PERGAMON

Behaviour Research and Therapy 40 (2002) 1243–1253

BEHAVIOUR RESEARCH AND THERAPY

www.elsevier.com/locate/brat

An examination of the decline in fear and disgust during exposure-based treatment

J.A.J. Smits, M.J. Telch *, P.K. Randall

Department of Psychology, Lab for the Study of Anxiety Disorders, University of Texas at Austin, Mezes 330, Mail Stop B3800, Austin, TX 78712, USA

Accepted 22 September 2001

Abstract

It has been suggested that disgust plays a prominent role in the fear of spiders. Participants (N=27) displaying marked spider fear were provided 30 min of self-directed in vivo exposure to an actual tarantula, during which time their fear and disgust levels were assessed repeatedly. Growth curve analyses were then conducted to examine the decay slopes in both fear and disgust and their relationship. Consistent with prediction, exposure led to significant declines in both spider fear and spider-specific disgust but not in global disgust sensitivity. However, the decay slope observed for fear was significantly greater than that for disgust. Further analyses revealed that the reduction in disgust during treatment remained significant even after controlling for change in fear; and similarly, change in fear remained significant even after controlling for change in disgust. Contrary to prediction, disgust levels at pretreatment did not moderate the level of fear activation or fear reduction during treatment. Theoretical and clinical implications of the findings are discussed.

1. Introduction

Disgust has received increased attention in the study of pathological fear states. The linkage between disgust and fear is in part functional; both emotions serve to activate defensive action tendencies (Izard, 1993; Tolin, Sawchuk, & Lee, 1999). The fear-disgust linkage has been most extensively studied in the context of spider phobia (cf. Woody & Teachman, 2000). Davey (1994) argued that the disgust evoking status of the spider might be attributed to its historical association with disease and illness. Accordingly, it has been proposed that the fear of spiders might be

* Corresponding author. Tel.: +1-512-471-3393.
E-mail address: telch@forum.utexas.edu (M.J. Telch).

0005-7967/02/$ - see front matter
PII: S0005-7967(01)00094-8

accounted for by a fear of contact with a disgusting stimulus (Davey, 1992; De Jong, Vorage, & Van der Hout, 2000; Matchett & Davey, 1991).

Support for the fear-disgust linkage in spider phobia comes from several lines of evidence. First, studies using non-clinical samples have observed a significant positive correlation between self-report measures of disgust sensitivity and spider fear (Armfield & Mattiske, 1996; De Jong, Andrea, & Muris, 1997; De Jong & Merckelbach, 1998; Merckelbach, De Jong, Arntz, & Schouten, 1993; Mulkens, De Jong, & Merckelbach, 1996; Sawchuk, Lohr, Tolin, Lee, & Kleinknecht, 2000; Thorpe & Salkovskis, 1998; Tolin, Lohr, Sawchuk, & Lee, 1977). Second, studies comparing spider phobics to nonphobic controls have generally shown higher disgust sensitivity scores among spider phobics relative to nonphobic controls (De Jong et al., 1997; Merckelbach et al., 1993; Mulkens et al., 1996; Sawchuk et al., 2000), although this finding was not observed in one study (Thorpe & Salkovskis, 1998). Third, compared to nonfearful controls, spider fearful subjects displayed significantly greater increases in both fear and disgust in response to viewing pictures of spiders (Thorpe & Salkovskis, 1998; Tolin et al., 1997). Finally, using a clever 'cookie-test' behavioral challenge paradigm, Mulkens et al. (1996) found that spider phobics were more likely to refuse eating a cookie that had been touched by a spider.

The observed linkage between spider fear and disgust raises the question as to whether treatments that effectively reduce pathological fear also reduce disgust. Preliminary evidence suggests that exposure treatments lead to reductions in both spider fear and spider-specific disgust, but not in global disgust sensitivity (De Jong et al., 1997; Merckelbach et al., 1993). Moreover, exposure to a live spider combined with a disgust intervention component (i.e. counter conditioning strategy focusing on the affective valence of the spider as well as its disgust properties) was no more effective than exposure alone in reducing both spider-specific disgust and fear (De Jong et al., 2000).

