3 Gender and PTSD

A Cognitive Model

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As noted by Norris, Foster, and Weisshaar in this book (Chapter 1), epidemiological studies indicate that males are somewhat more likely than females to experience traumatic events (e.g., Breslau, Davis, Andreski, & Peterson, 1991; Breslau et al., 1998; Kessler, Sonnega, Bromet, Hughes, & Nelson, 1995; Norris, 1992). Despite encountering fewer traumas, however, females appear to be more likely than males to develop posttraumatic stress disorder (PTSD) (e.g., Breslau & Davis, 1992; Breslau et al., 1998; Davidson, Hughes, Blazer, & George, 1991; Helzer, Robins, & McEvoy, 1987; Kessler et al., 1995). The purpose of this chapter is to explore hypotheses about cognitive factors that influence gender differences in vulnerability to develop PTSD. We describe a cognitive model of trauma processing, discuss the potential impact of gender differences on several aspects of the cognitive model, and make recommendations for future research.

A COGNITIVE MODEL OF PTSD

To explain individual differences in recovery after a trauma, Foa and colleagues (e.g., Foa & Kozak, 1986; Foa & Riggs, 1993; Foa & Rothbaum, 1998) forwarded *emotional processing theory*, which suggests that the development of disorders such as PTSD depends on both the *content* of cognition (i.e., what the person thinks, believes, and records in memory) and the *process* of cognition (i.e., the way the person thinks, perceives, and interprets events). Adaptive cognitive features are thought to act as a buffer against the development of PTSD; trauma victims with such features are likely to process the trauma effectively. Conversely, maladaptive cognitive

features are hypothesized to increase trauma victims' vulnerability to develop PTSD because they inhibit realistic processing of the traumatic event. Emotional processing theory is predicated on the following core propositions:

1. PTSD is a form of pathological fear. Thus, it is similar in many ways to the "normal" fear experienced by trauma victims who do not develop PTSD. However, it is distinguished from normal fear by the presence of specific cognitive associations, described in detail later.
2. All fear is a memory-based "program" for escaping danger. Fear helps organisms cope with imminent threat by deploying attention toward dangerous stimuli, facilitating quick assessment of danger, and activating the physiological and behavioral responses necessary to escape.
3. The fear program can be construed as a cognitive "structure" consisting of interconnected cognitive representations, and containing three kinds of information:
   a. Information about the feared *stimulus*. In the case of a trauma survivor, this information might include details about the trauma and the perpetrator.
   b. Information about verbal, physiological, and overt behavioral *responses*, including information about the victim's responses during the trauma (e.g., screaming, freezing, or running away), as well as responses that occurred after the trauma (e.g., sadness, hypervigilance, or nightmares).
   c. Interpretive information about the *meaning* of the stimulus and response elements of the structure. For trauma survivors, this may include appraisals of the perpetrator as dangerous, and also interpretations of one's own responses as appropriate (e.g., "I did what I had to do") or inappropriate (e.g., "I acted stupidly").
4. The fear structures of PTSD sufferers differ from those of individuals who recover from traumatic experience. PTSD is associated with a large number of maladaptive associations between elements of the structure. The specific associations hypothesized to increase vulnerability to develop PTSD are described later.

Figure 3.1 depicts a hypothetical fear structure of a "normal" trauma memory of a woman who was raped at gunpoint by a tall, bald man. The ovals in this model represent *stimulus* elements (e.g., "man" and "gun"). Elements related to each other are connected by lines. The rectangles represent *meaning* elements related to the self (e.g., "confused," "afraid") and to

