, journey time). However, we would not claim that there was no relationship, as concern for the health threat did account for some variance separate from the other influences.

General Discussion

In traditional theories of health behavior, beliefs about health threats are regarded as important predictors of behavior. There is evidence to suggest that this assumption may be true for such

domains as adherence to a course of medical treatment or participation in screening programs (Janz & Becker, 1984). However, the present investigation indicates that vulnerability to health threat may be a less important predictor of behavior than has previously been supposed. We used a variety of factors to predict risk-taking behavior in driving, and in every case, we found concern about health threat to be the least influential. In Study 1, thrill seeking and self-perceived skill were more important determinants of driving speed. In Study 2, concern about accident involvement was the least significant predictor of risk taking compared with a range of alternative influences. It should be noted that the present studies are cross-sectional and not longitudinal or experimental, so we need to be cautious when inferring the direction of causality of the effects.

Studies examining domains other than driving have also found that alternative factors have a greater impact on health behavior compared with the health threat itself. For example, McCarthy et al. (1996) found that difficulty in keeping medical appointments and transportation problems were better predictors of mammography screening attendance than the components of the health belief model. Lollis, Antoni, Johnson, Chitwood, and Griffin (1995) found that condom usage was predicted by drug use, condom discomfort, inconvenience, and acceptance of condoms, in addition to components related to perceived health threat. Beck (1981) asked participants how often in the previous 6 weeks they had driven a car while they were drunk or while they knew that they had had too much to drink. The author found that the most powerful predictor of drunk-driving behavior was attitudes toward people who drove under the influence of alcohol—that is, the individuals' views on the social acceptability of drunk driving.

How can these results fit with previous findings that supported the role of health threat in general health models? One possibility is that in many studies in the past, the focus of the study was on the health threat and factors that might prevent the heath threat, with much less attention being paid to other factors. When alternative variables have been included, they can outweigh the health threat (Goldberg et al., 2002; Lollis et al., 1995; McCarthy et al., 1996; Parsons et al., 1997). Overall, the results suggest that there are both theoretical and practical implications. At a theoretical level, the work indicates that models that attempt to predict risky behaviors by relying only on health threat are likely to be inadequate. Other factors, such as the perceived benefits, are likely to play a critical role. At a practical level, health policies that are designed entirely around the concept of health threat may have a limited impact. By understanding why people engage in risky behavior, it may be possible to design more effective health policies.

Why does concern about the health threat appear to be so poor at discriminating between different people's propensity to take risks? One possibility is that unrealistic optimism is operating to such an extent that people do not feel sufficiently vulnerable for this factor to influence behavior. A variant of this interpretation is that there is a threshold below which perceived vulnerability to accident involvement has no effect on risk taking. It is only when perceived vulnerability is raised above this threshold that concern about accident involvement begins to influence risk taking. It should be noted that if people perceive their accident likelihood on a per trip basis as opposed to across a lifetime, then the chances of being involved in an accident are very low, and as Slovic, Fischhoff, and Lichtenstein (1978) have noted, this low probability may not be sufficient to influence behavior. Likewise, if other forms of everyday risk taking, such as cigarette smoking, poor diet, and unprotected sex, are perceived on a per event basis, then they will be characterized by an extremely low probability of negative outcome. In other words, the everyday experience of many risk-taking activities is unlikely to include the negative health threat so that the risk itself is simply not experienced. In driving, individuals are more likely to perceive a direct link between their speeding and being caught by the police than between speeding and personal accident involvement. This explanation fits with the finding that police enforcement had a far greater influence on speed choice.

Yates and Stone (1992) noted that a key feature of definitions of risk is an acknowledgment of the possibility of loss or negative outcome. From the perspective of researchers and policy makers, this focus is understandable because negative outcome is very salient when the costs are aggregated across people and events. However, the importance of negative outcome to those participating in the activity is less clear as, for many activities, the negative outcome may become salient only when behavior is aggregated across people and events. The risk itself may not be manifest to a participant making a particular choice at a particular time and consequently may have little influence on the individual's behavior. When viewing the societal effects of smoking, poor diet, and speeding, the risk may be an emergent feature that is simply not prominent at an individual level.