While studies have shown pre- to posttreatment reductions in both fear and disgust following exposure-based treatment, little is known about the patterns of fear and disgust declines or their inter-relationship during treatment. The present study sought to clarify the relationship between the declines in these two emotional states during exposure-based treatment through individual growth curve analyses of treatment process data. Three specific questions were addressed:

1. Is there a difference between the slope of the decline in fear and the slope of decline in disgust?
2. Does the decline in fear across trials remain significant even after controlling for the change in disgust; conversely, does the decline in disgust across trials remain significant even after controlling for the change in fear?
3. Does disgust predict level of fear activation or the decline in peak fear across treatment trials?

2. Method

2.1. Participants

Participants were selected from a large pool (N=2630) of introductory psychology students from the University of Texas at Austin through a two-stage screening procedure (see below). The

final sample (N=27) consisted of females (100%) ranging in age from 17 to 23, with a mean of 18.30 yr (SD=1.23). The sample was comprised of 51.9% Caucasians, 11.1% Asians, 25.9% Hispanics, and 11% African–American. Participants received course credit for their participation in the study.

2.2. Design

Participants received 30 min of self-guided exposure to a live tarantula. Repeated assessments of subjective fear and disgust were obtained after each trial in which subjects attempted to touch the tarantula. Individual slopes of fear decline and disgust decline were then calculated for each participant and used in subsequent analyses to address the major study hypotheses.

2.3. Procedure

2.3.1. Screening

The screening consisted of two stages. During the first stage, 2630 potential participants completed a computerized version of the Fear of Spider Questionnaire (FSQ) (Szymanski & O'Donohue, 1995) and an author-constructed one-item scale assessing perceived self-efficacy to touch a tarantula. Those students scoring at least one SD above the mean on the FSQ and who indicated that they could not touch a tarantula under any circumstances were invited for individual behavioral testing (Stage 2). At the start of stage two, potential participants were provided a two-page information handout about tarantulas and their behavior. Subsequently, participants completed a computerized assessment battery consisting of several self-report questionnaires (see below). Each participant was then fitted with a heart rate monitor and administered two behavioral approach tests (BATs) (see below). Those who could touch the spider during either of the two consecutive pretreatment BATs were deemed insufficiently phobic and excluded from the study.

2.3.2. Behavioral approach tests (BATs)

Two separate BATs were administered at pre- and posttreatment. The objective was to measure participants' subjective fear and disgust while exposed to a live spider.

2.3.2.1. BAT 1 The BAT 1 consisted of a series of 14 tasks of increasing difficulty ranging from standing 120 cm from the spider to placing the spider on the palm of the right hand. The BAT was conducted in a room with an enclosed cage containing a live Chilean Rose tarantula (species: *Grammostola rosea*; body length approximately 4 cm; body width approximately 2.5 cm). Videotaped instructions with demonstration were included for tasks 6–14. Specific Instructions were as follows: "I am now going to open the door of the room and will ask you to approach the cage, open the cover, and touch one of the spider's legs. The video will demonstrate how to perform this task". A maximum of 15 s were allowed to execute each of the BAT tasks. Participants rated their peak fear and peak disgust on a 0–10 scale after each task.

2.3.2.2. BAT 2 The BAT 2 differed from BAT 1 in that the cage contained a Mexican Redknee tarantula (species: *Brachypelma smithi*; body length approximately 2.5 cm; body width approxi-

mately 1.5 cm). This assessment was included in order to assess for generalization of treatment effects to a spider not used during treatment.

2.3.3. Treatment

Eligible participants returned one day later. All participants received a total of 30 min of self-guided in vivo exposure to the spider used in BAT 1. The exposure consisted of short repeated trials, which corresponded with the tasks in the BAT. The exposure trials were interspersed with brief rest periods in which subjects completed post-exposure ratings (see below) and received additional instructions for the next exposure trial. Each task was repeated until the participants' peak fear had reduced to 4 on a 0–10 scale. The participant was then instructed to perform the next task on the hierarchy. If the participant declined to perform the subsequent task, he or she repeated the previous task until his or her peak fear had reduced to 0. The participant was then instructed to attempt the next task. This procedure was continued until the participant had acquired 30 min of total exposure to the spider.

2.4. Measures

2.4.1. Pre- and posttreatment battery

2.4.1.1. Fear of Spider Questionnaire (FSQ) The FSQ (Szymanski & O'Donohue, 1995) is an 18-item scale assessing fear of spiders. Each item is rated a seven-point likert-type scale (0= strongly disagree, 6= strongly agree). The FSQ has good psychometric properties, including high internal consistency (α=0.92) (Szymanski & O'Donohue, 1995), and a good test–retest coefficient (0.91) (Muris & Merckelbach, 1996).

