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Chapter 6

TRAIT ANXIETY AND TRAIT DISGUST IN SPIDER PHOBIA

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ABSTRACT

There is evidence for the role of trait anxiety in the specific phobias, and spider phobia in particular. Recently, trait disgust has received attention in relation to specific phobia and researchers and theorists have begun to address its contributions to phobia etiology, maintenance, and treatment processes. There is now strong evidence that a trait or dispositional proneness to experience disgust is related to spider phobia. What is perhaps more important is emerging evidence that both trait anxiety and trait disgust may contribute to spider phobia severity independently of one another. However, the overall picture is far from clear and distinguishing the role of anxiety from that of disgust in spider phobia is often quite difficult, perhaps in part due to the potential for synergistic effects between the two emotions. This chapter will review findings regarding the relationships among trait anxiety, trait disgust, and spider phobia, including cognitive and behavioral findings. The implications for theories of spider phobia etiology, maintenance, and treatment will be discussed.

INTRODUCTION

Spider Phobia Overview

Diagnosis

Spider phobia is classified as the animal type of the specific phobias in the Diagnostic and Statistical Manual of Mental Disorders (DSM-IV-TR; American Psychiatric Association, 2000). It is characterized by extreme, persistent, and irrational fear and avoidance of spiders. Fear and avoidance may be triggered even by anticipation of a potential encounter with

spiders and the phobic person experiences the fear nearly every time spiders are encountered. For a specific phobia diagnosis, symptoms must cause significant functional impairment or distress and adults must recognize the fear as excessive.

Types

The DSM-IV-TR identifies five types of specific phobias: animal (e.g., spiders), Blood-Injection-Injury (BII), situational (e.g., enclosed places), natural environment (e.g., heights), and other (e.g., vomiting). Animal phobias differ from the other types of specific phobia in several important ways. They are among the most common (Bourdon et al., 1988; Curtis, Magee, Eaton, Wittchen, and Kessler, 1998). Animal phobia typically has earlier onset than situational and height phobias (Barlow, 2002) and is associated with less fear of bodily sensations than claustrophobia (Craske and Sipsas, 1992).

Prevalence

A recent study estimated the 12-month prevalence of specific phobia as 8.7 % (Kessler, Chiu, Demler, and Walters, 2005). It is diagnosed more often among women than men (e.g., Öst, 1987). The median age of onset for specific phobia is approximately 15 (Magee, Eaton, Wittchen, McGonagle, and Kessler, 1996), but animal phobias typically begin in childhood around the age of 7 (Öst, 1987). Given how common specific phobias are and the potential for impairment associated with them (Wells et al., 2006), they remain an important focus for clinical psychology researchers.

Terminology

Spider Phobia

Typically phobia researchers have referred to participants as spider "phobic" when their symptoms have been assessed by diagnostic interview and meet the DSM criteria for specific phobia. When phobia symptom level is assessed by questionnaire, participants with high symptom levels are referred to as spider "fearful" or sometimes as spider phobia "analogues." Given findings of the potential role of disgust in spider phobia (described below), this chapter attempts to use emotionally neutral wording in describing trait emotion research and will typically refer to both spider "phobic" and spider "fearful" samples as spider "distressed", following Vernon and Berenbaum (2002, 2008). However, in cases such as discussing the diagnostic criteria for phobias or epidemiology research findings this chapter will still use the term "phobia."

Trait Anxiety

When referring to trait emotional styles, researchers have made important distinctions between different facets of emotion and the eliciting stimuli. Before discussing trait emotion, it is useful to note that the state emotions of anxiety, fear, and worry, although often used interchangeably in everyday life, are carefully distinguished by phobia researchers. State anxiety typically refers to apprehensive expectation about future negative events accompanied by physiological symptoms of arousal, such as elevated heart and respiration rate. Fear typically refers to a response to an immediate threat or danger perceived in one's environment

and is also accompanied by physiological arousal. Worry refers to repetitive cognitive rehearsal of future negative events.

For the current discussion of trait anxiety, there are several anxious, fearful personality styles that are relevant to spider phobia. First, trait anxiety may be operationalized as the frequency, intensity, and/or duration with which an individual experiences anxiety. Many anxiety symptoms are experienced internally and reported by the individual as symptoms they experience in general, rather than temporarily. Such symptoms can include the subjective experience of tension, emotions such as fear, and worried cognitions.

Second, fear propensity refers to the likelihood and level of state fear in response to external cues that are not themselves aspects of anxiety, such as hearing sirens, seeing a fight, or riding in a crowded elevator (Vernon and Berenbaum, 2008). An individual high in fear propensity might be expected to respond with fear to a larger variety of stimuli and with more intense fear than an individual low in fear propensity.

