Behavioural and Cognitive Psychotherapy, 2000, 28, 201–209
Cambridge University Press. Printed in the United Kingdom

Accelerated Publication

SPECIFICITY OF COGNITIVE BIASES IN SOCIAL PHOBIA AND THEIR ROLE IN RECOVERY

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Abstract. Cognitive theorists propose that each anxiety disorder is associated with a specific tendency to overestimate the danger inherent in particular situations or internal states. Studies comparing anxious patients with non-patient controls have shown that several anxiety disorders are associated with elevated subjective estimates of the likelihood (probability) and cost of negative events. The present study focuses on social phobia and extends previous findings by: a) including a control group of equally anxious patients with another anxiety disorder and b) investigating the effects of successful cognitive and drug treatments on patients' probability and cost estimates. In line with cognitive theory, the results indicate that social phobia is associated with a specific elevation in subjective estimates of both the probability and cost of potentially negative social events. Reductions in overestimation occurred in successful cognitive and drug treatment and were closely related to the degree of symptomatic improvement in both treatments. Contrary to previous findings, there was no evidence that reductions in cost were more important than reductions in probability.

Keywords: Social phobia, anxiety, cognitive bias, probability, cost, treatment.

Introduction

Cognitive theories of anxiety propose that anxiety disorders result from overestimates of the danger inherent in specific situations, sensations or thoughts. Carr (1974) and Beck (1976) proposed that perceived danger is substantially determined by the joint product of the subjective probability and cost of a feared event. Subsequent studies have shown that increased estimates of the probability and cost of certain types of negative events are present in generalized anxiety disorder (Butler & Matthews, 1983), social phobia (Lucock & Salkovskis, 1988; Foa, Franklin, Perry, & Herbert, 1996), agoraphobia (McNally & Foa, 1987) and acute stress disorder (Warda & Bryant, 1998). Although increases in subjective probabilities and costs have both been found in a range of anxiety disorders, Foa et al. (1996) propose that different anxiety disorders will show different patterns of distortion in their

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https://doi.org/10.1017/S1352465800003015 Published online by Cambridge University Press

estimates of probability and cost. They suggest that some anxiety disorders, such as social phobia, are mainly characterized by exaggerated cost, whereas other disorders are characterized by erroneous probabilities and conclude ''because disorders are thought to differ with respect to the relative role of biases in probability and in cost it is conceptually important to assess each separately'' (p. 433).

A further line of research has investigated the effects of treatment on overestimates of probability and cost. If such overestimates play a causal role in anxiety disorders, one would expect successful treatment to correct the biases. McNally and Foa (1987) found that cognitive-behavioural treatment for agoraphobia normalized probability and cost estimates. Lucock and Salkovskis (1988) and Foa et al. (1996) found that cognitive-behavioural treatment reduced the subjective probability and cost of feared social events in patients with social phobia. However, Foa et al. (1996) commented that patients with social phobia's post-treatment estimates remained significantly higher than non-patient controls and concluded that ''the cognitive distortions associated with agoraphobia are more easily and more completely corrected than those with social phobia'' (p. 438). A further intriguing aspect of Foa et al.'s (1996) study was a regression analysis that suggested that reductions in cost estimates, rather than reductions in probability estimates, are particularly important in mediating improvement in the treatment of social phobia.

Although the above studies generally support the role of inflated probability and cost estimates in anxiety disorders, they have several limitations. First, none of the studies included a control group of patients with other anxiety disorders. It is therefore unclear whether the observed biases are specific to particular anxiety disorders, as required by cognitive theories (Beck, 1986; Beck, Emery, & Greenberg, 1985; Foa et al., 1996), or are due to a more general factor such as high trait anxiety or depression. The present study focuses on social phobia and uses a control group of patients with other anxiety disorders who had equivalently high levels of depression and anxiety in an attempt to demonstrate that biases in the estimation of probability and cost of social events are specific to social phobia. Second, previous studies that have investigated the effects of treatment have only examined cognitive-behavioural interventions. As such interventions specifically target inflated probability and cost, it is possible the reported improvements in these variables would not be observed with effective treatments that do not directly address the variables. Such a result would be problematic for cognitive theory. To assess this possibility, the present study investigates changes in estimates of probability and cost in both cognitive therapy and drug treatment. Finally, previous treatment studies have also failed to include a group of treatment non-responders, and as a consequence the observed improvements could simply be due to repeated assessment. To assess this possibility, the present study includes a group of treatment non-responders.