2.4.1.2. Watts and Sharrock's Spider Fear Questionnaire (WSQ) The WSQ (Watts & Sharrock, 1984) consists of 33 items requiring a 'yes' or 'no' response. The questionnaire has demonstrated adequate internal consistency (α=0.78) (Johnsen & Hugdahl, 1990), as well as excellent test–retest reliability (0.94) (Muris & Merckelbach, 1996).

2.4.1.3. Spider Belief Questionnaire (SBQ) The SBQ (Arntz, Lavy, Van den Berg & Van Rijsoort, 1993) is a 78-item scale measuring one's concerns related to encounters with spiders. Items are rated on a 0–100 scale (0= I do not believe it at all (0%); 100= I absolutely believe it (100%)). The SBQ has excellent psychometric properties (α=0.94) (Arntz et al., 1993).

2.4.1.4. Disgust Sensitivity and Contamination Questionnaire (DSQ). The DSQ (Rozin, Fallon, & Mandell, 1984) was used to assess global disgust and contamination sensitivity. It comprises 24 self-report items describing specific events in which the subject's favorite food is presented as if it is contaminated. Participants rate on a 9-point scale how much they would like to eat each contaminated food item (1= do not want to eat at all; 9= would like to eat very much). Scores range between 24 (maximum disgust sensitivity) and 216 (minimum disgust sensitivity).

2.4.1.5. Armfield and Mattiske disgust scale This 8-item scale was used to assess spider-specific disgust. Respondents rate on a 0–6 scale (0= strongly disagree, 6= strongly agree) their level of

agreement in disgust-eliciting features of spiders (e.g. I believe that spiders carry diseases that may be harmful to me). This measure has demonstrated adequate reliability (α=0.83) (Armfield & Mattiske, 1996).

2.4.1.6. BAT indices

Performance fear index. A performance fear index was computed by dividing the average peak fear rating across bat tasks by the percentage of tasks completed.

Performance disgust index. A performance disgust index was computed by dividing the average peak disgust rating across bat tasks by the percentage of tasks completed.

2.4.2. Treatment process measures

The following indices were collected immediately after each treatment trial.

1. *Peak fear.* Upon completion of each task, participants rated on a 0–10 scale their peak fear experienced while performing the task.
2. *Peak disgust.* Upon completion of each task, participants rated on a 0–10 scale their peak disgust experienced while performing the task.

3. Results

3.1. Relationship between fear and disgust at pretreatment

Intercorrelations of the fear and disgust measures are presented in Table 1. The relationship between fear and disgust varied as a function of measurement modality. For questionnaire data, there was no significant relationship between general disgust sensitivity and spider fear as measured by the FSQ, WSQ, or SBQ. Contrary to expectation, we found no significant relationship between spider-specific disgust sensitivity and spider fear as measured by the FSQ, WSQ, or

Table 1
Intercorrelations between fear and disgust measures

Measure	2	3	4	5	6	7	8	9
1. FSQ	0.56*	0.69*	−0.07	−0.24	0.37	0.22	0.29	0.19
2. WSQ		0.61*	0.26	−0.25	0.30	0.25	0.19	0.13
3. SBQ			−0.23	0.25	0.33	0.28	0.26	0.25
4. DSQ				−0.52*	−0.17	−0.18	−0.14	−0.30
5. DISG[a]					0.24	0.25	0.31	0.37
6. BAT1-fear						0.90*	0.81*	0.71*
7. BAT1-disgust							0.67*	0.76*
8. BAT2-fear								0.86*
9. BAT2-disgust								

[a] Denotes Armfield & Mattiske's (1996) disgust questionnaire. *Denotes *F*-values significant at $p<0.01$.

SBQ. Similarly, there was no significant relationship between BAT measures and questionnaire measures of fear and disgust. In contrast, data from the two BATs revealed strong positive correlations between ratings of fear and disgust (r=0.90 for BAT 1 and r=0.86 for BAT 2).