Third, anxiety sensitivity refers to an individual's level of discomfort with anxiety signs and symptoms (Taylor, Koch, and McNally, 1992). For example, individuals with elevated anxiety sensitivity might report being extremely upset by physiological responses such as a racing heart or by the subjective experience of fear. Although it has not been examined in relation to spider phobic distress, it is a concept that is useful for the differential diagnosis of panic and some kinds of specific phobia, particularly claustrophobia, and is important for understanding the origin of some of the terminology in trait disgust.

Trait Disgust

Compared to the long tradition of anxiety research by clinical psychology and emotion researchers, disgust research is a relative newcomer. As the field of disgust research has developed, several different sets of terminology have been used. For ease of comparison of results between the trait anxiety and trait disgust literatures, this chapter will use terminology proposed by van Overveld, de Jong, Peters, Cavanagh, and Davey (2006); they refer to trait proneness to experience disgust as disgust propensity (conceptually parallel to both trait anxiety and fear propensity), which they distinguish from discomfort with the experience of disgust, which they refer to as disgust sensitivity (conceptually parallel to anxiety sensitivity).

It should be noted that this terminology is different from that used by many disgust and phobia researchers. The term "disgust sensitivity" has historically been used in a manner that is not conceptually parallel to the term "anxiety sensitivity". Whereas the term "anxiety sensitivity" refers to discomfort with the signs and symptoms of anxiety, "disgust sensitivity" typically referred to the likelihood and level of disgust responding to external objects and situations (Haidt, McCauley, and Rozin, 1994), which is termed "disgust propensity" in this chapter.

Assessment Measures

Spider Phobia

Phobia researchers have frequently measured spider phobia using the specific phobia modules of one of two semistructured diagnostic interviews: the Structured Clinical Interview for the DSM-IV (SCID-IV; First, Spitzer, Gibbon, and Williams, 1996, 1997) and the

Anxiety Disorders Interview Schedule for DSM-IV (ADIS-IV; Brown, Di Nardo, and Barlow, 1994; Di Nardo, Brown, and Barlow, 1994). For a more comprehensive review of issues regarding diagnostic interviewing for specific phobia, see Vernon (2007).

There are several spider phobia questionnaires that have been used in research on the role of trait emotion in phobia. The most popular is the Spider Phobia Questionnaire (SPQ; Klorman, Hastings, Weerts, Melamed, and Lang, 1974), which includes true-false items concerning negative behavioral, cognitive, and emotional responses to spiders. Watts and Sharrock's (1984) Spider Phobia Questionnaire is another self-report measure and it taps vigilance, preoccupation, coping, and avoidance of spiders. The Fear of Spiders Questionnaire (FSQ; Szymanski and O'Donohue, 1995) examines spider phobia symptoms of avoidance and concern about harm. The Spider Phobia Beliefs Questionnaire (Arntz, Lavy, van den Berg, and van Rijsoort, 1993) concerns beliefs about spiders and one's reactions to them.

Since avoidance is central in the diagnostic criteria of specific phobia, behavioral avoidance tasks (BATs) with spiders provide a concrete, observable index of severity. During a BAT, a spider may be approached down a walkway and/or the participant may be asked to complete tasks with increasingly close contact with the spider (e.g., touching the exterior of a spider's cage, removing the cage lid, touching the spider with a pen, a gloved finger, or a bare finger). BATs can include contrived, naturalistic, or imagined scenarios and settings. The respondent can also report fear, disgust, thoughts, and physical sensations during the BAT, as well as have their physiological responses monitored (McGlynn and Vopat, 1994). Ratings may be given in subjective units of distress scales (Wolpe, 1973), including a 0–100, 0–8, or 0–10 rating scale as well as fear thermometers (Walk, 1956). Visual analogue scales (McGlynn, Moore, Rose, and Lazarte, 1995) and dials allowing continuous input of fear levels (McGlynn, Rose, and Lazarte, 1994) have also been used.

Trait Anxiety

The most commonly used measure of trait anxiety in spider phobia research is the State-Trait Anxiety Inventory-Trait scale (STAI-T; Spielberger, Gorsuch, and Lushene, 1970; Spielberger, Gorsuch, Lushene, Vagg, and Jacobs, 1983). The STAI-T includes a range of positively and negatively keyed items referring to emotional, physiological, and cognitive aspects of anxiety, such as feeling generally nervous, jittery, and worried.

