BLOOD-INJECTION-INJURY PHOBIA AND FEAR OF SPIDERS: DOMAIN SPECIFIC INDIVIDUAL DIFFERENCES IN DISGUST SENSITIVITY

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Summary—We investigated whether disgust sensitivity is associated with blood-injection-injury (BII) and spider fear. We also explored whether the relationship between disgust sensitivity and phobic fears is domain specific. Ninety-six undergraduates (all women) completed the Disgust Questionnaire (DQ) (Rozin et al., 1984), the Disgust Scale (DS) (Haidt et al., 1994), the Spider Phobia Questionnaire (SPQ) (Klorman et al., 1974), and the Blood-Injury Phobia Questionnaire (BIQ) (Merckelbach et al., submitted). No relationship was evident between DQ scores and BII fear. Yet, BII fear was found to be related to the Body Envelope Violations subscale of the DS. Spider fear was found to be associated with DQ scores and the Animal sub-scale of the DS. Thus, the relationship between phobic fears and high disgust sensitivity was found to be domain specific with BII fear being related to animal-reminder disgust and spider fear to oral-centred disgust. © 1998 Elsevier Science Ltd. All rights reserved

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INTRODUCTION

A series of studies have demonstrated that disgust sensitivity (as measured with the Disgust Questionnaire, DQ) (Rozin et al., 1984) correlates with fear of fear-relevant but harmless animals (Matchett and Davey, 1991). In line with this, women with a clinically diagnosed spider phobia were found to have substantially higher levels of disgust sensitivity (i.e., lower DQ scores) than non-phobic controls (Mulkens et al., submitted; Merckelbach et al., 1993). Note, in passing, that the items of the DQ do not refer to spiders, fear or phobia. Rather, they are concerned with food-rejecting tendencies.

The relationship between disgust sensitivity and fear of spiders may be explained by assuming that spiders are most likely to acquire disgust-evoking properties for people with relatively high levels of disgust sensitivity. Following this line of reasoning, disgust sensitivity facilitates the development of spider phobia. The finding that DQ scores of spider phobics remain unaffected by successful treatment (de Jong et al., 1997; Merckelbach et al., 1993) sustains the idea that disgust sensitivity is a vulnerability factor rather than a mere epiphenomenon of phobic fear.

Several authors have argued that disgust and disgust sensitivity might also be involved in blood-injection-injury (BII) phobia (Page, 1994). Clearly, the stimuli that are feared by BII phobics such as blood and injuries, typically evoke feelings of disgust (Gross and Levenson, 1993). In addition, many BII phobics show a diphasic cardiovascular response when exposed to this particular class of stimuli. That is, after a brief fear-related increase in heart rate and blood pressure, there is a rapid decrease below baseline levels (Ost and Hellström, 1997). Such a heart rate deceleration is likely to occur in disgust but not in fear (Levenson, 1992). Both types of observations are in line with the idea that BII phobics' aversion of blood, injury, etc., is at least partly fuelled by disgust rather than fear. From such a perspective, high disgust sensitivity is likely to facilitate the acquisition of BII phobia (cf. supra).

The finding that BII phobics are liable to faint in the presence of blood or injury (e.g., Kleinknecht et al., 1996), also points to the possible involvement of disgust in BII phobia. That is, strong and
unopposed (parasympathetic) disgust reactions may underlie this emotional fainting. For example, Page (1994; p. 452) speculated that "when the (parasympathetic) processes underlying disgust combine with a homeostatic increase in parasympathetic activity (which counteracts the initial sympathetically mediated fight or flight response), the joint effect may produce a pattern of vascular and vagal responding responsible for fainting". From such a perspective, high disgust sensitivity results in a relatively low threshold for fainting in the presence of pertinent stimuli, which, in turn may facilitate the development of blood-injury phobia.