3.2. Effects of treatment on fear and disgust

Pre- to posttreatment changes in disgust and spider fear are presented in Table 2. A repeated measures manova revealed significant reductions in spider-related fear as measured by the FSQ, WSQ, and SBQ [Wilks' Lambda $F(3, 24)=12.52$, $p<0.001$]. Similarly, significant reductions in peak fear were observed across the two BATs [Wilks' Lambda $F(2, 23)=9.04$, $p<0.001$]. Follow-up univariate analyses indicated a significant reduction in performance fear for BAT 1 but a nonsignificant reduction ($p<0.10$) in performance fear for BAT 2.

Significant reduction in spider-specific disgust sensitivity was observed on the Armfield and Mattiske spider disgust scale $F(1, 26) =15.18$, $p<0.001$]. Similarly, significant reductions in disgust were observed across the two BATs [Wilks' Lambda $F(2, 23)=4.67$, $p<0.05$]. Follow-up univariate analyses revealed a significant reduction in performance disgust for BAT 1 but a nonsignificant reduction in performance disgust for BAT 2.

There was no significant pre- to posttreatment reduction in global disgust sensitivity as measured by the DSQ.

Table 2
Means and standard deviations for measures at pre- and posttreatment

	Pre-treatment		Post-treatment		F-value
	M	SD	M	SD	
Questionnaires (n=27)					
FSQ	85.15	10.62	62.82	22.27	27.64**
WSQ	18.74	5.07	16.29	6.41	10.52**
SBQ	55.33	15.52	39.51	19.37	37.18**
DSQ	78.97	33.24	76.78	31.98	0.67
DISG[a]	41.11	6.35	36.70	7.91	15.18**
BAT 1 (n=27)					
Fear	22.37	22.67	7.38	8.02	18.19**
Disgust	23.13	29.03	7.72	8.56	10.06**
BAT 2 (n=25)					
Fear	23.06	19.42	13.14	29.99	4.23
Disgust	22.33	19.89	15.13	33.49	1.48

[a] Denotes Armfield & Mattiske's (1996) disgust questionnaire. *Denotes F-values significant at $p<0.05$. **Denotes F-values significant at $p<0.01$.

3.3. Treatment process analyses

We examined several specific research questions concerning fear decline and disgust decline during treatment by modeling data from Task 9[1] using a multi-level, random regression procedure (HLM) (Bryk & Raudenbush, 1992; Bryk, Raudenbush & Congdon, 1996). In level one, fear and disgust were modeled as a function of trial. In this analysis, estimates of the rate of decline of either fear or disgust were computed for all individuals and hypotheses were tested regarding the populations of individual slopes (level 1). In addition, the degree to which these level 1 slopes were influenced by the characteristics of individual subjects was then evaluated. For example, slopes of the disgust $=f$(time) function was modeled as the outcome variable of a 'level 2' regression of slopes on pretreatment disgust.

3.3.1. Is there a difference in the rate of decline in fear and disgust across treatment trials?

Both fear and disgust declined with trial for task 9 with mean slopes of -0.52 ($t=-0.44$, $p<0.01$) and -0.35 ($t=-4.97$, $p<0.01$), respectively. The relative rate of decline in the two dependent measures was assessed by entering a dummy-code (fear versus disgust) and interaction of time by fear versus disgust into the level one model. As assessed by this level 1 interaction, the decline in fear was significantly more rapid than that of disgust ($t=3.65$, $p<0.01$). The differential slope of the two indices was still highly significant after adjustment for intercept ($t=4.45$, $p<0.01$). This suggests that the more rapid decline in fear was not simply a result of a more elevated intercept for fear than for disgust. The relative decline in the two outcomes is shown in Fig. 1.

3.3.2. Does the decline in fear across trials remain significant even after controlling for the change in disgust?

Fear and disgust ratings at each trial were included as a time-varying covariate for the other to determine whether each declined to a greater extent than predicted by the effect of the other (e.g. did fear decline across trials above and beyond what would be predicted by the decline in disgust). The basic pattern across time was described with a 'null' level two model (each subject had independent slopes and intercepts) and tests of two level 1 hypotheses were performed with appropriate level 2 models, pretreatment ratings of disgust. As expected, the trial-to-trial fear ratings were significantly related to trial-to-trial disgust ratings ($t=5.43$, $p<0.005$). However, significant declines in fear across trial were still observed, even after accounting for the changes in disgust ($t=-3.72$, $p<0.005$).

