

# Fear or disgust? The role of Emotions in Spider Phobia and Blood-Injection-Injury Phobia

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## Abstract

According to the literature, it is assumed that fear and anxiety are basic emotions in anxiety disorders. Many recent studies report that disgust, as well as fear, has an important role in the etiology and maintenance of anxiety disorders. Evaluation of the role of disgust in anxiety disorders has led the theoretical and empirical literature in a new direction, beyond the traditional emphasis on fear. Most of this basic research has focused on specific phobias, such as blood-injection-injury phobia and spider phobia. Findings obtained from evaluation of physiological and cognitive processes, and subjective and behavioral experiences clearly show that in addition to fear, emotional reactions to phobic stimuli also include disgust; however, empirical studies show that disgust and fear have different relative impacts on specific phobias. To illustrate, individuals experience disgust as the basic emotion in blood-injection-injury phobia, whereas both fear and disgust are experienced in spider phobia. Nevertheless, it is concluded that fear has a more fundamental role in the latter. Yet, research indicates that basic emotions different from those identified from neural structures or physiological responses, such as heart rate, can be identified if facial expressions and cognitive appraisals are taken into account. In the present review the role of fear and disgust in blood-injection-injury phobia vs. spider phobia are discussed, based on the relationship between the phobias and disgust sensitivity, disgust as part of phobic responses, and disgust-motivated avoidance behavior.

**Key Words:** Blood-injury-injection phobia, spider phobia, disgust, fear.

## Specific Phobias and Emotions

Having an incidence between 12.5%-19.9%, specific phobias are among the most common anxiety disorders and defined as the experience of extreme, unreasonable, and permanent fear in response to the presence of certain objects and conditions or to an individual's expectation of confronting such conditions or objects (American Psychiatry Association 2000), are among the most common anxiety disorders (Fredrickson et al. 1996; Kessler et al. 2005). The incidence of specific phobias in Turkey was reported as 2.7% (Kılıç 1998, 2006).

Although, specific phobias are among the most common disorders, debate about which basic emotions accompany phobias is ongoing. Because a frightening object and confronting it or the possibility of confronting

it almost always causes intense anxiety and avoidance behavior, the first models of specific phobias focused only on fear as the key determinant of anxiety and avoidance experienced in phobias (Merckelbach and Muris 2001). In the contemporary literature fear and anxiety are assumed to be basic emotions in anxiety disorders; therefore, diagnostic systems also classify phobias accordingly; however, research findings from last 20 years show that fear or other emotions may play a role in specific phobias and anxiety disorders.

Some researchers think that the emotion of disgust has a significant role in the etiology and maintenance of some specific phobias, based on the observed differences in the function, physiological processes, and behavioral characteristics of spider and blood-injection-injury phobia (Olatunji and Sawchuk 2005). The role of disgust in

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anxiety disorders has been clearly demonstrated in most studies that focused on specific phobias, such as spider phobia and blood-injection-injury phobia (Matchett and Davey 1991; Page 1994; Tolin et al. 1997; de Jong and Merckelbach 1998).

In the present study the potential role of disgust in spider and blood-injection-injury phobias is discussed in the light of the literature of the last 20 years, based on a search of the PsycINFO, Elsevier Science Direct, EBSCOHost, and ULAKBİM Turkish Medicine Index/Social Sciences Index databases. Then, in consideration of the dimensions examined in the literature the role of fear and disgust in blood-injection-injury phobia vs. spider phobia are discussed based on the relationship between the phobias and disgust sensitivity, disgust as a phobic response, and disgust-motivated avoidance behavior.

### **Spider Phobia**

Spider phobia is the permanent and disturbing fear experienced in response to the possibility of encountering a spider or actually encounters one, and is among the most common phobias with an incidence of 1.2% and 5.6% in men and women, respectively (Fredrickson et al. 1996).