Matchett and Davey (1991) obtained preliminary evidence for the hypothesized relationship between disgust sensitivity and BII-fear. In a student sample, they found that low DQ scores (i.e., high disgust sensitivity) were associated with higher scores on the BI(I) items of the Fear Survey Schedule (FSS), (Wolpe and Lang, 1964). However, in three subsequent studies using samples of undergraduate students as well as clinically diagnosed dental phobics, we could not substantiate the claim that low DQ scores are related to BII fear or fainting (Merckelbach et al., submitted). One explanation for the apparent absence of a robust relationship between DQ scores and BII fear might be that the DQ does not cover all relevant aspects of disgust sensitivity. That is, the DQ is restricted to one type of disgust elicitor: food contamination (by animal products). Yet, there is considerable evidence that revulsion associated with disgust extends far beyond this domain of contaminated food products. Therefore, Haidt et al. (1994) recently developed a broader index of disgust sensitivity, the Disgust Scale (DS), which covers 7 domains of disgust elicitors (i.e., food, animals, body products, sex, body envelope violations, death, and hygiene).

The domains of disgust elicitors were found to be relatively independent (Haidt et al., 1994). Therefore, it might well be that BII and spider fear are related to high disgust sensitivity within different domains. To explore this possibility, subjects in the present study were asked to complete both the DQ and the DS (as indices of disgust sensitivity). In addition, we assessed BII as well as spider fear. As a subsidiary issue, we also explored whether the relationship between disgust sensitivity and phobic fear is mediated by general trait anxiety. Note that there is some evidence for a connection between disgust sensitivity and general traits such as neuroticism (Hennig et al., 1996). The question arises, therefore, to what extent this connection can account for the correlation between phobic fears and disgust sensitivity.

METHOD

Participants

Participants were undergraduate students of the Faculty of Health Sciences of Maastricht University (N = 96). For pragmatic reasons we only included female subjects in our sample. As more than 90% of the students of our Faculty are women, it would be rather difficult to find sufficient male volunteers to allow for reliably evaluating possible gender effects. Therefore, we preferred to select a homogeneous sample of female subjects. They were paid for participating in this study. Their mean age was 18.5 years (r = 17-22).

Assessment

Participants were tested in small groups (5-10 students). They completed the following questionnaires:

Disgust Questionnaire (DQ). The DQ (Rozin et al., 1984) is a self-report measure of disgust and contamination sensitivity. 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 favourite 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). To assess spiders' disgust-evoking status we added two items to the original DQ (DQ-spider cf. de Jong et al., 1997): "How much would you like to eat your favourite chocolate bar after a spider has walked across the bar when it is still wrapped in its package?" and "How much would you like to eat your favourite chocolate bar after a spider has walked across the unpacked bar?"
Disgust Scale (DS). The DS (Haidt et al., 1994) is a more general 32-item self-report index of disgust sensitivity covering 7 domains of disgust elicitors: Food (e.g., “You are about to drink a glass of milk when you smell it is spoiled”), Animals (e.g., “You are walking barefoot on concrete, and you step on an earthworm”), Body Products (e.g., “You see a bowel movement left unflushed in a public toilet”), Sex (e.g., “You hear about an adult woman who has sex with her father”), Envelope Violation (e.g., “You see a man with his intestines exposed after an accident”), Death (e.g., “You accidentally touch the ashes of a person who has been cremated”), and Hygiene (e.g., “I never let any part of my body touch the toilet seat in public restrooms”). In addition, there is an eighth scale referring to the domain of Magical Thinking (e.g., “A friend offers you a piece of chocolate shaped like dog-doo”). The DS includes 2 true-false (T/F) and 2 disgust-rating items for each of the 8 domains. The disgust-rating items were scored on a 3 point scale: 0 = “not disgusting at all”, 0.5 = “slightly disgusting”, and 1 = “very disgusting”. Scores are summed and yield a total score between 0 (minimal disgust sensitivity) and 32 (maximal disgust sensitivity).

State-Trait Anxiety Inventory (STAI). We used the trait version of the STAI (STAI Y-2) (Spielberger et al., 1970). The STAI is a 20-item self-report measure of trait anxiety, ranging from 20 (minimal trait anxiety) to 80 (maximal trait anxiety).

Blood-Injury Phobia Questionnaire (BIQ). The BIQ (cf. Merckelbach et al., submitted) is a 10-item self-report measure of blood-injection-injury (BII) phobia. The BIQ contains the 5 BII items from the Fear Questionnaire (FQ) (Marks and Mathews, 1979) and 5 non-redundant BII items from the Fear Survey Schedule (FSS) (Wolpe and Lang, 1964). The items were rated on a 5-point scale with 1 indicating “no fear” and 5 indicating “maximal fear”.