A similar result was obtained with changes in disgust being modeled as a function of fear and trial, i.e. (fear: $t=7.48$, $p<0.001$ and trial: $t=2.69$, $p<0.02$). Thus, while fear and disgust are highly related, neither accounts entirely for the reduction in the other observed across trials. The relationship between the slopes (rates of decline) in the two measures is shown in Fig. 2.

[1] Because of the dramatic variation both among tasks within subjects and between subjects, an omnibus analysis incorporating the entire process was difficult to perform. The earlier tasks were often concluded with a single trial, precluding estimates of the rate of change across trials. In a few intermediate tasks, however, a substantial sample of behavior was available on most subjects. In particular task 9 ('touching the spider'), typically required at least several trials and appeared to represents a substantial increase in difficulty above the just previous tasks. Number of trials on Task 9 ranged from 1 to 53 (Mean =13.00, SD=14.68).

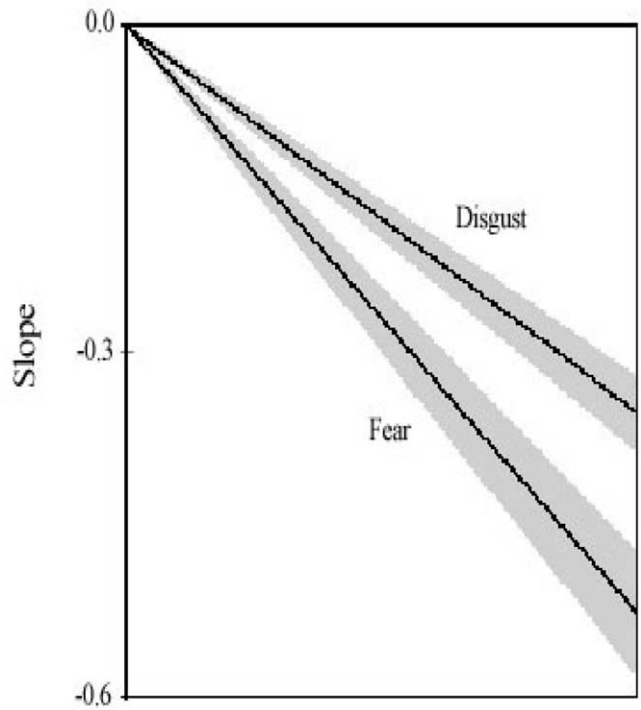

Fig. 1. Mean decline slopes for fear and disgust across trials.

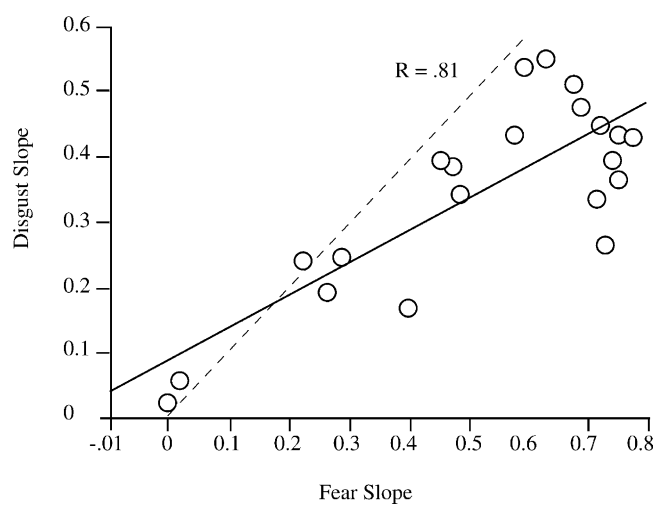

Fig. 2. The relationship between the slopes (rates of decline) in fear and disgust ratings across trials.

3.3.3. Does disgust predict either the initial peak fear level or the decline in peak fear across treatment trials?

We examined the influence of pretreatment spider specific disgust, as well as global disgust on the intercept and slope of peak fear during treatment. Neither global disgust sensitivity at pretreatment nor spider-specific disgust at pretreatment significantly predicted the level of fear activation or fear decline during treatment. We also examined the initial level of disgust during treatment and its effects on subsequent fear decline. Results revealed no significant relationship between initial disgust ratings and the slope of fear decline.