There is at least one domain in which the negative outcome is salient, and that is gambling. It has been argued that the study of laboratory gambling and lotteries has been the dominant paradigm for risk-taking research (Lopes, 1993, 2000; Mellers, 2000). Although there is an extensive literature in this area, there are concerns about the generality of the findings across domains (e.g., Rettinger & Hastie, 2001). Even within the gambling literature, the correspondence between the behavior in laboratory games and gambling in naturalistic settings has been questioned (Wagenaar, 1988). There are other reasons for being concerned about the utility of gambling as a theoretical model for all forms of risk taking. For example, one major distinction between gambling and many other forms of risk taking concerns the experience of negative outcome. In gambling, people have considerable experience with loss because this is the most probable outcome and is generally of low intensity. In many other forms of risk taking, particularly those involving health implications, such as driving, high-fat diets, and smoking, people have relatively little experience of the high-intensity negative outcomes.

Though such considerations as ease of access to a particular screening facility or concerns about being stopped by the police may predict health behavior better than beliefs about the health threat, this does not imply that health beliefs are redundant or have no predictive power. Indeed, in Study 2, we found that the health threat factor could account for variance in risk-taking behavior after all other factors were accounted for. In some cases, interventions that tackle the perceived benefits of risk taking may be too problematic to implement, in which case health threat interventions may be the most effective course of action.

Yates (1992) has noted that implicit in the term *risk taking* is the view that the behavior is deliberative in the sense that the participant takes account of the potential for negative outcome when engaging in the behavior. The present investigation has shown that although there is a focus on negative outcome in the literature, it

can be an inefficient method of predicting behavior. From the participant's perspective, other factors are more important. From the perspective of those either observing behavior or reviewing the aggregate outcomes of behavior, the term *risk taking* may have considerable appeal. However, from the perspective of the participant engaging in the activity, it may be rather less meaningful.

References

Ajzen, I. (1991). The theory of planned behavior. *Organizational Behavior and Human Decision Processes, 50,* 179–211.

Beck, K. H. (1981). Driving while under the influence of alcohol: Relationship to attitudes and beliefs in a college population. *American Journal of Drug and Alcohol Abuse, 8,* 377–388.

Chambers, J. R., & Windschitl, P. D. (2004). Biases in social comparative judgments: The role of nonmotivated factors in above-average and comparative-optimism effects. *Psychological Bulletin, 130,* 813–838.

Christiansen, B., Roehling, P., Smith, G., & Goldman, M. (1989). Using alcohol expectancies to predict adolescent drinking behavior after one year. *Journal of Consulting and Clinical Psychology, 57,* 93–99.

Evans, L. (1991). *Traffic safety and the driver*. New York: Van Nostrand Reinhold.

Evans, L., & Wasielewski, P. (1983). Risky driving related to driver and vehicle characteristics. *Accident Analysis and Prevention, 15,* 121–136.

Floyd, D. L., Prentice-Dunn, S., & Rogers, R. W. (2000). A meta-analysis of research on protection motivation theory. *Journal of Applied Social Psychology, 30,* 407–429.

French, D. J., West, R. J., Elander, J., & Wilding, J. M. (1993). Decision-making style, driving style, and self-reported involvement in road traffic accidents. *Ergonomics, 36,* 627–644.

Gardner, D. G., Cummings, L. L., Dunham, R. B., & Pierce, J. L. (1998). Single-item versus multiple-item measurement scales: An empirical comparison. *Educational and Psychological Measurement, 58,* 898–915.

Gibbons, F. X., & Gerrard, M. (1995). Predicting young adults' health risk behavior. *Journal of Personality and Social Psychology, 69,* 505–517.