Spider Phobia Questionnaire (SPQ). The SPQ (Klorman et al., 1974) is a validated 31-item self-report instrument that measures fear of spiders. Total SPQ score can range from 0–31 (the higher the score, the higher the self-reported fear of spiders).

RESULTS

Means and ranges for all measures are presented in Table 1. There was a significant correlation between the DS and the DQ (r = −0.54, P < 0.01). To examine the relationship between the DQ and the subscales of the DS we performed a forward regression analysis with the DQ being the dependent variable and the 8 DS subscales being the predictor variables. Magic (β = −0.30, t = −3.4, P < 0.01), Animal (β = −0.22, t = −2.4, P < 0.05), Food (β = −0.19, t = −2.1, P < 0.05), and Hygiene (β = −0.18, t = −2.0, P < 0.05) were subsequently entered in the equation. Thus it appears that the DQ is predominantly related to the DS subscales that seem to refer to an oral-centred disgust.

Disgust and blood-injury fear

In line with our previous study, no significant correlation emerged between DQ and BIQ scores (see Table 2). However, a significant correlation did emerge between the broader index of disgust

<table>
<thead>
<tr>
<th>Measures</th>
<th>M (SD)</th>
<th>Scale</th>
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<tbody>
<tr>
<td><strong>Disgust Scale</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Food</td>
<td>2.0 (0.9)</td>
<td>0-4</td>
</tr>
<tr>
<td>Animal</td>
<td>2.5 (1.0)</td>
<td>0.5-4</td>
</tr>
<tr>
<td>Body Products</td>
<td>2.3 (1.0)</td>
<td>0.5-4</td>
</tr>
<tr>
<td>Sex</td>
<td>2.2 (0.6)</td>
<td>1-4</td>
</tr>
<tr>
<td>Envelope Violation</td>
<td>2.1 (0.8)</td>
<td>0-4</td>
</tr>
<tr>
<td>Death</td>
<td>1.3 (1.0)</td>
<td>0-4</td>
</tr>
<tr>
<td>Hygiene</td>
<td>1.4 (0.7)</td>
<td>0-3.5</td>
</tr>
<tr>
<td>Magic</td>
<td>1.4 (0.9)</td>
<td>0-4</td>
</tr>
<tr>
<td>Total</td>
<td>15.0 (3.6)</td>
<td>7.5-24</td>
</tr>
<tr>
<td><strong>Disgust (DQ)</strong></td>
<td>149.3 (29.1)</td>
<td>66-195</td>
</tr>
<tr>
<td><strong>Spider Phobia (SPQ)</strong></td>
<td>6.6 (5.3)</td>
<td>0-22</td>
</tr>
<tr>
<td><strong>BIQ Phobia (BIQ)</strong></td>
<td>17.4 (4.6)</td>
<td>10-35</td>
</tr>
<tr>
<td><strong>Trait Anxiety (STAI)</strong></td>
<td>38.5 (8.0)</td>
<td>24-66</td>
</tr>
</tbody>
</table>
sensitivity (i.e., total DS score) and BIQ scores. The Envelope Violation and Death subscales were the only subscales that significantly correlated with the BIQ. Furthermore, a significant correlation was found between BIQ scores and trait anxiety.

To investigate the independent predicting properties of trait anxiety and the various subscales of the DS, we performed a forward regression analysis with BIQ scores as the dependent variable and the STAI and the 8 subscales of the DS being the predictor variables. The Envelope Violation subscale was the first variable that was entered in the equation \( \beta = 0.51, t(95) = 5.8, P < 0.001 \). The STAI was entered on the second step \( \beta = 0.20, t(95) = 2.3, P < 0.05 \). None of the other variables could explain additional variance of the BIQ scores. The positive beta’s indicate that high disgust sensitivity to envelope violations and high trait anxiety are related to BIQ phobia.

**Disgust and fear of spiders**

In line with previous studies, a significant and negative correlation was found between SPQ and DQ scores (Table 2). That is, women with a relatively high disgust sensitivity report a relatively strong fear of spiders. A similar relationship was found between SPQ and participants’ summed scores on the Disgust Scale. As can be seen in Table 2, this relationship was mainly carried by the correlation between SPQ scores and the Animal and Death subscales of the DS. Furthermore, a significant correlation emerged between trait anxiety and fear of spiders. To investigate the independent predicting properties of the various subscales of the DS and trait anxiety, we performed a forward regression analysis with SPQ score being the dependent variable and DS-subscales and STAI-score being the predictor variables. Only the Animal subscale was included in the final equation \( \beta = 0.43, t(95) = 4.6, P < 0.05 \). Thus, no additional variance of SPQ scores could be explained by the STAI and the remaining subscales of the DS.

