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Disgust and Spider Phobia

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Twenty-four women with spider phobia and 45 nonphobic women completed the Disgust Questionnaire (DQ; P. Rozin, A. E. Fallon, & R. Mandell, 1984) and the Spider Phobia Questionnaire (SPQ; R. Klorman, T. C. Weerts, J. E. Hastings, B. G. Melamed, & P. J. Lang, 1974). Participants also underwent behavioral tests concerning disgust sensitivity and fear of spiders. Spider phobic women showed stronger disgust sensitivity than nonphobic women, and spiders were found to have a disgust-evoking status that was related to participants' fear of spiders. The relationship between DQ and SPQ was independent of neuroticism and introversion. DQ scores were not associated with a global measure of phobic complaints (i.e., Fear Questionnaire; I. M. Marks & A. Mathews, 1979). Results are consistent with a disease-avoidance model of spider phobia (G. Matchett & G. C. L. Davey, 1991), which emphasizes the role of disgust in spider phobia.

Community studies such as those of Agras, Sylvester, and Oliveau (1969) and Costello (1982) not only show that fear of certain small animals (e.g., spiders) ranks high in the hierarchy of fears, but also that some other fears (e.g., fear of dentists, cars, etc.) are relatively scarce in the general population. The phenomenon that some fears are more prevalent than others has been termed the "non-arbitrary distribution of fears" (Seligman, 1971, p. 312). This nonarbitrary distribution forms the core of Seligman's preparedness hypothesis. Briefly, this hypothesis assumes that evolutionary pressures select for an adaptive predisposition ("preparedness") to associate fear with potentially dangerous stimuli. According to the preparedness hypothesis, fear reactions toward stimuli that once posed a threat to our ancestors are learned rapidly and are slow to extinguish.

Öhman, Dimberg, and Öst (1985) extended the preparedness hypothesis and related fear of spiders and snakes to a "predator-defense" system. These authors argued that spiders and snakes are prototypical examples of evolutionally dangerous and consequently, prepared stimuli. This would explain why fear of spiders and snakes is far more common than fear of evolutionally recent stimuli (e.g., dentists, cars, etc.). Although the predator-defense model seems plausible for fear of snakes, several authors have questioned its validity for fear of spiders (e.g., Davey, 1995; Delprato, 1980; Merckelbach, van den Hout, & van der Molen, 1987). A more straightforward account might be that spiders are easily associated with dirt rather than direct physical harm. For example, it seems reasonable to argue that spiders are linked to dirt and contamination because they are often found in "dirty" places like cellars, sewers, chinks, and so on. If this line of reasoning is correct, the "disease-avoidance model" proposed by Matchett and Davey (1991) would provide a better analysis of the origins of spider fear than the predator-defense model. The disease-avoidance model states that certain animals (e.g., spiders and rats) are associated with the spreading of disease, dirt, and contamination. From this perspective, the aversion of spiders is an expression of disgust rather than of fear of being attacked.

Indirect evidence for the idea that disgust plays a role in fear of spiders was obtained by Matchett and Davey (1991). They found that disgust and contamination sensitivity (as measured by the Disgust Questionnaire, DQ; Rozin, Fallon & Mandell, 1984) correlates with fear of fear-relevant but harmless animals (e.g., spiders). In line with this, a study of Merckelbach, de Jong, Arntz, and Schouten (1993) revealed preliminary evidence to suggest that women with a clinical fear of spiders are characterized by a higher disgust and contamination sensitivity (as indexed by the DQ) than nonphobic controls. Note, in passing, that the items of the DQ do not refer to fear or phobia. Rather, they are concerned with food-rejecting tendencies.

The present study was carried out to explore further the role of disgust in spider phobia. First, we investigated the robustness of the earlier finding of Merckelbach et al. (1993) that women with a spider phobia display a relatively strong disgust and contamination sensitivity (as indexed by the DQ). In addition, we explored to what extent the relationship between disgust sensitivity and spider phobia is mediated by other personality characteristics that are known to play an important role in the etiology of phobias, that is, introversion and neuroticism (Eysenck, 1987). In other words, we investigated the possibility that the relationship between DQ scores and spider phobia is merely due to the fact that the DQ shares some variance with measures of introversion or neuroticism.