Goldberg, J. H., Halpern-Felsher, B. L., & Millstein, S. G. (2002). Beyond invulnerability: The importance of benefits in adolescents' decision to drink alcohol. *Health Psychology, 21,* 477–484.

Horswill, M. S., & McKenna, F. P. (1999). The development, validation, and application of a video-based technique for measuring an everyday risk-taking behavior: Drivers' speed choice. *Journal of Applied Psychology, 84,* 977–985.

Horswill, M. S., Waylen, A. E., & Tofield, M. I. (2004). Drivers' ratings of different components of their own driving skill: A greater illusion of superiority for skills that relate to accident involvement. *Journal of Applied Social Psychology, 34,* 177–195.

Janz, N. K., & Becker, M. H. (1984). The health belief model: A decade later. *Health Education Quarterly, 11,* 1–47.

Kirsch, K. L., Passick, S., Holtsclaw, E., Donaghy, K., & Theobald, D. (2001). I get tired for no reason: A single item screening for cancer-related fatigue. *Journal of Pain and Symptom Management, 22,* 931–937.

Lin, Y., & Raghubir, P. (2005). Gender differences in unrealistic optimism about marriage and divorce: Are men more optimistic and women more realistic? *Personality and Social Psychology Bulletin, 31,* 198–207.

Lollis, C. M., Antoni, M. H., Johnson, E. H., Chitwood, D. C., & Griffin, D. K. (1995). Does the health belief model predict risky sexual practices in injection drug users? *Clinical Psychology and Psychotherapy, 2,* 227–233.

Lopes, L. L. (1993). Reasons and resources: The human side of risk taking. In N. J. Bell & R. W. Bell (Eds.), *Adolescent risk taking* (pp. 197–227). London: Sage.

Lopes, L. L. (2000). Algebra and process in the modeling of risky choice. In T. Connolly, H. R. Arkes, & K. R. Hammond (Eds.), *Judgment and decision making: An interdisciplinary reader* (pp. 733–754). New York: Cambridge University Press.

McCarthy, B. D., Yood, M. U., Janz, N. K., Boohaker, E. A., Ward, R. E., & Johnson, C. C. (1996). Evaluation of factors potentially associated with inadequate follow-up of mammographic abnormalities. *Cancer, 77,* 2070–2076.

McKenna, F. P., & Albery, I. P. (2001). Does unrealistic optimism change following a negative experience? *Journal of Applied Social Psychology, 31,* 1146–1157.

Mellers, B. A. (2000). Choice and the relative pleasure of consequences. *Psychological Bulletin, 126,* 910–924.

Nagy, M. S. (2002). Using a single-item approach to measure facet job satisfaction. *Journal of Occupational and Organizational Psychology, 4,* 361–375.

Nunnally, J. C. (1978). *Psychometric theory*. New York: McGraw-Hill.

Parker, D., Reason, J. T., Manstead, A. S. R., & Stradling, S. G. (1995). Driving errors, driving violations and accident involvement. *Ergonomics, 38,* 1036–1048.

Parsons, J., Siegel, A., & Cousins, J. (1997). Late adolescent risk-taking: Effects of perceived benefits and perceived risks on behavioral intentions and behavioral change. *Journal of Adolescence, 20,* 381–392.

Pomeroy, I. M., Clark, C. R., & Philp, I. (2001). The effectiveness of very short scales for depression screening in elderly medical patients. *International Journal of Geriatric Psychiatry, 16,* 321–326.

Prochaska, J. O., Velicer, W. F., Rossi, J. S., Goldstein, M. G., Marcus, B. H., Rakowski, W., et al. (1994). Stages of change and decisional balance for 12 problem behaviors. *Health Psychology, 13,* 39–46.

Rettinger, D. A., & Hastie, R. (2001). Content effects on decision making. *Organizational Behavior and Human Decision Processes, 85,* 336–359.

