Pergamon

0005-7967(93)E0020-6

Behav. Res. Ther. Vol. 32, No. 7, pp. 747–751, 1994

0005-7967/94 $7.00 + 0.00

PROXIMITY TO SAFETY AND ITS EFFECTS ON FEAR PREDICTION BIAS

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(Received 5 November 1993)

Summary—We tested the hypothesis that the perceived availability of safety resources plays an influential role in fear prediction bias. Claustrophobic *S*s ($N = 37$) completed a claustrophobic challenge under conditions of either low or high proximity to safety. Proximity to safety was operationalized as distance from the exit. We examined the effects of proximity to safety on *S*s' predicted fear, actual fear, and discrepancy between predicted and actual fear (prediction bias). Consistent with prediction, the availability of safety resources had a more pronounced effect on *S*s' actual fear than *S*s' predicted fear. Moreover, subjects displayed a significant underprediction bias when proximity to safety was low and a slight (albeit nonsignificant) overprediction bias when proximity to safety was high. Our results lend further support for the hypothesis that anxious *S*s underutilize safety information when confronting perceived threats. Possible mechanisms underlying this tendency are discussed.

INTRODUCTION

Although research on the prediction bias of fear has shown a general tendency for *S*s to overpredict their fear in a subjectively threatening situation (see Rachman & Bichard, 1988), Telch, Ilai, Valentiner and Craske (1994) observed just the opposite in nonclinical *S*s displaying moderate to severe claustrophobic fear. To account for the discrepancy in this finding and that of Rachman and colleagues (Rachman & Lopatka, 1986; Rachman, Levitt & Lopatka, 1988), the authors speculated that between-site differences in the nature of the claustrophibic challenge might account for their failure to find an overprediction bias. Specifically, unlike the Rachman studies which provided easy access to safety (i.e. *S*s stood directly by an unlocked door in a filing cabinet), the Telch *et al.* study made safety less accessible (i.e. *S*s were required to stand in a long narrow observation chamber approx. 11 m from the exit).

Following the experiment, we informally probed some *S*s as to why they underestimated their fear. Reactions such as "I did not realize how far away I was from the door until I went into the chamber" led us to hypothesize that the lack of safety (i.e. far proximity to the exit) was not incorporated into the *S*s' estimation of the challenge task when making their fear predictions. This presumed failure to consider safety information would thus be expected to result in an underprediction bias when safety resources are scarce, but an overprediction bias when safety resources are readily available.

Interestingly, Taylor and Rachman (1994) posited that the underprediction of safety features contributes to overprediction bias. More specifically, they propose a stimulus estimation hypothesis which states that overprediction arises from two primary sources: (a) the overprediction of danger features associated with the fear stimulus; and (b) the underprediction of safety features. Taylor and Rachman (1994) provided preliminary support for their stimulus estimation hypothesis using path analyses of data from over 200 snake-fearful *S*s.

The present study sought to test experimentally the effects of safety features on the prediction bias of phobic *S*s. In accordance with the stimulus estimation model of Taylor and Rachman, we hypothesized that an experimental manipulation designed to vary the available safety features should influence *S*s' actual fear to a greater degree than *S*s' prediction of fear. Moreover, in line with our speculation that the perceived availability of safety resources should determine the direction and magnitude of prediction bias, we hypothesized that *S*s would display a general tendency to underpredict fear when perceived safety resources were low, but overpredict fear when perceived safety resources were readily available. We chose *proximity to the exit* as our experimental manipulation of safety resources. This decision was based on our observation that, for claustrophobics, the most salient safety consideration is the perceived ease of escape (Valentiner, Telch, Petruzzi & Bolte, 1993).

The following specific predictions were tested: (1) that safety resource manipulation would influence *S*s' actual report of fear to a greater degree than *S*s' fear predictions (i.e. differential weighting); (2) that *S*s would show a tendency to underpredict fear during a claustrophobic challenge when proximity to the exit is low (i.e. *S*s must stand 10 m from the door); and (3) that *S*s would show a tendency to overpredict fear when proximity to the exit is high.

METHOD

Subjects

The sample consisted of 138 students who received course credit for their participation. Subjects were selected from a large pool ($N = 2650$) of introductory psychology students who were pretested in large groups. Selection was based on a response of 3 (moderate fear) or higher on each of two screening questions assessing fear of enclosed places. One-hundred and sixty-one students met the fear criterion. Of these, 138 (85.7%) agreed to participate. The sample was predominantly female (86.2%) with a mean age of 18 yr (SD = 1.7).