In examining fear propensity, phobia researchers have typically used one of two measures. The Fear Survey Schedule (FSS-III; Wolpe and Lang, 1964, 1977) includes 108 items in five broad domains of fear-eliciting stimuli and situations: fear of harmless animals, social fears, agoraphobic fears, injury-illness-death fears, and sex and aggressions fears (and has also been used as a phobia screening tool). The Fear Scale (FS; Vernon and Berenbaum, 2008) is a brief updated measure of the construct of fear propensity.

Trait Disgust

Research examining the role of disgust propensity in spider phobia has often used one of three questionnaires. The food contamination Disgust Questionnaire (DQ; Rozin, Fallon, and Mandell, 1984) was commonly used for over a decade following its development. The following decade, two more disgust propensity measures were developed to target a broader array of disgust elicitors: the Disgust Sensitivity index (DS; Haidt et al., 1994), and the Disgust Emotion Scale (DES; Walls and Kleinknecht, 1996). The DS includes eight potential

domains of disgust elicitors: animals, food, body products, sex, body envelope violations, death, hygiene, and magical contagion. The DES measures disgust propensity to five domains of potential disgust elicitors: small animals, food, odors, mutilation and death, and injections and blood draws.

Haidt et al. (1994) hypothesized two higher-order disgust groups encompassing the lower-order disgust elicitor domains, with "core" disgust elicitor domains such as food related to an evolutionary adaptation for avoiding potential contamination and "animal-reminder" disgust domains such as sex raising an uncomfortable awareness of our animal nature. There is some support for such a structure to the DS (Olatunji, Williams, Lohr, and Sawchuk, 2005), although not all of the domain loadings matched the structure theorized by Haidt et al. (1994). Olatunji, Williams, Tolin et al. (2007) proposed a revision to the DS using 25 of the original 32 items and found support for a three dimensional model of disgust propensity including core, animal-reminder, and contamination, which includes hygiene-related disgust elicitors. A larger cross-cultural study recently replicated this three-dimensional structure of the DS-R (Olatunji et al., 2009).

Cavanagh and Davey (2000) developed the 32-item Disgust Propensity and Sensitivity Scale (DPSS) to measure two trait disgust constructs: A disgust propensity subscale, which asks participants about the frequency of their experience of the signs and symptoms of disgust without reference to specific eliciting stimuli, and a disgust sensitivity subscale tapping discomfort with the signs and symptoms of disgust. A 16-item revised version of the scale (DPSS-R; van Overveld et al., 2006) proved psychometrically superior, but was found to have four problematic items in a later study (Olatunji, Cisler, Deacon, Connolly, and Lohr, 2007). A further revision of the DPSS-R has been proposed, which removes the four unreliable items to further improve the psychometric properties of the measure (Fergus and Valentiner, 2009).

Another recent addition to spider phobia trait disgust research is Teachman and Saporito's (2009) Disgust Cognitions scale. The scale measures primary appraisals of the disgustingness of a stimulus or likelihood of one's disgust response to it and secondary appraisals about the meaning and consequences associated with one's disgust reaction.

Etiology and Maintenance of Spider Phobia

Anxiety and Fear-Based Theories of Learning

Theories of phobia etiology and maintenance that focus on the contribution of anxiety and fear largely posit the importance of negative life experiences and their impact in the form of classical conditioning, operant conditioning, and vicarious conditioning, and negative appraisals and information from information transmission. When combined with research findings of the influence of fear and anxiety on cognitive processes, such theories offer a compelling possible role for trait anxiety in the development and maintenance of spider phobia. This section will first review conditioning models of acquisition and the evidence in support of them and will then turn to theory and findings regarding cognitive processes.

Mowrer's (1939, 1947) two-factor theory of phobia etiology is based on behavioral conditioning theory and forms the basis for much phobia etiology research and treatment. It

posits fear acquisition through classical conditioning and fear maintenance through operant conditioning. In the acquisition phase, a previously neutral stimulus is thought to be paired with an aversive stimulus or experience. For example, spider phobia might develop following a painful spider bite. Then symptom maintenance is theorized to occur via operant conditioning in which phobic individuals avoid the feared stimulus, thereby reducing their anxiety, which is negatively reinforcing and increases the likelihood of future avoidance. In addition, avoidance is thought to prevent habituation and the disconfirmation of negative or irrational beliefs about the phobic stimulus.

Although there is some support for the two-factor theory and the role of conditioning experiences in the onset of animal phobias (e.g., Öst, 1987), there are also a fair number of phobic individuals who don't recall a direct conditioning experience (Rachman, 1990). Further, even among nonclinical populations, it appears that direct conditioning experiences are not recalled preceding the development of all subthreshold fears (Kleinknecht, 1982; Vernon and Berenbaum, 2004).