Robins, R. W., Hendin, H. M., & Trzesniewski, K. H. (2001). Measuring global self-esteem: Construct validation of a single-item measure and the Rosenberg Self-Esteem Scale. *Personality and Social Psychology Bulletin, 27,* 151–161.

Rosenstock, I. M., Strecher, V. J., & Becker, M. H. (1994). The health belief model and HIV risk behavior change. In R. J. DiClemente & J. L. Peterson (Eds.), *Preventing AIDS: Theories and methods of behavioral interventions* (pp. 5–24). New York: Plenum Press.

Rothengatter, T. (1988). Risk and the absence of pleasure: A motivational approach to modeling road user behavior. *Ergonomics, 31,* 599–607.

Rotheram-Borus, M. J., & Koopman, C. (1991). Sexual risk behaviors, AIDS knowledge, and beliefs about AIDS among runaways. *American Journal of Public Health, 81,* 206–208.

Schacter, S. (1982). Recidivism and self-cure of smoking and obesity. *American Psychologist, 37,* 436–444.

Slovic, P., Fischhoff, B., & Lichtenstein, S. (1978). Accident probabilities in seat belt usage: A psychological perspective. *Accident Analysis and Prevention, 10,* 281–285.

Spears, R., Abraham, S. C. S., Abrams, D., & Sheeran, P. (1992). Framing in terms of high-risk groups versus risky practices and prognoses of HIV-infection. *European Journal of Social Psychology, 22,* 195–201.

Stewart, A. L., & Brook, R. H. (1983). Effect of being overweight. *American Journal of Public Health, 73,* 171–178.

Svenson, O. (1981). Are we all less risky and more skillful than our fellow drivers? *Acta Psychologica, 47,* 143–148.

Taylor, S. E., & Brown, J. D. (1988). Illusion and well-being: A social psychological perspective on mental health. *Psychological Bulletin, 103,* 193–210.

Tyler, T. R., & Cook, F. L. (1984). The mass media and judgments of risk: Distinguishing impact on personal and societal level judgments. *Journal of Personality and Social Psychology, 47,* 693–708.

Wagenaar, W. A. (1988). *Paradoxes of gambling behaviour*. Hove, United Kingdom: Erlbaum.

Walton, D., & Bathurst, J. (1998). An exploration of the perceptions of the average driver's speed compared to perceived driver safety and driving skill. *Accident Analysis and Prevention, 30,* 821–830.

Wanous, J. P., Reichers, A. E., & Hudy, M. J. (1997). Overall job satisfaction: How good are single-item measures? *Journal of Applied Psychology, 82,* 247–252.

Wasielewski, P. (1984). Speed as a measure of driver risk: Observed speeds versus driver and vehicle characteristics. *Accident Analysis and Prevention, 16,* 89–103.

Watkins, C., Daniels, L., Jack, C., Dickinson, H., & van den Broek, M. (2001). Accuracy of a single question in screening for depression in a cohort of patients after stroke: Comparative study. *British Medical Journal, 323,* 1159.

Weinstein, N. D. (1989). Effects of personal experience on self-protective behavior. *Psychological Bulletin, 105,* 31–50.

West, R., Elander, J., & French, D. (1991). *Decision making, personality and driving style as correlates of individual accident risk. Final report*. Crowthorne, United Kingdom: Transport Research Laboratory.

West, R., French, D., Kemp, R., & Elander, J. (1993). Direct observation of driving, self reports of driving behaviour, and accident involvement. *Ergonomics, 36,* 557–567.

Wilson, T., & Greensmith, J. (1983). Multivariate analysis of the relationship between drivers' accident, sex, and exposure status. *Human Factors, 25,* 303–312.

Yates, J. F. (1992). Epilogue. In J. F. Yates (Ed.) *Risk-taking behavior* (pp. 321–330). Chichester, United Kingdom: Wiley.

Yates, J. F., & Stone, E. R. (1992). The risk construct. In J. F. Yates (Ed.), *Risk-taking behavior* (pp. 1–25). Chichester, United Kingdom: Wiley.