### **Spider Phobia and Disgust Sensitivity**

Disgust sensitivity is the tendency to react with general or relatively constant disgust to many stimuli in the environment. In addition, disgust sensitivity is thought to be a partially genetically based personality trait, which increases the tendency for anxiety disorders as well as specific phobias (Davey et al. 1993; de Jong and Merckelbach 1998; Muris et al. 1999). The primary assessment process for disgust includes the thought that creatures that arouse disgust, such as a spider, cause contamination and the fear that any physical contact with such stimuli will result in disease (Rozin and Fallon 1987; Olatunji et al. 2004). According to Matchett and Davey's (1991) disease avoidance model, spiders are associated with the spread of disease, dirt, and germs. They propose that spider phobia occurs in response to the perception of spiders as disgusting and the avoidance of disease and contamination, not to the fear of being physically harmed. The result of a study conducted in England (Davey 1994) suggested that avoidance of objects and situations that elicit disgust is confused with avoidance based on fear. Davey (1994) also reported that in European cultures disgust-inspiring images of spiders have been associated with disease and disease outbreaks

since the tenth century, and as such, fear of spiders is not biological in origin, but cultural in origin and is the result of the fear of becoming sick or contaminated.

Merckelbach et al. (1993) investigated the role of disgust sensitivity in the development and treatment of spider phobia. The researchers determined that the participants with spider phobia had higher disgust and contamination sensitivity than the control group. Short-term exposure therapy was administered to the participants by grouping those with high and low disgust sensitivity. It was thought that the disgust experienced in spider phobia has a functional role alone or in combination with fear, because treating the participants with high disgust sensitivity was more difficult than treating those with low disgust sensitivity, although both groups did benefit from the therapy.

The origins of many psychological disorders in adulthood are based on childhood experiences. As such, thinking that if there is a relationship between spider phobia and disgust sensitivity it should be observed in childhood, de Jong et al. (1997) compared students with and without spider phobia between the ages of 9 and 14 years. The students with spider phobia had a higher level of disgust sensitivity than those without spider phobia. It was observed that after administering *in vivo* exposure and eye movement desensitization to the phobic students, although fear and disgust of spiders decreased, the level of general disgust sensitivity did not change. Although disgust and fear are both associated with spider phobia, it is thought that disgust has an important role in the etiology and continuation of phobia.

The literature contains much evidence of the role of disgust sensitivity in spider phobia, although the relationships between the reactions of disgust sensitivity in spider phobia, and fear and disgust responses have not been clearly established.

### **Disgust as a Part of the Reaction to Spiders in Spider Phobia**

Phobic individuals experience anxiety when they encounter stimuli that cause phobia or if there is a possibility of encountering them. As such, examining visual stimuli, including imagining, photography, and video of threatening stimuli that cause phobia is another approach to identify basic emotions in specific phobias. Webb and Davey (1992) examined the role of disgust in the development of spider phobia. They showed films containing violence (fear), a surgical operation (disgust), and landscape views (neutral) to non-phobic partici-

pants. They reported that watching the film containing violent predators increased the level of fear of the predators, whereas the film based on disgust increased the level of disgust of spiders, but not of predators. They observed that disgust increased fear of specific animals due to the protective, disease avoidance function of disgust. These results suggest that disgust has a causal relationship with animal phobias under specific circumstances.

People react to disgust and fear with prototypical and differentiating facial expressions. de Jong et al. (2002) observed that spider-phobic women exhibited facial expressions specific to disgust (EMG activity) and had higher disgust sensitivity to images that arouse general disgust than did the controls. Moreover, when asked to report their subjective experiences, they stated that they felt both disgust and fear. As the differences in the levels of phobia were examined, the least frightened individuals experienced disgust and those that were most frightened exhibited disgust and fear equally. The researchers concluded that fear is the emotion that determines the level of phobia and that disgust is independent of fear.

In addition to research findings showing that disgust is the basic emotion experienced in spider phobia, some studies reported that the role of disgust is smaller than that of fear. Tolin et al. (1997) reported that the emotional reaction to various spider pictures that were shown to spider-phobic participants was a combination of fear and disgust; however, fear was thought to be more dominant because 78% of the participants reported that they primarily experienced fear. In spider phobia, the relationship between fear which results from appraisal of threat and disgust which has led by feeling of being contaminated may have brought about experience of fear as more dominant emotion, as compared to disgust. Similarly, Thorpe and Salkovskis (1998) reported that fear has a basic role in the etiology of spider phobia and disgust has a minimal role. According to some researchers, fear can increase the tendency for disgust to be experienced as part of a negative evaluation of a stimulus that causes fear, and therefore has a direct effect. Sawchuck et al. (2002), and Edwards and Salkovskis (2006) suggest that both fear and disgust play a role in avoidance reactions in spider phobia, reporting that the primary conditional emotional response in spider phobia is fear and that the secondary conditional emotional response is disgust. Disgust interacts with fear and is a component that increases negative affectivity.