Fear of spiders was not only found to be related to disgust sensitivity, but also to the contaminating properties of spiders per se. That is, women with a relatively strong fear of spiders were less eager to eat their favourite chocolate bar after a spider has walked across the bar. For the bar that was still wrapped in its package, the correlation with SPQ scores was \( r = -0.45 \). In case the bar was unpacked, the correlation was even stronger, \( r = -0.57 \).

**DISCUSSION**

The present study could replicate the previous finding that fear of spiders is related to elevated levels of disgust sensitivity as indexed by the DQ (Davey, 1992; Mulkens et al., 1996). A similar relationship was evident between a broader index of disgust sensitivity (i.e., the DS) and spider fear. Regression analysis suggested that the latter relationship was mainly carried by the Animal subscale of the DS. Both the Animal subscale of the DS and the DQ refer to disgust as an oral defense, i.e., they reflect a sensitivity for contamination of food items by animal products and revulsion of animals that are associated with body products or spoiled food (cf Haidt et al., 1994). This
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relationship may be best explained by assuming that spider-fearful subjects consider spiders as “contaminants”. Such an interpretation is supported by the current finding that spiders could strongly reduce the edibility of tasty chocolate bars by brief contact (cf. Mulkens et al., 1996).

As in the earlier study of Merckelbach et al. (submitted), no association was found between DQ scores and BII-fear. However, a significant relationship between disgust sensitivity and BII-fear did emerge in case disgust sensitivity was indexed by the DS rather than the DQ. Regression analysis showed that the relationship between DS and BII-fear was mainly carried by the Envelope Violations subscale. Rather than being an oral-centred disgust, body envelope violations may be disgusting because they are direct reminders of the fragility and animality of our bodies (Haidt et al., 1994).

In their two-stage theory of disgust, Rozin et al. (1993) differentiate between core disgust and animal-reminder disgust. Core disgust is considered to be an adaptive oral defense mechanism preventing people (and animals) from bacteriological and viral contamination. This core disgust is proposed to be expanded via cultural evolution into a broader “animal-reminder” disgust. The animal-reminder disgust can be considered as a defensive emotion that prevents the recognition of our animality and avoids ambiguity about our superior status by accentuating the human-animal boundary (Rozin and Fallon, 1987).

The present study indicates that fear of spiders is related to core disgust, whereas BII-fear is more associated with animal-reminder disgust. The present pattern of findings strongly suggest that the absence of a robust relationship between BII-fear and DQ scores follows from the fact that the DQ only taps core disgust. Meanwhile, the present data sustain the idea that individual differences in disgust sensitivity are domain-specific and that only elevated levels of disgust sensitivity for certain domains are linked to BII or spider fear.

As the current findings are correlational in nature, it cannot be excluded that high disgust sensitivity is an epiphenomenon of certain fears rather than a personality characteristic that makes people liable to acquire a BII (or animal) phobia. Longitudinal studies are necessary to provide a more definite answer concerning the status of disgust sensitivity in the development of BII (and spider) phobia. Another limitation with regard to the present findings is the fact that only women were included in the present study. Therefore, it remains to be seen whether a similar pattern of results can be obtained in men.

Germane to this issue, several studies have found that women report generally stronger fear of blood, injuries, etc. and report more BII-related fainting histories than men (Kleinknecht et al., 1996), whereas other studies demonstrated that women display higher levels of disgust sensitivity (e.g., Haidt et al., 1994; Davey, 1994). It would be interesting to see whether the difference in BII (and spider) fear between men and women can be attributed to gender related differences in disgust sensitivity (cf. Tucker and Bond, 1997).

In sum, the current study adds to the evidence that disgust is involved in small animal phobia. In addition, the present findings lend support to the idea that BII fear is also linked to disgust sensitivity. Further research is needed to test Page’s (1994) more detailed hypothesis that disgust sensitivity mediates the faintness component of BII phobia.

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REFERENCES