Method

Participants

Three groups of participants took part. The social phobia group consisted of 59 patients (31 male) referred for treatment of social anxiety in a controlled treatment trial. All patients in this group met DSM-IV (American Psychiatric Association, 1994) criteria for social phobia. Diagnoses were established using the Structured Clinical Interview for DSM-IV (SCID-R;

https://doi.org/10.1017/S1352465800003015 Published online by Cambridge University Press

Table 1. Participant characteristics: Means and standard deviations (in parentheses)

Measure	Group			
	Social phobia (N = 59)	Other anxiety disorder (N = 29)	Non-patients (N = 34)	F (2, 54)
Age	33.5 (8.3)	35.4 (11.6)	32.8 (9.2)	.6
Trait anxiety (STAI)	54.0[a] (8.2)	52.9[a] (13.1)	35.9[b] (8.7)	42.2*
Depression (BDI)	13.1[a] (7.1)	16.8[a] (11.5)	3.7[b] (3.4)	25.9*
Fear of negative evaluation (FNE)	24.6[a] (5.4)	17.0[b] (9.8)	10.3[c] (6.2)	46.6*
Social phobia scale (SPS)	32.3 (16.0)			
Social interaction anxiety scale (SIAS)	44.6 (12.6)			

Note: * $p < .001$. Means with different superscripts differ significantly ($p < .01$).

First, Spitzer, Gibbon, & Williams, 1995). Thirty-two of the patients with social phobia were tested before and after treatment. Of these individuals, 10 received cognitive therapy, 13 received drug treatment (fluoxetine, up to 60mg/day), and 9 received placebo medication. For patients who received fluoxetine or placebo the therapists also encouraged increased exposure to feared social situations outside of the sessions and reviewed this exposure each week (self-exposure instructions). The anxiety disorder control group consisted of 29 patients (16 male) who met DSM-IV criteria for any anxiety disorder other than social phobia (14 post-traumatic stress disorder, 9 panic disorder with agoraphobia, 5 obsessive-compulsive disorder, and one panic disorder without a history of agoraphobia). All patients with other anxiety disorders were awaiting treatment or in the early stages of therapy. The non-patient control group consisted of 34 volunteers (16 male) recruited from the community to participate in the study. These participants were recruited by word of mouth from among hospital staff and acquaintances of staff members and were not paid to participate.

All participants completed the Fear of Negative Evaluation questionnaire (FNE; Watson & Friend, 1969), the Beck Depression Inventory (BDI; Beck, Rush, Shaw, & Emery, 1979), and the trait scale of the State Trait Anxiety Inventory (STAI-T; Spielberger, Gorsuch, & Lushene, 1970). The social phobia group only also completed the Social Phobia Scale (SPS; Mattick & Clarke, 1998) and the Social Interaction Anxiety Scale (SIAS; Mattick & Clarke, 1998) to assess overall severity of the disorder. Mean scores and standard deviations for each of the questionnaires are given in Table 1.

One way analyses of variance (ANOVAs) followed by Tukey tests revealed that the social phobia and other anxiety disorder groups did not differ in trait anxiety (STAI-T) or depression (BDI) and both were significantly more anxious and depressed than the non-patients. On fear of negative evaluation (FNE), the social phobia group scored significantly higher than both the other anxiety disorder and the non-patient control groups. In addition, the other anxiety disorder group scored significantly higher than the non-patients. The groups did not differ in age.

Measures

The *Social Probability and Cost Questionnaire (SPCQ)* is a 33-item questionnaire developed from the questionnaire used by Foa et al. (1996). The questionnaire was modified in two

https://doi.org/10.1017/S1352465800003015 Published online by Cambridge University Press

ways. First, Foa et al. (1996) included non-social questions as control items. As these were unnecessary for the present study, they were dropped. Second, Foa et al. (1996) deliberately chose mildly unpleasant social situations as they hypothesized that ''biases in judging such events are especially debilitating, given the frequency of their occurrence'' (p. 438). However, after failing to find a mediational effect of change in probability estimates they note the clinical observation that patients with social phobia ''are not only concerned with mildly unpleasant situations but they dread the possibility of being a target for extreme forms of humiliation and scrutiny and exaggerate the likelihood that such events will occur'' and conclude ''had we included such events in our measure, a mediational effect of change in estimated probability might have emerged'' (p. 439). Hence, the version used in this study includes more strongly negative social events, e.g., ''I will be ridiculed for voicing my opinion'' as well as items that are more ambiguous e.g., ''a guest will leave earlier than expected''. Following Foa et al. (1996), half of all the questionnaire items included social performance: e.g., ''I will freeze during a job interview'', or ''I will make a mistake in front of my colleagues''. The other half did not include mention of the individual's performance: e.g., ''someone will yawn while I am talking to them'', or ''a friend will cancel an arrangement to meet me''. Participants are first instructed to rate the likelihood of the event happening to them ''in the near future'' on a 0-100 scale, where 0 was labelled ''not at all likely to happen'' and 100 was labelled ''almost sure to happen''. Second, participants are instructed to rate the likely cost, by indicating ''how bad or distressing'' it would be if each of these events happened to them with 0 labelled ''not at all bad/distressing'' and 100 labelled ''really bad/distressing''. The performance and non-performance sub-scales were highly intercorrelated (0.82 for probability and 0.85 for cost – $p < .01$) and showed identical patterns of results. For this reason, they are collapsed in all analyses reported in this paper.