To account for phobia acquisition by indirect means, Rachman (1976, 1977) developed a model including vicarious conditioning and information transmission. According to this model, vicarious conditioning could occur when an individual witnesses another's negative experience with the stimulus or observes another behaving fearfully of the stimulus. Such observational learning has been noted in the laboratory with rhesus monkeys, who acquired fear of snakes after observing other monkeys behaving fearfully of live and toy snakes (Mineka, Davidson, Cook, and Keir, 1984). Further, the model posits potential acquisition via information transmission, in the absence of any negative experience. For example, an individual could develop a spider phobia after hearing about a fatal spider bite or being warned frequently about the dangers of spiders.

Empirical findings have provided inconsistent support for these phobia acquisition models. Some studies have provided evidence in support of phobia acquisition via direct conditioning, vicarious conditioning, and information transmission (McNally and Steketee, 1985; Menzies and Clarke, 1993; Merckelbach, Arntz, and de Jong, 1991; Merckelbach and Muris, 1997), although other studies have not found significant differences between phobic and nonphobic individuals in the frequency of such experiences (Di Nardo et al., 1988; Graham and Gaffan, 1997; Menzies and Clarke, 1995; Poulton, Davies, Menzies, Langley, and Silva, 1998; Poulton, Menzies, Craske, Langley, and Silva, 1999). These three pathways do not exhaustively explain all phobia acquisition or cases in which phobias fail to develop following intense or repeated "acquisition" experiences (Antony and Barlow, 1997).

Seligman's (1971) biological preparedness theory posits that it was evolutionarily adaptive for humans to have a predisposition to associate historically dangerous stimuli with negative outcomes. Thus, a tendency to quickly learn to fear spiders following even a single negative experience may be hardwired into our species. Taking such reasoning a step further, Menzies and Clarke (1995) have theorized possible phobia acquisition in the absence of conditioning experiences and suggest that some evolutionarily relevant stimuli may not even require a conditioning experience for phobia acquisition.

Trait Anxiety and Cognitive Biases

Trait anxiety likely interacts with the life experiences highlighted in these conditioning models to contribute to the etiology of spider phobia through its influence on cognitive processes. Influences on cognition by trait anxiety, induced state anxiety, and anxiety disorder status have been well documented over the years and have been referred to as cognitive "biases" (Mineka and Sutton, 1992) and "selective" cognitive processing (Mathews and MacLeod, 1994). Mineka and Sutton (1992) reviewed cognitive biases, three of which are relevant to the anxiety disorders: attentional biases, judgmental biases, and associative biases. Attentional biases involve the prioritization of attentional focus to potentially threatening or fearsome stimuli at the cost of attention to other stimuli. Judgmental biases occur when the likelihood of two or more events co-occurring is judged as greater than what is actually probable. Associative biases are thought to be an evolutionary predisposition to associate certain situations and stimuli with fear and avoidance (in line with biological preparedness theory). Mineka and Sutton (1992) concluded that associative biases are likely involved in the development and maintenance of fear associated with specific phobias, although there was insufficient research to determine whether attentional or judgmental biases also played a role in phobias specifically. In terms of the anxiety disorders in general, a review by Mathews and MacLeod (1994) concluded that research findings support synergistic processes between anxiety and cognitive biases, with elevated anxiety increasing the tendency to prioritize the encoding of emotionally negative material relative to neutral material and to impose negative interpretations on ambiguous information.

The implication of such cognitive bias research is that trait anxious individuals would be more likely than less anxious individuals, due to cognitive biases, to have negative experiences with stimuli that are thought to lead to the development of a specific phobia. For example, highly trait anxious individuals might be especially likely to pay attention to the potentially threatening aspects of spiders, to misinterpret ambiguous situations with spiders as threatening, and to associate fear and avoidance with spiders relative to other stimuli.

Disgust-Based Theories

Although theories of phobia etiology have typically been fear-based, Davey and colleagues (Davey, 1992; Davey, Forster, and Mayhew, 1993; Matchett and Davey, 1991) have proposed a disgust-based disease avoidance model of animal phobia. The model posits that avoidance of nonpredatory animals such as spiders may be due to appraisals of these animals as dirty, diseased, or contaminated and that such avoidance is evolutionarily adaptive as it may minimize disease and contamination exposure (Matchett and Davey, 1991; Rozin and Fallon, 1987; Rozin, Haidt, and McCauley, 1993). This is in contrast to fear-based models which posit avoidance due to physical threat of harm.