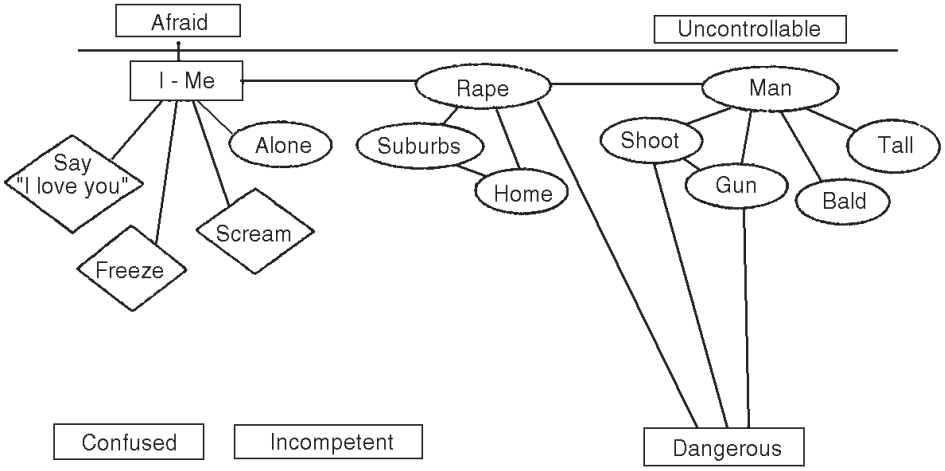

FIGURE 3.1. A schematic model of a normal rape memory. From Foa and Rothbaum (1998). Copyright 1998 by The Guilford Press. Reprinted by permission.

the world (e.g., "dangerous"). The diamonds represent *response* elements, that is, the woman's responses during the rape (e.g., "scream," "freeze").

Note that the elements of the fear structure are not isolated; rather, there is a systematic pattern of connections between elements. These connections are shown as solid lines. The concept of interconnections between cognitive elements borrows from models of cognitive psychology that conceptualize memory as a configuration of separate concepts associated with one another (e.g., Anderson & Bower, 1973). When one element is activated by an environmental trigger or an internal event, activation spreads from that element to other elements, creating new connections. Repeated activation of a connection between two elements results in a priming effect, in which thinking about one element automatically activates the related element.

In Figure 3.1, the associations between elements of the structure are realistic. For example, the stimuli "gun" and "shoot" are associated with "danger." Conversely, characteristics of the rapist such as "man," "bald," and "tall" are not associated with "danger." Thus, the woman recognizes that these attributes are not inherently dangerous. Similarly, the self is associated with the responses "freeze" and "scream," but not "incompetence." Thus, the woman recognizes that her responses during the trauma do not signify any negative meaning about herself. These realistic interelement associations indicate healthy trauma processing. We would predict that this woman would be unlikely to develop PTSD; that is, she is likely to "recover" from the trauma.

Individuals who develop PTSD, on the other hand, are hypothesized to have markedly different fear structures than do those who recover. Below, we discuss the specific elements of pathological trauma structures.

The Structure of Pathological Fear

Figure 3.2 depicts a pathological fear structure associated with PTSD, that is structurally similar to other forms of pathological fears (e.g., phobias), but differs in its large size and high number of erroneous associations (Foa, Steketee, & Rothbaum, 1989). The pathological fear structure differs from the normal fear structure in several ways (Foa & Kozak, 1986):

1. Pathological fear structures are disruptively *intense*. In other words, a pathological fear structure involves excessive response elements such as representations of avoidance and physiological arousal. In this woman's case, the diamond labeled "PTSD symptoms" depicts the excessive response elements.
2. Pathological fear structures include *unrealistic stimulus–stimulus associations* that do not accurately represent the world. As shown in Figure 3.2, this woman's fear structure contains an association between "gun" and "bald man"; that is, bald men have become associated with guns.
3. Pathological fear structures also contain *erroneous stimulus–*