In summary, according to the results of studies that examined the reactions to spiders, disgust is the basic emo-

tion experienced in some cases of spider phobia, whereas in some it is fear and in others both are experienced.

### **Avoidance Behavior Based on Disgust**

Because the most common reaction to a stimulus that causes phobia is avoidance in specific phobias, research is conducted based on avoidance behavior in response to stimuli that cause phobia in an effort to identify the emotional mechanism underlying the phobia. Fear and disgust, both being negative emotions, motivate behavioral avoidance; however, the question concerning phobias is whether or not disgust causes avoidance behavior, rather than fear or in addition to fear.

Mulkens et al. (1996) asked phobic and non-phobic participants to eat cookies before and after a spider walked on them to evaluate disgust sensitivity and avoidance behavior in spider phobia. Although there were no differences between the groups in the perception of dirtiness related to spiders, it was observed that a tendency to eat cookies that had been walked on by the spider was less in phobic women than in non-phobic women. In addition, the participants were asked to drink tea from 3 cups to determine if avoidance is related to general cleanliness or to disgust and fear of contamination. Two of the cups were clean and the third was dirty. The women in both groups generally drank a little tea and they drank tea from the dirty cup more slowly. In terms of general disgust sensitivity related to dirtiness vs. stimuli unrelated to phobia, no differences were observed between the groups. This result shows that avoidance behavior based on disgust was only related to the spiders.

Woody et al. (2005) suggested that disgust of spiders causes avoidance behavior independent of fear. They asked participants with high- and low-level fear of spiders to slowly approach a cage in which there was a tarantula, touch the outer, inner, and upper walls of the cage, and lastly to touch the harmless tarantula for 3 seconds. Afterwards, the participants were asked to perform consecutive behaviors that require gradually increasing contact with a pen that touched the spider. The highest level of such contact was eating a cracker that touched the pen. While 32% of those with a high level of fear completed all the tasks, 76% of those with a low level of fear completed all the tasks. Notwithstanding, 20 % of those with low-level fear and 40% with high-level fear avoided contact with the pen touched by the spider. Phobic individuals reported experiencing anxiety and disgust more intensely. Additionally, phobic individuals reported that they thought they would get dirty and avoided eating

the cracker touched by the spider. Woody et al. (2005) concluded that the mechanism that causes avoidance of spiders is primarily activated by disgust, not fear. While disgust reaction results in avoidance of objects for spider phobic individuals who have high level of disgust sensitivity, fear reaction maintains distress to spiders and fear is subsidiary as compared to disgust. Disgust is a better predictor of avoidance of stimuli that cause phobia than fear and anxiety (independent of fear and anxiety). Difference between fear and disgust avoidances and evidence of avoidance based on disgust is the avoidance of participants from both spider and the pencil. If it was based on fear, they must have only avoided spider.

Although fear and disgust have considerably different reaction patterns, there is evidence that spider-phobic individuals experience both disgust and fear. Many studies report that fear in spider phobia has a more primary role; however, such studies that have included spider-phobic individuals are important, as they show that disgust is experienced in addition to fear.

### **Blood-Injection-Injury Phobia**

Blood-injection-injury phobia, which is characterized by avoidance behavior and intense, irrational fear in response to seeing blood, injections, injuries, disability, or exposure to these or other similar medical procedures (American Psychiatry Association), is seen in approximately 3%-4.5% of the general population (Fredrikson et al. 1996; Curtis et al. 1998). Research related to blood-injection-injury phobia has not been conducted concerning Turkey as a whole, but a study performed with 1500 people reported that 30.1% of individuals with a chronic disease and 19.5% of those without a chronic disease described blood-injection-injury fear (Köse and Mandıracıoğlu 2007).