When spider-fearful people are characterized by a relatively strong disgust and contamination sensitivity, this does not necessarily imply that they consider spiders per se as disgusting. Therefore, we also examined more directly spiders' disgust-evoking status and its connection with spider phobia. If spiders are, indeed, considered disgusting, they should share the strik-

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ing feature of any disgusting substance, namely, that they can render a prefectly good food item inedible by brief contact (cf. Rozin & Fallon, 1987). To explore this issue, we designed an experimental task. During this task, participants indicated their willingness to eat a cookie before and after it had been in contact with a live spider. In addition, participants were invited to eat the cookie after the experimental manipulation. If disgust is an important aspect of spider phobia, one should expect that the decline in motivation to eat the cookie would be especially prominent in high fearful participants.

Rozin and Fallon (1987) argued that almost all disgusting objects are animals or animal products. To explore the possibility that fear of spiders is associated with a more general repugnance to dirty objects rather than with disgust per se, we designed an additional task (i.e., a tea-flavor test). In this task the possibility of contamination was suggested by the abundant presence of tea scale (i.e., a nonanimal product). Participants were invited to judge the taste of tea under two conditions: when it was offered in a clean cup and when it was presented in a dirty cup that contained a vast amount of tea scale. If fear of spiders is specifically associated with disgust rather than with a general repugnance of dirty objects, one would anticipate no relationship between differential appreciation of tea presented in dirty and clean cups and spider fear.

Participants in the present study consisted of a group with and a group without a clinically diagnosed spider phobia. The latter group did not represent an explicitly nonfearful sample. Rather, it contained women with varying levels of nonclinical spider fear. Such a sample has the advantage that it provides the opportunity to evaluate whether the relationship between disgust sensitivity and fear of spiders holds up in the nonphobic range. Obviously, this procedure has the disadvantage that it renders the present study less sensitive to subtle between-group differences related to fear of spiders.

Method

Participants

Participants were 24 women who had a phobia of spiders and applied for treatment at our department. The control group consisted of a random sample of 45 undergraduate students (all women). Participants of the control group were recruited through advertisements. The women who were spider phobic met criteria from the *Diagnostic and Statistical Manual of Mental Disorders* (3rd ed., rev.; *DSM-III-R*; American Psychiatric Association, 1987) for simple phobia, with spider phobia as their main psychopathological problem. Diagnoses were made by a trained clinical psychologist. Only women who suffered from an isolated fear participated in the current study. Phobic participants in the experiment received free treatment. Their mean score on the Spider Phobia Questionnaire (SPQ; Klorman, Weerts, Hastings, Melamed & Lang, 1974) was 22.9 (range = 12–30; SD = 3.9), a score that comes close to the scores that were reported by Fredrikson (1983) and de Jong, Arntz, and Merckelbach (1993) for their phobic samples.

Participants also underwent a Behavioral Approach Test (BAT; Arntz, Lavy, van den Berg, & van Rijsoort, 1993) to assess avoidance of spiders. The BAT was scored on a 13-point scale ranging from 0 (i.e., distance between individual and spider is 300 cm) to 12 (i.e., spider on individual's hand; see below). Mean BAT score of the women with spider phobia was 4.1 (i.e., "pulls the glass jar containing a spider up to a distance of 0.75 meter"), which is highly similar to the mean BAT score reported by de Jong et al. (1993) for their spider phobic sample. Mean age of the phobic women was 28 years (range = 19–42 years). The mean educational level (on a scale ranging from *only primary school* [1] to *university education completed* [9] was rather high (M = 6.3, SD = 1.6).

Nonphobic women were recruited among undergraduate students. The mean age of the nonphobic sample was 20.4 years (range = 18–23 years); their mean score on the SPQ was 8.5 (range = 0–20; SD = 6.1). Mean BAT score of this sample was 10 (i.e., "touches the spider with a pencil").

Assessment

Participants were asked to complete the following questionnaires.

DQ. The DQ is a self-report measure of disgust and contamination sensivity. It consists of 24 questions about specific events in which food is involved. The DQ asks participants to rate on a 9-point scale how much they would like to eat "contaminated" food items (1 = *do not want to eat at all*; 9 = *would like to eat very much*). A sample item would be: "How much would you like to eat your favorite soup after it has been stirred by a new fly swatter?" Scores are summed and yield a total score between 24 (maximum disgust sensitivity) and 216 (minimum disgust sensitivity). In the present study a Dutch version of the DQ was used (cf. Merckelbach et al., 1993).