4. Discussion

Overall, we attempted to clarify the nature of the relationship between fear and disgust before, during, and after in vivo exposure to a live spider. Contrary to expectation, there was no significant relationship between questionnaire measures of spider fear and spider disgust in this phobic sample. However, the relationship between fear and disgust was significant when measured by ratings of each during a BAT with a real spider. One possible explanation for this result is the restriction of range in our sample. That is, our sample consisted of high spider fear individuals only, whereas previous studies examining this correlation used samples in which fear levels varied. Another possible explanation for this finding is that the association between fear and disgust may be more prominent in the presence of the fear stimulus. This conclusion is consistent with the hypothesis put forward by Thorpe & Salkovskis (1998), suggesting that that "when stimuli normally associated with disgust become the focus of phobic anxiety, the disgust emotion may be amplified" (p. 892).

What happens to fear and disgust in response to repeated exposure to the fear stimulus? Several conclusions seem warranted by our findings. First, our data revealed that both fear and disgust declined significantly as a function of exposure as evidenced by the significant negative decay slopes for both fear and disgust. Second, the decline in fear was greater than the observed decline in disgust as evidenced by a steeper decay slope for fear relative to disgust. Third, our findings suggest that the decline in fear and disgust are partially independent of each other. In support of this conclusion, was our finding that the decline in fear was present and significant even after controlling for change in disgust; similarly, the decline in disgust was present even after controlling for change in fear.

We also examined whether the disgust levels were associated with either the activation of fear (i.e. fear intercept during trial 1) or the decline in fear (i.e. decay slope) across treatment trials. We found no evidence that pretreatment disgust levels or initial disgust levels during treatment affected fear activation or fear decline during treatment.

The clinical implications of our findings deserve note. First, it appears that in vivo exposure produces marked improvement in both fear and disgust and that the improvements observed in both are at least partially independent of each other. Second, our findings fail to provide evidence that high levels of disgust interfere with the fear reducing effects of repeated exposure.

Several limitations of the study deserve comment. First, although we employed a stringent two-stage screening procedure to ensure that our research participants display marked phobicity (our sample represents the top 1% on indices of spider fear and avoidance), many did not meet DSM-

IV criteria for specific phobia. Upon closer examination, our research participants meet all DSM-IV criteria with the exception of Criterion E (i.e. the person must experience significant interference in social, academic or work functioning *or* experiences marked distress about having the phobia). Although we have no reason to believe that this clinical status variable limits the generalizability of our findings, the issue remains an empirical one and awaits replication with a treatment-seeking clinical sample. Second, we have no data on the *durability* of the observed findings since we were not able to assess study participants after a significant period following treatment termination.

The observation that exposure has such pronounced effects on both fear and disgust raise the interesting question as to whether a common mechanism governs both the reduction of fear and the reduction of disgust. Recent attempts to manipulate exposure parameters and observe the effects on fear reduction have led to some promising findings with respect to fear reduction (Kamphuis & Telch, 2000; Rowe & Craske, 1998; Sloan & Telch, 2001; Telch, Valentiner, Ilai, Petruzzi, & Hehmsoth, 2000). Future studies are needed to see if these same experimental manipulations influence change in disgust in a similar fashion.

References

Armfield, J. M., & Mattiske, J. K. (1996). Vulnerability representation: The role of perceived dangerousness, uncontrollability, unpredictability and disgustingness in spider fear. *Behaviour Research and Therapy*, *34*, 899–909.

Arntz, A., Lavy, E., Van den Berg, G., & Van Rijsoort, S. (1993). Negative beliefs of spider phobics: A psychometric evaluation of the spider phobia beliefs questionnaire. *Advances in Behaviour Research and Therapy*, *15*, 257–277.

Bryk, A. S., & Raudenbush, S. W. (1992). *Hierarchical lineal models: Applications and data analysis methods.* Newbury Park, CA: Sage.

Bryk, A. S., Raudenbush, S. W., & Congdon, R. T. Jr. (1996). *HLM: Hierarchical linear and nonlinear modeling with the HLM/2L and HLM/3L programs.* Chicago, IL: Scientific Software International.

Davey, G. C. L. (1992). Characteristics of individuals with fear of spiders. *Anxiety Research*, *4*, 299–314.

Davey, G. C. L. (1994). The disgusting spider: The role of disease and illness in the perpetuation of fear of spiders. *Society and Animals*, *2*, 17–24.