Although blood-injection-injury phobia is classified as a specific phobia, it is considered an atypical fear because it includes significantly different cognitive, psychophysiological, motor, and subjective emotional reactions (Rachman 1990; Page 1994). The greatest difference is in physiologic reactions. In contrast to all other phobias, diphasic autonomic nervous system activity, including activation of the sympathetic and parasympathetic nervous systems, occurs when stimuli causing phobia are encountered. The rapid increase in blood pressure (sympathetic arousal $\frac{3}{4}$ tachycardia and hypertension) observed at the onset, as in specific phobias (especially spider phobia), is followed by a sudden decrease to below baseline levels (parasympathetic arousal $\frac{3}{4}$ bradycardia

and hypotension) when an individual is afraid of a stimulus (Woody and Teachman 2000; Sarlo et al. 2002). This kind of sudden decrease in the heart rate is not seen in response to fear; it is present only in response to disgust and disgust is related to parasympathetic nervous system activity (Rozin and Fallon 1987; Levenson 1992). There is a biphasic reaction pattern in blood-injection-injury phobia, which is adduced proof that the emotion experienced is disgust. Some researchers suggest that the fainting reaction observed in blood-injection-injury phobia occurs only in response to disgust (Rachman 1990; Kleinknecht et al. 1996), while others think that it occurs in response to a combination of fear and disgust (Kleinknecht et al. 1997; Schienle et al. 2003b; Olatunji et al. 2006); however, other researchers did not obtain reliable evidence concerning the increase in general cardiovascular activity and diphasic reaction pattern in blood-injection-injury phobia (Lumley and Melamed 1992; Sarlo et al. 2002; Ritz et al. 2005). Based on the body of evidence in the literature, there is a relationship between disgust and blood-injection-injury phobia, although uncertainty about such findings continues.

### **Blood-Injection-Injury phobia and Disgust Sensitivity**

Many studies report that blood-injection-injury-phobic individuals have a higher level of disgust sensitivity than individuals without any phobia, and that disgust sensitivity has an important role in the occurrence and continuation of blood-injection-injury phobia (Connolly et al. 2006; Olatunji et al. 2006).

Page (1994) associates blood-injection-injury phobia with intense disgust and detestation. In individuals that reported they have fainting symptoms high levels of trait anxiety and high-level disgust sensitivity were observed. Fainting occurs via the same psychological and physiological processes as disgust, and is unrelated to fear. In the presence of related stimuli, high-level disgust sensitivity indicates a low threshold for fainting and causes the development of blood-injection-injury phobia. Blood phobia is characterized by dizziness and fainting. After fear initially occurs via sympathetic nervous system activation in blood-injection-injury phobia, disgust is experienced via the parasympathetic system. As such, disgust sensitivity has a functional role in the etiology and continuation of blood-injection-injury phobia.

Disgust sensitivity, which is thought to have a functional role in blood-injection-injury phobia, was defined as domain-specific in some studies (de Jong and

Merckelbach 1998; Schienle et al. 2003a). For example, de Jong and Merckelbach (1998) reported that blood-injection-injury-phobic individuals had high disgust sensitivity to phobia-specific situations, such as blood, death, injury, disability, injection, amputation of limbs, and inappropriate form of death, rather than general disgust-arousing stimuli. In addition, it was stated that the relationship between fears of blood-injection-injury and disgust sensitivity is domain-specific (animal reminder disgust) and animal-reminder disgust serves as a strong risk factor for the formation and maintenance of the blood-injection-injury phobia. Blood-injection-injury phobic participants were found to react more to participants to death, bleeding, deformation of the body and photographs of such. These stimuli were assumed to remind some commonality in existentiality between animals kingdom and human beings, while disgust might function as defense mechanism which suppress mortality anxiety (Rozin and Fallon 1987).

Muris et al. (1999) evaluated disgust sensitivity and trait anxiety in 189 healthy primary school students in order to examine the relationship between disgust sensitivity and anxiety disorders, such as obsessive-compulsive disorder, social phobia, and specific phobias. They reported that even after trait anxiety levels were controlled for there was a positive correlation between blood phobia and disgust sensitivity.

In summary, research shows that when individuals encounter stimuli related to a phobia, reacting with disgust indicates there is a risk for blood-injection-injury phobia and has an important role in the development and continuation of blood-injection-injury phobia.