To examine the test–retest reliability of the DQ, an independent sample of female undergraduates (N = 22) completed this questionnaire on two occasions, 4 weeks apart. The reliability of the DQ appeared to be satisfactory (r = .80, p = .05). Mean disgust scores were 131.2 (range = 84–193; SD = 28.4) and 135.2 (range = 93–195; SD = 28.6) on the first and second occasion, respectively.

SPQ. The SPQ is a validated 31-item self-report instrument that measures fear of spiders (Arntz, Lavy, van den Berg, & van Rijsoort, 1993; Fredrikson, 1983). Total SPQ score can range from 0 to 31 (the higher the score, the higher the self-reported fear of spiders).

Eysenck's Personality Questionnaire (EPQ; Eysenck & Eysenck, 1984). The EPQ consists of 101 items, to be answered with either "yes" or "no." Items represent several scales (e.g. Extraversion [E] and Neuroticism [N]). The psychometric properties of the Dutch version of the E and N scales have been found to be satisfactory (Evers, van Vliet-Mulder, & ter Laak, 1992).

Fear Questionnaire (FQ; Marks & Mathews, 1979). The FQ is a 15-item self-report measure that provides a global index of phobic avoidance behavior. It contains three subscales: Social Phobia, Blood-injury Phobia, and Agoraphobia. The Dutch translation of the FQ has good psychometric properties (e.g., van Zuuren, 1988).

Procedure

The experiment proper consisted of three parts. In the first part, participants were asked to participate in a "flavor task concerning the taste of tea." Taste and flavor of a cup of tea had to be judged three times, using 100 mm Visual Analogue Scales (VASs). The pertinent question that participants had to answer in each case was "How much do you like the taste of this tea?" (ranging from 0 = *do not like it at all* to 100 = *like it very much*). Participants were instructed to drink as much tea as they felt necessary to properly answer the questions. Two of the three cups were clean inside and one cup was obviously dirty, containing a vast amount of tea scale. All cups were identical and so was the tea in each cup. During the experiment, the women were seated in a chair, in a sound-attenuated room with a one-way screen. For each trial, cups were placed under a cover and brought into the room by an assistant; a beep sound was the sign for the participants to remove the cover and start tasting the tea. The experimenter measured participants' delay. The cup of tea was weighed both before and after drinking.

(Participants were not informed about this procedure.) Trial order was balanced across participants.

In the second part, the women were asked to participate in a cookie preference task. In this task, participants had to choose from a box containing cookies the cookie they preferred most. Following this, they had to rate on a VAS how much they wanted to eat the cookie (ranging from 0 = *do not want to eat at all* to 100 = *want to eat very much*). Next, an assistant walked in and guided a medium-sized live spider (Tegenaria Atrica) across the cookie, at a 1-m distance from the participants. As soon as the assistant left the room with the spider, the women rated once more on a VAS how much they wanted to eat the cookie. Finally, participants were asked to eat the cookie; instructions to eat the cookie were repeated (twice) if they refused.

In the third part of the experiment, all women performed a BAT to assess the participants' fear of spiders. During this test, the women were seated in a chair in front of a large shelf (3 m long). On the far end of this shelf (opposite to the participants), a glass jar was placed, containing a medium-sized living house spider. The jar could be advanced by means of a string. Participants were instructed to pull the spider as close as possible (see Arntz et al., 1993, for more details concerning the BAT).

Results

Descriptive Measures

Means and standard deviations of all relevant descriptive measures are presented in Table 1. The phobic group significantly differed from the control group with regard to the SPQ, $t(67) = -10{,}5$, $p < .005$, and the BAT, $t(67) = 6.6$, $p < .005$. In addition, the nonphobic group showed higher scores on the extraversion scale of the EPQ, $t(67) = 2.4$, $p = .02$. No significant differences emerged for FQ scores, $t(67) < 1$, and Neuroticism, $t(67) < 1$.