De Jong, P. J., Andrea, H., & Muris, P. (1997). Spider phobia in children: Disgust and fear before and after treatment. *Behaviour Research and Therapy*, *35*, 559–562.

De Jong, P. J., & Merckelbach, H. (1998). Blood-injection injury phobia and fear of spiders: domain specific individual differences in disgust sensitivity. *Personality and Individual Differences*, *24*, 153–158.

De Jong, P. J., Vorage, I., & Van den Hout, M. A. (2000). Counterconditioning in the treatment of spider phobia: Effects on disgust, fear and valence. *Behaviour Research and Therapy*, *38*, 1055–1069.

Izard, C. E. (1993). Organizational and motivational functions of discrete emotions. In M. Lewis, & J. M. Haviland (Eds.), *Handbook of emotions* (pp. 631–641). New York: Guilford Press.

Johnsen, B. H., & Hugdahl, K. (1990). Fear questionnaires for simple phobias: Psychometric evaluations for a Norwegian sample. *Scandinavian Journal of Psychology*, *31*, 42–48.

Kamphuis, J. H., & Telch, M. J. (2000). Effects of distraction and guided threat reappraisal on fear reduction during exposure-based treatments for specific fears. *Behaviour Research and Therapy*, *38*, 1163–1181.

Matchett, G., & Davey, G. C. L. (1991). A test of the disease-avoidance model of animal phobias. *Behaviour Research and Therapy*, *29*, 91–94.

Merckelbach, H., De Jong, P. J., Arntz, A., & Schouten, E. (1993). The role of evaluative learning and disgust sensitivity in the etiology and treatment of spider phobia. *Advances in Behaviour Research and Therapy*, *15*, 243–255.

Mulkens, S. A., De Jong, P. J., & Merckelbach, H. (1996). Disgust and spider phobia. *Journal of Abnormal Psychology*, *105*, 464–468.

Muris, P., & Merckelbach, H. (1996). A comparison of two spider fear questionnaires. *Journal of Behaviorial Therapy and Experimental Psychiatry*, *27*, 241–244.

Rowe, M. K., & Craske, M. G. (1998). Effects of varied-stimulus exposure training on fear reduction and return of fear. *Behaviour Research and Therapy*, *36*, 719–734.

Rozin, P., Fallon, A. E., & Mandell, R. (1984). Familial resemblance in attitudes to foods. *Developmental Psychology*, *20*, 309–314.

Sawchuk, C. N., Lohr, J. M., Tolin, D. F., Lee, T. C., & Kleinknecht, R. A. (2000). Disgust sensitivity and contamination fears in spider and blood-injection-injury phobias. *Behaviour Research and Therapy*, *38*, 753–762.

Sloan, T. B., Telch, M. J. (2001). The effects of safety-seeking behavior and guided threat reappraisal on fear reduction during exposure: An experimental investigation (in press).

Szymanski, J., & O'Donohue, W. (1995). Fear of spiders questionnaire. *Journal of Behavioral Therapy and Experimental Psychiatry*, *26*, 31–34.

Telch, M. J., Valentiner, D. P., Ilai, D., Petruzzi, D., & Hehmsoth, M. (2000). The facilitative effects of heart-rate feedback in the emotional processing of claustrophobic fear. *Behaviour Research and Therapy*, *38*, 373–387.

Thorpe, S. J., & Salkovskis, P. M. (1998). Studies on the role of disgust in the acquisition and maintenance of specific phobias. *Behaviour Research and Therapy*, *36*, 877–893.

Tolin, D. F., Lohr, J. M., Sawchuk, C. N., & Lee, T. C. (1997). Disgust and disgust sensitivity in blood-injection-injury and spider phobia. *Behaviour Research and Therapy*, *35*, 949–953.

Tolin, D. F., Sawchuk, C. N., & Lee, T. C. (1999). The role of disgust in blood-injection-injury phobia. *The Behavior Therapist*, *22*, 96–99.

Watts, F. N., & Sharrock, R. (1984). Questionnaire dimensions of spider phobia. *Behaviour Research and Therapy*, *22*, 575–580.

Woody, S. R., & Teachman, B. A. (2000). Intersection of disgust and fear: Normative and pathological views. *Clinical Psychology: Science and Practice*, *7*, 291–311.