Procedure

Participants received a pack containing the questionnaires and were asked to complete them in the following order: SCPQ, FNE, BDI, STAI, BAI and (patients with social phobia only) SPS, SIAS.

Results

Internal consistency of the probability and cost scales

The internal consistency of the Social Probability and Cost Questionnaire (SPCQ) was examined using data from the first assessment. Both the probability and cost scales showed high internal consistency (Cronbach's alpha's = .96 and .97 respectively) in the total sample and in the social phobia group alone (Cronbach's alpha = .95 and .95 respectively).

Specificity of probability and cost overestimates

Means and standard deviations for SCPQ scores in the three groups are shown in Table 2. To compare estimates of probability and cost in patients with social phobia, patients with other anxiety disorders and non-patient controls, one way analyses of variance (ANOVAs) followed by Tukey tests between pairs of means were carried out. For probability estimates,

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Table 2. Estimates of probability and cost of negative social events: Means and standard deviations (in parentheses)

	Group			
Measure	Social phobia (N = 59)	Other anxiety disorder (N = 29)	Non-patients (N = 34)	F (2, 54)
Probability	44.6[a] (20.0)	28.9[b] (18.4)	21.4[b] (15.7)	18.5*
Cost	51.6[a] (18.8)	35.5[b] (23.7)	20.7[c] (10.5)	31.6*

Note: * $p < .001$. Means with different superscripts differ significantly ($p < .01$).

patients with social phobia scored significantly higher than both control groups (ps < .01), which did not differ from each other. For cost estimates, patients with social phobia scored significantly higher than both control groups ($p < .01$) and the other anxiety disorder group scored significantly higher than the non-patient group ($p < .01$).

Effects of treatment on probability and cost estimates

Table 3 shows pre- and post-treatment probability and cost estimates for patients with social phobia who received either cognitive therapy or drug treatment (fluoxetine) plus self-exposure instructions. Paired t-tests revealed significant changes in probability and cost following treatment in both cognitive therapy (t (9) = 2.5, $p < .05$ for probability and t (7) = 2.5, $p < .05$ for cost) and in drug treatment plus self-exposure instruction (t (12) = 2.6, $p < .05$ for probability and t (12) = 2.6, $p < .05$ for cost). Lucock and Salkovskis (1988) and Foa et al. (1996) reported that although group cognitive-behavioural treatment reduced probability and cost estimates, they remained higher than those of non-patients at the end of treatment. To determine whether the same was true for the individual cognitive therapy and drug treatments in the present study, post-treatment scores for patients who had received each treatment were compared with non-patients, using independent t-tests. Post cognitive therapy and post drug treated patients did not differ from non-patients in their estimates of the probability or cost of feared social events (for probability: post CT = 13.5 ± 14.9, non-patients = 21.4 ± 15.7, t = 1.4, NS; post drug = 27.8 ± 23.1, non-patients = 21.4 ± 15.7, t = 0.9, NS. For cost: post CT = 19.4 ± 18.3, non-patients = 20.7 ± 10.5, t = 0.2, NS; post drug = 32.0 ± 24.6, non-patients = 20.7 ± 10.5, t = 1.6, NS). In the case of cognitive therapy,

Table 3. Pre- and post-treatment estimates of probability and cost in patients with social phobia: Means and standard deviations (in parentheses)

		Treatment	
Measure	Occasion	Cognitive therapy (N = 10)	Drug treatment (N = 13)
Probability	Pre	29.2 (13.9)	46.0 (23.1)
	Post	13.5 (14.9)	27.8 (23.1)
Cost	Pre	41.7 (15.4)	51.7 (19.7)
	Post	19.4 (18.3)	32.0 (24.6)