Procedure

Subjects completed a prediction questionnaire followed by a claustrophobic challenge. Prior to completing the prediction questionnaire, an undergraduate experimenter, blind to the hypotheses under investigation, partially opened (approx. 30°) the door leading to the experimental chamber. The chamber consisted of a long narrow observation corridor measuring 11.4 m (length), 57 m (width) and 2.29 m (height). The *S* was instructed to look inside for 5 sec after which the door was closed. The *S*s were then informed that they would be asked to enter the chamber they had just seen. Subjects assigned to the low safety group were told that they would be asked to walk to the very end of the chamber and remain standing there for several minutes. Subjects assigned to the high safety condition were told that they would be asked to enter the chamber and stand directly by the exit door for several minutes. Both groups were informed that the door would remain unlocked and that they could leave the chamber if they became too uncomfortable. However, all *S*s were encouraged to remain in the chamber as long as they could and that the experimenter would open the door to let them know when the trial had ended.

Following these verbal instructions, subjects rated their expected peak fear on a 0 (no fear) to 100 (extreme fear) Likert scale as part of a larger prediction questionnaire that assessed *S*s' perceived danger, perceived panic likelihood and perceived coping efficacy. This prediction questionnaire is described in Telch *et al.* (1994). Upon completing the questionnaire, *S*s were asked to enter the chamber and walk to their designated place without stopping or looking back. Upon reaching their designated place (either the back wall or at the front of the chamber), *S*s were to remain there for as long as possible. They were reminded that the exit door would remain unlocked and that the experimenter would open the door to signal the end of the trial. Although *S*s were encouraged to remain at their designated location until the experimenter signaled the end of the trial, specific information on the duration of the trial was not provided. If a *S* remained in the chamber for the full 2 min, the experimenter opened the door and instructed the *S* to exit. Immediately upon exiting, *S*s rated their actual peak fear on a 0 (no fear) to 100 (extreme fear) Likert scale.

RESULTS

Analytic strategy

To test whether proximity to safety influences actual fear to a greater extent than predicted fear (Hypothesis 1), we compared the high and low proximity groups on measures of actual fear, predicted fear, and prediction bias. Two-sample *t*-tests were used to examine between-group differences on measures of actual and predicted fear. Effect sizes corresponding to these t-tests are presented to illustrate the differential influence of proximity to safety on predicted vs actual fear. In addition, predicted-fear minus actual-fear discrepancy scores were subjected to an ANCOVA. To control for inflated error associated with the use of difference scores (see Cronbach & Furby, 1970) unpredicted fear was entered into the model as a covariate. Given the directional nature of our hypotheses, we report one-tailed tests of significance.

To test whether the lack of safety resources leads to an underprediction bias (Hypothesis 2), a one-sample t-test was used to determine whether discrepancy scores for *S*s in the low safety condition were significantly less than zero. Similarly, a one-sample t-test was used to determine whether discrepancy scores for *S*s in the high safety condition were significantly greater than zero (Hypothesis 3). Given that these predictions were directional, we again report one-tailed tests of significance.

Differential influence of proximity to safety

Means and standard deviations of actual and predicted fear for subjects in the two safety proximity conditions are reported in Table 1. As expected, *S*s in the high proximity condition reported significantly lower actual fear than did those in the low proximity condition ($t = 2.10$, $df = 136$, $P < 0.05$). There was no significant difference in predicted fear ratings between those in the high and low proximity conditions ($t = 1.11$, $df = 136$, NS). The effect sizes (ES) of proximity to safety on predicted and actual fear are reported in Table 1. The ES for actual fear was apporoximately twice as large as the ES for predicted fear.

Subjects in the High Proximity condition showed lower Discrepancy scores (i.e. greater underprediction) than did those in the Low Proximity condition [$F(1,136) = 3.28$, $P < 0.05$]. Adjusted mean discrepancy score for the two proximity conditions and the corresponding effect size are reported in Table 1.

Effects of Proximity to safety on prediction bias

As predicted (Hypothesis 2), *S*s in the Low Proximity condition showed a significant underprediction bias ($t = 2.01$, $df = 64$, $P < 0.05$). However, the overprediction bias expected in the high proximity condition (Hypothesis 3) was negligible ($t = 0.57$, $df = 64$, NS).