### **Disgust as a Part of Phobic Reaction**

Rachman (1990) reported that blood-injection-injury-phobic individuals experience fear because of the reaction in response to these stimuli, rather than any danger associated with the stimuli. As such, Rachman (1990) thinks that phobia is not the correct terminology. For example, while animal-phobic individuals are defined as reacting with fear, blood-injection-injury-phobic individuals reported that they experience feelings of disgust, such as nausea and avoidance. In contrast to other phobic situations, the reaction is primarily produced by disgust. Many studies report that when phobic individuals encounter stimuli related to blood-injection-injury, they experience disgust rather than fear (Lumley and Melamed 1992; Page 1994; Tolin et al. 1997; de Jong and Peters 2007).

Tolin et al. (1997) evaluated subjective experiences related to disgust and fear by presenting photographs in which someone is injected and photographs of spiders to blood-injection-injury-phobic, spider-phobic, and control groups. All in the blood-injection-injury group reported that they experienced fear and disgust in response to the injection photographs; however, disgust was the basic emotion. Furthermore, they were observed to look at the injection photographs significantly less than those in the spider-phobic and control groups. The blood-injection-injury-phobic group had a high level of general disgust sensitivity and mostly exhibited avoidance behavior in response to stimuli unrelated with phobia, such as scent, body secretions, rotten food, and animals, in addition to the stimuli related to phobia, such as blood and death.

Olatunji et al. (2005) examined disgust and fear reactions in participants shown photographs that did not cause fear by matching neutral facial expressions with photographs related to phobia, such as blood, injection, and bodily injury in a blood-injection-injury group and control group. Although it was assumed that the conditioning would be easier in the phobic group and the phobic participants would exhibit more disgust and fear than the controls, the results of the conditioning experiment did not show any differences between the 2 groups; however, the phobic participants reported that they found the stimuli related to the phobia disgusting rather than frightening, and exhibited disgust-related facial expressions. It was observed that the basic emotion was disgust. The researchers reported that the avoidance behavior in blood-injection-injury phobia is due to anxiety about infection rather than the perception of a threat based on fear.

Page (1999) studied blood-injury fear and fainting in response to images depicting pain and nausea. After individuals with blood-injury fear looked at the blood-injury images repeatedly, they then listened with their eyes closed to stories that were designed to arouse images concerning fear (ache/pain), disgust (nausea), or anger (avoidance). They completed evaluation scales after again viewing the blood-injury images. Totally four test sessions that is preceded by relaxation sessions (breath) were applied in one-week intervals and 3 stimuli were presented in each session. Under every condition it was observed that fear and fainting were decreased. Directing the focal point of participants can affect the emotions experienced. While the frightening images increased fear and fainting, and disgusting images increased fainting, they had no effect on fear. This result shows that both emotions accompany

blood-injection-injury phobia, and have a role in the development and maintenance of phobia.

In their study, Olatunji et al. (2007) recorded participants' evaluations of their disgust and fear levels before, during, and after exposing them to some phobia-related stimuli periodically (e.g., preparation to inject a puppet and making injection in 30 minutes sessions). They found that after repeated, the level of fear decreased faster than disgust. It was observed that the participants showed sensitivity peculiar to blood-injection-injury stimuli rather than to generalized stimuli. These findings show that disgust sensitivity in blood-injection-injury phobia is a vulnerability factor, in accordance with the disease avoidance model.

### **Avoidance Behavior Based on Disgust**

Blood-injection-injury-phobic individuals exhibit avoidance behavior in response to phobia-inducing stimuli. In blood-injection-injury phobia, although active avoidance strategies (closing the video) are observed, mostly passive strategies, such as closing the eyes, nausea, and fainting, are observed (Connolly et al. 1976; Rachman 1990; Lumley and Melamed 1992; Öst 1992; Page 1994). The consideration of such avoidance behaviors as nausea, fainting, and disgust-specific facial expressions is evidence of the existence of disgust.