Merckelbach, de Jong, Arntz, and Schouten (1993) have theorized that individuals high in trait disgust may be more likely to acquire a phobia because they are more likely to experience potentially disgusting animals such as spiders as aversive and would be more sensitive to a negative conditioning experience with them. They draw on the work of Baeyens, Eelen, Crombez, and van den Berg (1992) regarding aversive classical conditioning via evaluative learning based on an intrinsically aversive stimulus in which the aversive

reaction is resistant to extinction and not based on painful experiences. Thus, Merckelbach et al. (1993) predicted that spider phobic women with high trait disgust might experience spiders as intrinsically aversive and thus report fewer negative conditioning events than those low in trait disgust, however, they found the opposite. Thus, these results did not provide support for this hypothesized characteristic of evaluative learning, although a prospective test would obviously be more conclusive than a test based on participants' retrospective recall.

An alternative disgust-based hypothesis is put forth by Woody and Tolin (2002) and suggests the synergistic effects of disgust with other negative emotions. They hypothesized that those high in trait disgust are probabilistically more likely to experience disgust in any given situation and that this negative emotional experience acting in concert with other negative emotions such as fear could make the experience of a situation, even an ambiguous situation, more aversive and lead to avoidance.

It is also possible for the cognitive bias models of fear to be adapted for disgust. For example, for an attentional bias, rather than a fear-based focus on threat of harm, the focus could be a disgust-based focus on threat of contamination. Similarly, whereas judgment biases for fear would demonstrate an overestimate of fearful facial expressions following presentation of the stimulus, for disgust the overestimate would be of disgust facial expressions (e.g., Olatunji, Cisler, Meunier, Connolly, and Lohr, 2008).

Trait Anxiety and Spider Phobic Distress

In studies on the role of trait anxiety in spider distress, the consistency of the results seems to vary based on the research design. Correlational studies have had consistent findings. Results show a significant correlation between trait anxiety measured by the STAI-T scale and spider distress measured by the SPQ or SFQ (e.g., Connolly, Olatunji, and Lohr, 2007; de Jong and Merckelback, 1998; Lipp and Derakshan, 2005; Olatunji and Deacon, 2008). Further, in three different studies with college samples, Vernon and Berenbaum (2008) reported significant positive correlations between spider distress on the SPQ and both the animal and non-animal fear propensity scales of the FS. Overall, these studies suggest some role of dispositional anxiety in spider distress.

However, studies that compare spider distressed and non-distressed individuals on trait anxiety on the STAI-T have yielded mixed results. Some studies fail to find statistically significant differences in trait anxiety levels between spider distressed and non-distressed individuals (Cavanagh and Davey, 2001; Reinecke, Rinck, and Becker, 2008), whereas other studies do find significant group differences, with the spider distressed group reporting higher trait anxiety (Ferraro, Christopherson, and Douglas, 2006; Wenzel, Zetocha, and Ferraro, 2007). An explanation for these inconsistent results is not currently known. Among the four studies comparing trait anxiety levels, three studies (Cavanagh and Davey, 2001; Ferraro et al., 2006; Wenzel et al., 2007) used the SPQ and one (Reinecke et al., 2008) used the SFQ. Use of different spider measures does not appear to account for differences in the findings. Although it has been hypothesized that trait anxiety is a diathesis or a factor increasing vulnerability for spider distress, there is as yet no consensus in the literature.

Trait Disgust and Spider Phobic Distress

Significant correlations between spider phobic distress and disgust propensity have been demonstrated using the food-related DQ (e.g., Davey et al., 1993; Mulkens, de Jong, and Merckelbach, 1996) and using the more generalized DS (de Jong and Merckelbach, 1998; Sawchuk, Lohr, Tolin, Lee, and Kleinknecht, 2000; Tolin, Lohr, Sawchuk, and Lee, 1997; Vernon and Berenbaum, 2002, 2008), DS-R (Cisler, Olatunji, and Lohr, 2009), and the DES (Sawchuk et al., 2000; Tolin et al., 1997; Vernon and Hirai, 2011). Further, there is evidence that on the DPSS-R and its reduced-item version both disgust propensity and disgust sensitivity are correlated with spider distress and that each provides incremental concurrent validity independent of one another and independent of negative affect (Olatunji, Cisler et al., 2007; van Overveld et al., 2006; Fergus and Valentiner, 2009). There is emerging evidence that these relationships between disgust propensity and spider distress also occur among individuals with different cultural backgrounds, including an intranational study of Asian Americans using the DES (Vernon and Hirai, 2011). Studies that have not found relationships between disgust propensity and spider distress are fairly rare (e.g., Smits, Telch, and Randall, 2002).