Disgust Sensitivity and Spider Phobia

As predicted, phobic women had lower DQ scores than nonphobic women (i.e., higher disgust sensitivity), $t(67) = 2.93$, $p < .05$ (see also Table 1). In line with this, a negative Pearson's product–moment correlation was found between SPQ and DQ scores, $r = -.39$, $p < .05$ ($N = 69$). When the contribution of EPQ-N and EPQ–Introversion was partialled out, the relationship between DQ and SPQ remained fairly unaffected: $r = -.37$, $p < .05$. Thus, the relationship between DQ and SPQ was not mediated by Neuroticism or Introversion. The relationship between disgust sensitivity and fear of spiders holds up when the analysis is restricted to the nonphobic range ($n = 45$); for the nonphobic subsample, the partial correlation between DQ and SPQ, controlling for the EPQ scales, was $r = -.36$, $p < .05$.

Table 1
Scores on the Descriptive Measure for the Spider Phobic and the Nonphobic Participants

	Spider phobic		Nonphobic	
Measure	*M*	*SD*	*M*	*SD*
BAT	4.1	2.7	10.1	1.7
SPQ	22.9	3.9	8.5	6.1
FQ	24.5	10.2	28.2	16.2
Neuro	9.2	5.6	8.9	4.3
Extra	12.3	4.5	14.8	3.8
DQ	107.8	38.4	131.2	27.5

Note. BAT = Behavioral Approach Test; SPQ = Spider Phobia Questionnaire; FQ = Fear Questionnaire; Neuro = Eysenck's Personality Questionnaire (EPQ) Neuroticism; Extra = EPQ Introversion–Extraversion; DQ = Disgust Questionnaire.

Means and standard deviations of the data obtained during the two experimental tasks are presented in Table 2. A 2 (group) × 2 (before vs. after contamination) analysis of variance (ANOVA) performed on participants' willingness to eat the cookie showed a main effect of contamination, $F(1, 67) = 110.10$, $p < .05$. That is, there was a general decline in participants' motivation to eat the cookie after it had been in contact with a spider. In line with the idea that disgust is an important aspect of spider phobia, this decline was especially prominent in the phobic group, as was evidenced by a significant Contamination × Group interaction, $F(1, 67) = 10.83$, $p < .05$. Similarily, the number of phobic participants' who eventually ate the cookie was significantly smaller than the number of nonphobic participants who ate the cookie after it had been in contact with the spider, $\chi^2(1, N = 69) = 13.5$, $p < .05$.

An ANOVA performed on the latency data of the tea-task revealed a main effect of contamination, $F(1, 67) = 8.4$, $p < .05$, indicating that, in general, participants took more time before drinking tea from the dirty cup relative to the control cups (mean latencies for both clean cups were used in the analyses). However, there was no significant Group × Contamination interaction, $F(1, 67) = 2.37$, $p = .13$. That is, no evidence emerged to suggest that the spider phobic women were more sensitive to dirtiness than the nonphobic women. Furthermore, no main effect of group emerged, $F(1, 67) < 1$. A similar pattern of results emerged for the weight data. An ANOVA showed a significant main effect of contamination, $F(1, 60) = 16.53$, $p < .05$, indicating that, in general, participants drank more tea from clean than from dirty cups. Again, this contamination effect was similar for both groups, because no significant interaction emerged between contamination and group, $F(1, 60) = 1.98$, $p = .16$. Nor was there a main effect of group, $F(1, 60) = 2.35$, $p = .13$. A 2 (group: phobic–nonphobic) × 2 (condition: contamination vs. no contamination) ANOVA performed on participants' subjective evaluations during the tea task revealed a main effect of condition, $F(1, 67) = 14.16$, $p < .05$. This was due to the fact that, overall, participants evaluated tea in dirty cups more negatively than tea in clean cups. This contamination effect was similar for both groups, as was evidenced by the absence of a significant interaction between group and condition, $F(1, 67) < 1$. There was no main effect of group, $F(1, 67) < 1$.

Discussion

In the current study, we investigated the alleged link between disgust and spider phobia. Consistent with Matchett and Davey's disease avoidance model of small animal fear (e.g., Davey, 1994; Matchett & Davey, 1991), the present study showed that spider phobic women display a stronger disgust sensitivity than nonphobic women. This finding confirms the results reported in a previous study (Merckelbach et al., 1993). The relationship between digust sensitivity and fear of spiders was found to be

Table 2
Mean Scores During the Tea Test and the Cookie Test of Women With and Women Without Spider Phobia