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Table 4. Changes in probability and cost estimates in treatment responders and non-responders: Means and standard deviations (in parentheses)

		Group	
Measure	Occasion	Responder (N = 19)	Non-Responder (N = 13)
Probability	Pre	44.0 (22.8)	39.1 (19.9)
	Post	23.0 (24.2)	39.7 (22.4)
Cost	Pre	52.2 (20.0)	46.8 (21.1)
	Post	25.8 (24.2)	49.3 (21.9)

the mean post-treatment level was below that of non-patients, suggesting that cognitive therapy can return these variables to non-patient levels. Although the drug treated group also did not differ from non-patients, their mean was higher and our small sample size meant that the study has low statistical power for detecting residual elevations in probability/cost.

To be sure that the changes in probability and cost observed with treatment were related to improvement in treatment and were not simply due to repeated assessments or the passage of time, two further analyses were carried out. First, a group of treatment non-responders was constructed using the criteria of a mean change of less than 10 points on the Social Phobia Scale (SPS) from pre- to post-treatment. The maximum change possible on the SPS is 80 points. For maximum variability of response, patients treated with pill placebo plus self-exposure instructions were also included in this analyses. The cutoff yielded a group of 13 treatment non-responders (7 placebo, 4 drug, 2 cognitive therapy) with a mean change of –0.1 (SD = 10.1) points on the SPS to compare with 19 responders (2 placebo, 9 drug, 8 cognitive therapy), who had a mean change of 22.6 points (SD = 11.2) on the SPS. Mean changes in the other social phobia measures were consistent with those for the SPS. (For FNE; responders = 11.8, SD = 8.7, non-responders = 1.8, SD = 8.0; for SIAS; responders = 27.2, SD = 13.3, non-responders = 5.4, SD = 13.4). Table 4 compares the pre- and post-treatment estimates of probability and cost in the treatment responders and non-responders. A group (responder – non-responder) by time (pre – post) repeated measures analysis of variance (ANOVA) revealed a significant main effect of group for probability estimates, F (1, 30) = 10.1, $p < .01$ and for cost estimates, F (1, 30) = 9.6, $p < .01$. Both main effects were qualified by significant group by time interactions: F (1, 30) = 11.3 $p < .01$ for probability and F (1, 30) = 14.1 $p < .001$ for cost. Paired t-tests showed that the responders' estimates of probability and cost reduced significantly during treatment (t (19) = 4.5, $p < .05$ and t (19) = 5.0, $p < .05$ respectively) whereas the non-responders' estimates of probability and cost did not change (t (13) = –.16, N.S. and t (13) = –.6, N.S.). Second, we computed correlations between changes in probability and cost and changes in symptoms during cognitive and drug treatment (see Table 5). For both types of treatment, there were significant and substantial positive correlations between changes in estimates of the probability and cost of negative social events and changes in symptoms. These analyses suggest that the changes in probability and cost estimates that were observed during treatment were related to improvement in treatment and not simply due to repeated assessment.

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Table 5. Correlations between changes in estimates of probability and cost and changes in symptom measures in cognitive and drug treatment

Change score	Δ SPS	Δ SIAS	Δ FNE
		Cognitive therapy (N = 10)	
Δ Probability	.67*	.65*	.30
Δ Cost	.74*	.64	.81*
		Drug treatment (N = 13)	
Δ Probability	.72**	.84**	.76*
Δ Cost	.60*	.68*	.63*

Note: * $p < .05$ ** $p < .01$

To determine whether clinical improvements are more related to changes in cost than changes in probability, as reported by Foa et al. (1996), separate hierarchical multiple regression analyses (Cohen & Cohen, 1983) were conducted for each outcome measure (SIAS, SPS, FNE). Post-treatment symptom score was the dependent variable. All treated patients (cognitive therapy, drug, placebo) were included in the analyses. The order of entry of each independent variable was controlled to obtain an estimate of the unique contributions of change in probability and change in cost. In each analysis, pre-treatment symptom score (SIAS, SPS, FNE) was entered first. In the first set of analyses, change in probability was entered second and change in cost was entered third: the order was reversed in the second set of analyses. For all three outcome measures, change in probability and change in cost both accounted for a significant amount of variance when entered second (for SIAS: change in probability R^2 change = .58, $F(1,27) = 39.6$, $p < .001$; change in cost R^2 change = .47, $F(1,27) = 25.2$, $p < .001$. For SPS: change in probability R^2 change = .40, $F(1,27) = 28.9$, $p < .001$; change in cost R^2 change = .34, $F(1,27) = 21.5$, $p < .001$. For FNE: change in probability R^2 change = .49, $F(1,27) = 28.8$, $p < .001$; change in cost R^2 change = .46, $F(1,27) = 25.1$, $p < .001$). For the SIAS and the SPS, change in probability estimates also accounted for a significant amount of variance when entered third, after change in cost estimates (for SIAS: change in probability R^2 change = .11, $F(1,26) = 7.1$, $p < .05$. For SPS; change in probability R^2 change = .06, $F(1,26) = 4.2$, $p = .05$). In contrast, change in cost was not significant when entered after change in probability. For the FNE, neither change in probability nor change in cost was significant if entered third. Taken together, these results provide no support for Foa et al.'s (1996) hypothesis that clinical improvement is more related to changes in cost than changes in probability. Instead, they provide partial support for a more prominent role for changes in probability, at least for two out of three outcome measures.