There is also evidence of relationships between disgust propensity and spider distress from cross-sectional research comparing distressed and non-distressed individuals. Spider distressed individuals typically report more disgust propensity than non-distressed individuals on the DQ (Merckelbach et al., 1993; Mulkens et al., 1996), the DS (Olatunji and Deacon, 2008; Sawchuk et al., 2000), and the DES (Sawchuk et al., 2000), with one exception (Thorpe and Salkovskis, 1998). In examining the domains of disgust propensity elicitors separately, spider distressed participants have been found to report more disgust propensity to the DS small animals subscale and also to the food, body products, hygiene, and magical contagion subscales of the DS than non-distressed participants (Tolin et al., 1997). Similarly, spider distressed participants have reported more disgust propensity on all subscales of the DES than non-distressed controls (Tolin et al., 1997).

There is also some evidence for the specificity of relationships between certain domains of disgust elicitors and spider distress. de Jong and Merckelbach (1998) found that spider distress was significantly correlated with the DS animal and death scales, but not with other DS scales. Vernon and Berenbaum (2008) found that the DS animal scale was significantly associated with spider distress, as was an aggregate of the remaining DS items, which they term non-animal disgust propensity. Further, in examinations of the relative contributions of different disgust propensity domains to spider distress, the association between animal disgust propensity and spider distress appears to be independent of other disgust propensity domains in regression analyses (de Jong and Merckelbach, 1998; Vernon and Berenbaum, 2008). However, non-animal disgust propensity and other individual DS domain scales were not uniquely associated with spider distress when controlling for other disgust propensity variables (de Jong and Merckelbach, 1998; Vernon and Berenbaum, 2008).

There is preliminary evidence suggesting that cultural background may influence the relationship between disgust propensity and spider distress. Vernon and Hirai (2011) found in hierarchical regression analyses that gender, disgust propensity to animals, and non-animal disgust propensity were uniquely related to spider distress among European Americans. However, among Asian Americans only animal disgust propensity was uniquely related to

level of spider distress. The influence of culture on relationships between disgust propensity and spider distress is an exciting area that warrants further study.

Comparing Trait Anxiety and Trait Disgust in Spider Phobic Distress

Moderate correlations have been reported between trait anxiety and trait disgust measures, such as the DS and the STAI-T (e.g., Olatunji, Sawchuk, Arrindell, and Lohr, 2005; Schienle, Schafer, and Stark, 2005). Some theorists have questioned whether associations between disgust propensity and spider distress might be due to the influence of trait anxiety (e.g., Thorpe and Salkovskis, 1998).

To tease apart their role in spider distress, researchers have examined whether the contributions of measures of trait disgust and trait anxiety are uniquely associated with spider distress. The results have been somewhat mixed, with results from some studies in support of unique associations of both trait anxiety and trait disgust with spider distress, whereas other studies have found unique associations with spider distress for only trait anxiety or trait disgust alone.

Several studies have suggested the potential independence of associations of spider distress with both trait disgust and trait anxiety. For example, in a univariate ANCOVA, Olatunji (2006) found that disgust propensity on the DS was uniquely associated with spider distress even after controlling for trait anxiety. Further, Vernon and Berenbaum (2008) reported the results of a series of studies which suggested that disgust and fear propensity likely independently contribute to spider distress. In two of the studies, conducted with introductory entomology students, animal fear propensity on the FS and animal disgust propensity on the DS were independently related to spider distress in regression analyses, whereas non-animal FS and DS scores were not.

On the other hand, there have also been results showing a unique association of spider distress with trait disgust but not with trait anxiety. For example, in a regression analysis on spider distress with the STAI-T and DS subscales, de Jong and Merckelbach (1998) found that only animal disgust proneness but not trait anxiety contributed independently to spider distress scores among women.

Further, in structural equation models, Olatunji, Williams, Lohr et al. (2007) found that DES disgust propensity and STAI-T trait anxiety latent factors were independently related to spider distress, but when simultaneously modeled as predictors, only latent disgust propensity remained significantly associated with spider distress. Olatunji, Williams, Lohr et al. (2007) noted that their model supported disgust as a significant intervening variable between trait anxiety and spider distress.

In summary, there is no clear consensus in the literature regarding the relative independence of the associations of trait anxiety and trait disgust with spider distress. Although there is evidence suggesting that under some conditions one or both are uniquely associated with spider distress, there is still no unifying theoretical model that accounts for the array of research findings in this area. It may be the case that the findings are influenced by characteristics of the samples studied or the measures used. Future empirical work is

needed to more conclusively determine the relative associations of trait anxiety and trait disgust with spider distress.