Measure	Spider phobic *M*	Spider phobic *SD*	Nonphobic *M*	Nonphobic *SD*
Tea test				
Latency				
Clean	6.9	1.2	8.1	4.3
Dirty	8.8	2.6	8.7	2.9
Weight				
Clean	14.0	13.8	19.9	12.2
Dirty	10.9	10.3	13.6	10.4
Taste				
Clean	53.1	20.6	52.2	17.7
Dirty	42.2	24.6	43.5	21.8
Cookie test				
Willingness to eat				
Before spider	66.9	24.8	68.0	21.9
After spider	15.5	25.2	41.3	27.2
EAT (%)	25		71	

Note. Latency = time that elapsed between the start of the experiment and participants' first swallow of tea from the clean and the dirty cups, respectively; weight = amount of tea (in grams) participants drank; taste = participants' evaluation of the taste of the tea; willingness to eat = participants' motivation to eat the cookie before and after it has been in contact with a spider; EAT = percentage of participants that eventually ate the cookie.

independent of personality characteristics that are frequently associated with phobic fear (i.e., neuroticism and introversion) and did not reflect a general phobic tendency (as indexed by the FQ). A similar relationship between disgust sensitivity and fear of spiders was present within the nonphobic range, as was evidenced by the negative correlation between DQ and SPQ scores in the nonphobic group.

The cookie task provided further support for the idea that disgust plays a role in spider phobia. That is, phobic individuals displayed a much stronger decline in their motivation to eat a tasty cookie after it had been in brief contact with a live spider than nonphobic women. Moreover, only 25% of the spider phobic women eventually ate (some of) the cookie, against 70% of the nonphobic participants.

Thus, the present data not only indicate that fear of spiders is linked to disgust and contamination sensitivity, they also suggest that spiders per se are considered disgusting by women with spider phobia. That is, spiders seem to share the striking feature of any disgusting substance, namely, that they can render a perfectly good food item inedible by brief contact. Although the present results suggest that spiders have a disgust-evoking status, it remains to be established whether the results of the cookie task reflect a general disgust sensitivity or an enhanced sensitivity that is restricted to (feared) spiders. One way to elucidate this issue is to include an additional item of revulsion in a future study (e.g., a snail).

Rozin and Fallon (1987) argued that disgust essentially is confined to animals or animal products. To explore the possibility that fear of spiders is associated with a general repugnance to dirty objects rather than with disgust and contamination sensitivity per se, we used a tea-flavor test. In this task the possibility of contamination was suggested by the abundant presence of tea scale (i.e., a nonanimal product). Although, in general, participants drank less tea from the dirty cup than from the clean cups, displayed longer latencies when tea was presented in the dirty cup, and preferred the tea presented in a clean cup, no differences emerged between the phobic and nonphobic women in this respect. Thus, no evidence emerged to suggest that the relationship between fear of spiders and disgust sensitivity reflects a general repugnance to dirt or dirty objects.

It should be acknowledged that in the present study, the phobic and nonphobic group were not carefully matched on demographic factors such as age, educational level, and socioeconomic status. Although there are no compelling reasons to suspect that these factors would systematically influence disgust sensitivity, it cannot be ruled out that these unmatched variables modulated in some way the group differences that were evident in the current study. However, that the pertinent relationship between digust sensitivity and fear of spiders was also present within the sample of nonphobic undergraduate students renders this possibility not very likely.

Taken together, the present study confirms the idea that disgust is an important feature of fear of spiders. Of course, the current data do not preclude the possibility that the fear of being attacked plays a role in spider phobia as well. In fact, Arntz et al. (1993) showed that during actual confrontation with their feared object, individuals with spider phobia report irrational beliefs related to disgust (e.g., "will make me ill"; "is disgusting") as well as beliefs related to the fear of being attacked (e.g., "will attack me"; "will take revenge").

What is the role of disgust and contamination sensitivity in the development of spider phobia? One possibility is that disgust sensitivity operates through latent inhibition (Merckelbach et al., 1993). Before the onset of phobic complaints, people with high disgust sensitivity may have avoided spiders and settings where spiders are likely to be encountered. As a result of this lack of familiarity with spiders, individuals high in disgust sensitivity may be more prone to subsequent conditioning processes (see, e.g., Davey, 1989; Doogan & Thomas, 1992; Merckelbach et al., 1993). A second possibility is that high disgust sensitivity plays a role in the maintenance of spider fear: It may well be the case that high disgust sensitivity intensifies avoidance and thus reduces functional exposure to spiders (see also Merckelbach et al., 1993).

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