Discussion

The results of the present study clarify and extend the findings of previous studies. Lucock and Salkovkis (1988) and Foa et al. (1996) found that patients with social phobia give higher estimates for the probability and cost of negative social events than non-anxious, non-patient controls. The present study included an additional control group; equally anxious patients with a different anxiety disorder. Patients with social phobia had significantly higher probability and cost estimates than the other anxiety disorder patients. It therefore appears

https://doi.org/10.1017/S1352465800003015 Published online by Cambridge University Press

that social phobia is associated with a specific bias in estimating the likelihood and cost of negative social events, as predicted by cognitive theories (Beck, 1976; Beck et al., 1985; Foa et al., 1996). Patients with other anxiety disorders did not differ from non-patient controls in their estimates of the likelihood of negative social events but did give the events higher cost estimates. The latter result is not unexpected as patients with other anxiety disorders also had significantly higher levels of fear of negative evaluation (FNE) than the non-patient controls.

Lucock and Salkovkis (1988) and Foa et al. (1996) found that the inflated probability and cost estimates associated with social phobia reduce during cognitive-behavioural treatment. It was not clear whether this reduction was a genuine effect of treatment or a result of repeated assessment. The present study clarified this issue by comparing a group of patients who improved during treatment with a treated group who had the same assessments but showed no improvement in social phobia. Only the former group showed a reduction in probability and cost estimates, demonstrating that this effect was not simply a consequence of repeated assessment.

The group cognitive-behavioural treatments studied by Lucock and Salkovksis (1988) and Foa et al. (1996) failed to return the probability and cost estimates of patients with social phobia to non-patient levels. On the basis of these observations, Foa et al. (1996) hypothesized that the cognitive distortions associated with social phobia may be more difficult to correct than those associated with some other anxiety disorders, such as agoraphobia. While this is possible, the results of the present study suggest that a return to non-patient levels can be achieved with some cognitive-behavioural treatments. In particular, patients treated with an individual cognitive therapy programme derived from Clark and Wells' (1995) cognitive model were indistinguishable from non-patients at the end of treatment.

A limitation of previous treatment studies was that all had focused on treatments that explicitly target change in probability and cost, meaning that it was possible that the improvements observed on these measures were demand effects. The present study included an additional drug treatment that placed much less emphasis on changing cognitive variables. Probability and cost estimates improved with the drug treatment and the correlations between change in these cognitive variables and symptomatic improvement were of similar magnitude in the drug treated group and the group who received individual cognitive therapy. This suggests that change in probability and cost is not simply a demand effect but instead plays a more central role in recovery, as required by cognitive theory (Beck, 1976; Beck et al., 1985; Foa et al., 1996).

Foa et al.'s (1996) finding that changes in cost were more important determinants of recovery than changes in probability was not replicated in the present study. In our multiple regression analyses, patients treated with individual cognitive therapy, drug treatment or placebo medication showed evidence of a more central role for changes in probability on two outcome measures and no evidence of differentiation between cost or probability on a third outcome measure. There are two possible reasons for this slightly different pattern of results. First, the group cognitive-behavioural treatment used by Foa et al. (1996) may have placed greater emphasis on changing cost. Second, as Foa et al. (1996) hypothesized, restricting their questionnaire to mild, ambiguous social events may have made variation in cost more salient than in the present study where unambiguously negative social events were also included. In the absence of a clarity on this issue, it would seem prudent for

cognitive-behavioural therapists to place a strong emphasis on changing patients' overestimates of both the likelihood and the cost of feared social outcomes.

Acknowledgments

This work was supported by the Wellcome Trust. The authors are grateful to Norma Morrison and Paul M. Salkovskis for their assistance with patient recruitment.

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