Spider Phobic Distress and Behavior

Fear and disgust are both thought to be avoidance-motivated emotions, and in addition to the ample evidence of behavioral avoidance of frightening objects there is emerging evidence of avoidance of a range of disgusting objects (Rozin, Haidt, McCauley, Dunlop, and Ashmore, 1999; Woody, McLean, and Klassen, 2005; Woody and Tolin, 2002). Scores on trait disgust measures such as the DPSS-R appear to be predictive of avoidance on a range of disgusting tasks thought to represent core and animal-reminder disgust (Van Overveld, de Jong, and Peters, 2010).

There is some preliminary evidence to suggest the potential role of trait anxiety and disgust in avoidance behavior. Olatunji, Cisler et al. (2007) reported that BAT spider avoidance was positively correlated with both the disgust propensity and disgust sensitivity subscales of the DPSS-R, however, regression analyses revealed that only disgust propensity was uniquely associated with spider avoidance. BAT performance has also been found to be associated with STAI-T scores (Cochrane, Barnes-Holmes, and Barnes-Homes, 2008).

In examining visual avoidance, Tolin, Lohr, Lee and Sawchuk (1999) found that spider distressed participants spent less time viewing photographs of spiders relative to neutral pictures, despite instructions to view all carefully for a later recognition test. However, in a reanalysis of this data combining spider distressed, BII distressed, and nondistressed control groups, contrary to predictions about disgust-motivated avoidance, Woody and Tolin (2002) found that higher scores on the DS Death subscale were predictive of more time spent viewing spider photographs. Such seemingly paradoxical findings underscore the complex nature of disgust and fear. Despite being conceptualized as primarily avoidance-motivated emotions, it is not uncommon for individuals to display a morbid curiosity and fascination with frightening and disgusting objects and events. In fact, in controlled circumstances, perhaps when the potential for physical danger and contamination can be dismissed, it is not uncommon for individuals to exhibit approach behavior during their everyday lives, seeking out frightening or disgusting experiences, such as riding a roller coaster or watching a gory scene on television. It will be interesting for future research to delineate the role of trait disgust and trait anxiety in such sensation-seeking behavior.

In an examination of self-reported spider avoidance, Vernon and Berenbaum (2008) found that the animal and non-animal subscales of the DS and FS were all significantly positively correlated with self-reported spider avoidance. However, they also found some preliminary evidence that disgust propensity and fear propensity may be differentially associated with changes in spider avoidance. In a regression analysis in this study, only lower scores on FS fear propensity was uniquely predictive of decreased self-reported spider avoidance over the course of a semester in an introductory entomology course.

SPIDER PHOBIC DISTRESS AND COGNITION

As briefly mentioned above, interactions between cognitive biases, particularly association biases, and trait anxiety appear to contribute to spider distress. Theoretical models emphasizing implicit association biases in spider distress suggest that spider-distressed individuals quickly associate spider-relevant information with negative constructs. To examine the bias, recent studies have employed several methods including the Implicit Association Test (IAT; Greenwald, Mcghee, and Schwartz, 1998), Go/No-go Association Task (GNAT; Nosek, and Banaji, 2001), and the Extrinsic Affective Simon Task (EAST; De Houwer, 2003) and results are largely consistent. Specifically, spider distressed individuals automatically associate spiders with negative fear-relevant and disgust-relevant descriptors and such tendencies differentiate between spider distressed and spider non-distressed individuals (e.g., Ellwart, Rinck, and Becker, 2006; Teachman, Gregg, and Woody, 2001; Huijding and de Jong, 2005).

Researchers have found creative ways to examine disgust cognitive biases. For example, Olatunji et al. (2008) found a disgust expectancy bias but not a fear expectancy bias among spider distressed participants rating the probability that spider pictures would be followed by a picture of a disgust, fear, or neutral facial expression. Spider distressed participants showed a bias toward expecting disgust pictures to follow spider pictures and these higher disgust expectancies were predictive of more BAT avoidance.

Cognitive biases in spider distress have not been investigated in relation to trait anxiety directly, although findings on a state anxiety X trait anxiety interaction may be relevant. Mathews and MacLeod (1988) have found that elevated state anxiety was associated with increased attention to threat among high trait anxious individuals and decreased attention to threat among low trait anxious individuals. One possible interpretation of such findings for spider distress could suggest that the combination of state anxiety elevated via spider distress along with trait anxiety may make attentional biases to threatening stimuli especially prominent.

Overall, the above studies suggest that some types of cognitive biases occur in individuals with spider distress and more have yet to be investigated. It is still unclear whether cognitive biases are etiological factors or consequences of the phobia or both.