Lumley and Melamed (1992) showed a video of thoracic surgery and a video unrelated to phobia to participants in blood phobia and control groups. Subjective, psychophysiological, and motor reactions of the participants were evaluated via video records. When the facial expressions in response to the video of surgery in the blood-injection-injury-phobic participants were compared with those in the controls, it was observed that the facial expressions of the phobic participants were characteristic of disgust (crumpled eyebrows, lifted upper lip) and that they experienced disgust more than fear. Moreover, the blood-phobic participants exhibited more avoidance expressions/gestures, turned their eyes away more, and exhibited more avoidance behavior than the controls. In blood phobia, the stimuli frightened was found to result in high level of nausea and feelings of fainting, and increase in pulse, which is actually a symptom of anxiety, was observed before basic disgust reaction occurred. Individuals with blood fear reacted with both fear and disgust to blood stimuli. In addition, although blood pressure measurements in the phobic individuals was not in line with reports, the participants stated to be about to faint. It seems that fear and disgust are interacted. Disgust appears

to influence fainting fear and behavior by itself and/or by its own relationship with fear.

Koch et al. (2002) requested two samples composed of blood-injection-injury phobic individuals and controls to watch gauze pad wiped blood, a wounded looking deer leg obtained from butcher (stimulus concerning phobia) or a death worm (stimulus about general disgust). Then, the participants were asked to touch next to these stimuli and to touch the stimuli directly with glove. Then, without glove, they wanted to touch next to stimulant and then touch the stimuli directly. After the participants watched the researcher touch a bloody area with the end of a stick, touch a cookie with the other end of the stick, and then touch a worm with the cookie, the level of eating desire in participants were evaluated. In all, 81% of the phobic participants and 51% of the control group reported that they felt less desire to eat the cookie and experienced disgust. The phobic participants experience higher level of fear and disgust especially disgust and avoidance behavior than control group in behavioral avoidance task. The difference in generalized disgust sensitivity levels between the groups was not significant, and domain specific sensitivity (animal reminder disgust) predicted blood-injection-injury phobia and blood-injection-injury predicted fainting.

## **DISCUSSION**

Many studies support the functional role of disgust in the etiology and continuation of blood-injection-injury phobia and spider phobia (Davey 1992; Merckelbach et al. 1993; Tolin et al. 1997). Although it has been reported that there is a strong correlation between disgust and specific anxiety disorders, there is a lack of experimental results indicating that disgust has a causal role in the development and maintenance of these anxiety disorders (Davey 2003). In addition, when specific phobias are considered findings showing that disgust is independent of fear, is unique, and has a distinctive role are not clear. For example, some studies reported that disgust and fear interact and intensify one another (Woody and Teachman 2000; Olatunji et al. 2006), whereas others reported that disgust increases only negative affectivity related to stimuli that cause phobia and that it is not a distinctive, unique, or causal factor (Thorpe and Salkovskis 1998; Edwards and Salkovskis 2006).

The common research finding is that both fear and disgust are reactions observed in spider-phobic and blood-injection-injury-phobic individuals exposed to stimuli that cause phobia. Nonetheless, it was observed that the dominant emotion changes according to the nature of

the phobia. For example, while the dominant emotion in spider phobia is fear, the basic emotion is disgust in blood-injection-injury phobia. Because of the differential processing of threatening information in both phobias, different emotional reactions are exhibited. These studies are important because they show that the reactions observed in phobias do not only originate from fear, but are part of a complex reaction pattern.

In the current DSM diagnostic system classification the diagnosis of anxiety disorders is based on fear. If disgust is really a part of the emotional reaction in spider and blood-injection-injury phobias, and if it plays a significant role in these phobias treatment protocols and conceptualizations must be changed in the light of the presented findings, and classification in future editions of the DSM must be changed accordingly. Disorders in which the basic emotion is disgust could be reclassified as disgust disorders (Olatunji and Sawchuk 2005).

Research on the role of disgust in anxiety disorders is still in its early stage. In one part of the studies about namely spider phobia, it lessens the effect of fear and causes disgust-oriented perception, because the usage of visual stimuli such as photograph, video, imaging actually seems to put away the risk of effects like approach, bite and damaging of the spider. Accordingly, this condition might result in a limitation for these studies. In addition, future studies must examine how fear and disgust occur as different reaction systems by evaluating fear and disgust reactions simultaneously. As such, systematically studying disgust alone or together with other emotions in healthy and clinical population does not only increase our knowledge about basic emotions, but it might also facilitate to understand their complex roles in psychopathologies and treatment. Furthermore, this effort might contribute to our understanding of human behaviors in general (Woody and Teachman 2000).

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