DISCUSSION

The present findings lend additional support for the hypothesis that phobic *S*s underutilize safety information when estimating their anticipated fear in confronting a fear relevant situation. This support came from two primary sources. First, as predicted by Hypothesis 1, the effects of our safety feature manipulation had a significantly greater effect on *S*s' actual fear than on their predicted fear. Indeed, the proximity effect size on actual fear was twice that of predicted fear. Moreover, our index of prediction bias was also significantly affected by our safety feature manipulation.

Our results were consistent with Hypothesis 2, namely that subjects would display an underpre-

Table 1. Means, standard deviations, and effect sizes for predicted fear, actual fear, and discrepancy scores by proximity condition

	Proximity condition		
Variable	High safety ($n = 73$)	Low safety ($n = 65$)	Effect size
Predicted fear			
Mean	50.3	54.8	0.09
SD	25.3	21.9	
Actual fear			
Mean	49.9	58.0	0.18[a]
SD	25.3	19.5	
Discrepancy score			
Mean	1.2	−4.1	0.15[a]
SD	17.3	16.3	

[a]$P < 0.05$ (one-tailed).

diction bias when perceived safety resources were low. As predicted, positioning *S*s far from the claustrophobic chamber exit (low safety) resulted in an overall pattern of fear underprediction, whereas an underprediction bias was not observed for *S*s who were positioned close to the exit (high safety).

Our prediction that *S*s in the high safety condition would display a significant overprediction bias (Hypothesis 3) was not supported. Subjects in the high safety group neither underpredicted nor overpredicted fear. It is possible that our proximity manipulation was not sufficiently potent in achieving a "high safety" condition. Alternatively, other factors such as our failure to inform *S*s about the duration of the exposure trials, may have created sufficient unpredictability to counteract partially the safety associated with being positioned close to the exit.

Our failure to find a fear overprediction bias* is consistent with the results of our previous study with claustrophobics (Telch *et al.*, 1994). Data from the present experiment provide support for our earlier speculation that the tendency to underpredict fear will occur when perceived safety resources are low. It appears that the underutilization of safety resources when estimating future fear can have bi-directional effects depending on the availability of safety resources. Specifically, the failure to take into account the *absence* or *scarcity* of safety resources when estimating fear should lead to an underprediction of fear, just as the failure to take into account the *presence* of safety resources should result in the more commonly observed overprediction of fear.

The above formulation invites comparison with the Taylor and Rachman stimulus estimation model. Unlike our safety feature underutilization hypothesis, the Taylor and Rachman (1994) hypothesis asserts that *S*s *underpredict* safety features when estimating future encounters with fear-provoking situations. If correct, this assertion would have predicted that our low safety *S*s would overpredict fear. Such was not the case.

Our findings suggest that it is not the underprediction of safety features per se but rather the underutilization of relevant safety information that contributes to fear prediction biases. This formulation has the advantage of being able to accommodate those situations in which anxious individuals underpredict fear as well as the more commonly observed situations in which anxious people overpredict fear.

We can only speculate as to the mechanisms underlying the tendency to underutilize safety information. One possible contributor may be an anticipatory attentional bias toward danger. One's capacity to process safety features will be compromised if one's attentional resources are being heavily allocated toward potential danger cues. Ample evidence now exits documenting that anxious individuals display an attentional bias for threat relevant material (e.g. MacLeod, Mathews & Tata, 1986; McNally, Reimann & Kim, 1990; Mathews & MacLeod, 1985). Encoding bias may also contribute to the observed underutilization of safety information. Even if *S*s attend to safety information, the encoding of danger information may take precedence over safety information thus resulting in safety information underutilization. Biases in information processing, whether at the level of attention or encoding, may have evolved as an adaptive strategy for responding to potential threats. The contributions of attentional and encoding biases to underutilization of safety await future work.

Acknowledgements—The authors would like to thank Drs David Cohen, and Brad Schmidt for their editorial suggestions.
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*As part of a study currently underway in our laboratory, we have run over 50 claustrophobics through a behavioral approach test similar to that used in the Rachman *et al.* studies. Our results replicated those of Rachman *et al.* in observing a strong overprediction bias (Valentiner, Telch & Bolte, unpublished data).

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