SPIDER PHOBIC DISTRESS TREATMENT

There is a wealth of evidence supporting the efficacy of professionally administered exposure-based treatments for the reduction of state fear and avoidance responses to spiders (Hirai, Vernon, and Cochran, 2006) and emerging evidence suggesting that they also reduce state disgust to spiders (Hirai et al., 2006; Merckelbach et al., 1993; Smits et al., 2002; Teachman and Woody, 2003). As might be expected given the theorized stability of trait emotion, exposure treatment for spider distress does not appear to reduce disgust propensity (Merckelbach et al., 1993; Smits et al., 2002).

There is some evidence that trait anxiety may be related to the efficacy of exposure therapies for spider distress, but it appears that trait disgust may not have such an influence. Muris, Mayer, and Merckelbach (1998) found that higher trait anxiety was predictive of less

spider distress reduction from exposure treatment. In contrast, Merckelbach et al. (1993) found no outcome difference in exposure therapy for spider distress between those with high and low disgust propensity scores on the DQ.

The association of trait emotion with the effects of naturalistic exposure and remission processes has also been examined. A longitudinal study of naturalistic change over the course of a semester of exposure in an introductory entomology course did not find an association between DS disgust propensity and changes in spider distress and avoidance (Vernon and Berenbaum, 2008). Fear propensity on the FS, on the other hand, though not related to change in spider distress, was related to spider avoidance at the end of the semester, with low animal fear propensity at the beginning of the semester predictive of decreased spider avoidance at the end of the semester (Vernon and Berenbaum, 2008). Taken together, these three studies (Merckelbach et al., 1993; Vernon and Berenbaum, 2008) preliminarily suggest that high trait anxiety and fear propensity may interfere with professional treatment and more naturalistic remission mechanisms, however, disgust propensity appears not to.

CONCLUSION

In summary, there is a growing body of evidence suggesting associations between spider distress and trait anxiety and trait disgust. Preliminary findings suggest that among spider distressed individuals behavioral avoidance of spiders may be related to both trait disgust and trait anxiety. However, the *relative* contributions of trait anxiety and trait disgust to spider distress and avoidance behavior are far less clear and findings in the literature have been particularly mixed regarding whether trait anxiety contributes to spider distress independent of trait disgust. It appears that many of the theories of spider distress etiology and maintenance may be applied to both anxiety and disgust. Spider distressed individuals appear to demonstrate a number of fear cognitive biases, including attentional biases and associative biases. There is also emerging evidence that suggests a disgust expectancy bias and a disgust negative interpretational bias among spider distressed individuals. Although these cognitive biases likely interact with trait anxiety and trait disgust in spider distressed individuals, the role of cognitive biases in spider distress etiology is still speculative and requires further research. Exposure treatment is highly effective for spider distress, but it is likely that high trait anxiety, but not trait disgust, may interfere with exposure treatment efficacy and with the process of change accompanying naturalistic exposure in everyday life.

The rapid information expansion in the area of psychopathology and trait emotion has led to many exciting discoveries and there are still many directions ripe for future exploration. Longitudinal research will be needed to delineate the effects of trait anxiety and trait disgust on the etiology and maintenance of spider distress. While this chapter supports the role of trait anxiety in spider phobic distress, it also strongly suggests the importance of considering trait disgust and its symptom manifestations in spider distress.

Findings regarding the potential importance of state and trait disgust in spider distress may necessitate modifications in traditionally fear-based assessment and treatment procedures. Assessments of spider distress have historically emphasized the evaluation of fear-driven symptoms, avoidance behavior, and harm cognitions. Assessment of not only fear-driven but also disgust-driven symptoms, behaviors, and contamination cognitions are

likely to improve identification of individuals with spider phobic distress and give clinicians a richer clinical picture. Individuals whose spider distress seems predominantly based in disgust toward spiders rather than fear may need interventions specific to disgust. Although conventional exposure techniques targeting fear appear to reduce disgust as well, more research is needed to investigate how to maximize reductions in disgust and associated symptoms, behaviors, and cognitions as well as those associated with fear. Additional research with clinical samples will be helpful in this respect.

It should be noted that many of the studies that this chapter reviewed used student populations with spider phobic distress symptoms. Thus, another important step for future research will be to test disgust-based models of spider phobia in clinical populations.

This chapter also reveals the lack of cross-cultural research in spider distress. The role of disgust propensity in distress in different cultural groups has received remarkably little attention. It would also be valuable for future spider distress and individual difference research to investigate the effects of cultural and gender differences on the relationships among spider distress, trait disgust, and trait anxiety and to tailor models of spider distress accordingly. Our knowledge about the role of demographic variables in spider distress must be improved in order to refine theoretical models of spider distress, trait anxiety, and trait disgust.

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