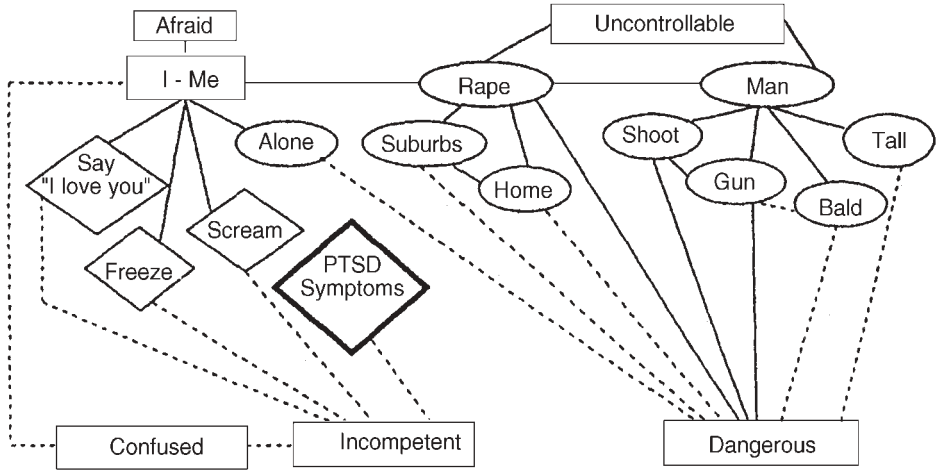

FIGURE 3.2. A schematic model of a pathological rape memory. From Foa and Rothbaum (1998). Copyright 1998 by The Guilford Press. Reprinted by permission.

meaning associations. In this woman's case, harmless stimuli such as "bald," "home," and "suburbs" have become associated with the meaning "dangerous." Similarly, her responses during and after the rape are associated with the meaning "incompetence."

4. Pathological fear structures contain *erroneous associations between harmless stimuli and escape or avoidance responses*. For example, because this woman was raped by a bald man, she is primed to avoid contact with such men.

This woman's fear structure shows a failure to process the trauma effectively. It contains excessive representations of fearful responses; she associates harmless stimuli with danger, views herself as incompetent, and tends to avoid situations that frighten her. Thus, she is less likely to recover from her trauma and is considered at high risk for developing PTSD. Below, we discuss various hypothesized reasons why some trauma survivors develop the normal fear structure depicted in Figure 3.1, whereas others develop the pathological fear structure shown in Figure 3.2.

Why Do Some Trauma Victims Recover and Others Do Not?

Foa and colleagues (e.g., Foa & Riggs, 1993; Foa & Rothbaum, 1998) posited that the following cognitive factors influence the likelihood that a person will develop PTSD:

1. *Pretrauma schemas*. Schema theory holds that an individual's set of beliefs and attitudes (schemas) influence his or her perceptions, interpretations, and memories (e.g., Beck, Emery, & Greenberg, 1985). Schema development is thought to be influenced by experiences throughout the lifespan. Thus, people's life experiences may provide them with new information that alters their beliefs and expectations. Reciprocally, schemas also influence the cognitive processing of experiences, often distorting the experience to make them schema-consistent. Thus, a person may misperceive or misremember an event as being consistent with his or her prior knowledge or beliefs. Schema-based theories of PTSD posit that trauma victims' schemas about the world and themselves prior to the trauma influence how well they will recover from the trauma. Several trauma theorists (Epstein, 1991; Horowitz, 1986; Janoff-Bulman, 1992; McCann & Pearlman, 1990) imply that trauma victims who previously viewed themselves as invulnerable and worthy, and perceived their world as benevolent, are at high risk for developing chronic emotional disturbances, because the trauma forces an extreme change in their schemas of themselves and the world. However, this view is incongruent with empirical studies indicating that multiple traumatic experiences and pretrauma psychological disturbances increase the likelihood of PTSD (Burgess & Holmstrom, 1978; Resick, 1987;

Rothbaum, Foa, Riggs, Murdock, & Walsh, 1992). Presumably, individuals with such a history do not perceive themselves as competent and the world as safe. Rather, the repeated traumas would be expected to create a strong priming effect, in which the person becomes more likely to perceive the world as extremely dangerous and him- or herself as extremely incompetent. These preexisting schemas may influence the perception or memory of the trauma, so that the trauma serves to reinforce their existing negative beliefs. To reconcile these seeming contradictions, Foa and Rothbaum (1998) suggest that it is not positive assumptions that render an individual less adept at processing a traumatic event, but rather his or her extremely *rigid* conceptions. Accordingly, they proposed that individuals who have experienced multiple traumas also hold rigid extreme views, but those views are negative rather than positive. Foa and Rothbaum further posited that trauma victims whose rules of interpretation allow finer discriminations of degree of "dangerousness" and "self-competence" will be better equipped to process the trauma as a unique event, one that should not substantially alter their evaluations of themselves or of the world. Hence, these victims will be less likely to develop PTSD. In the case of the woman raped, rigid preexisting beliefs that the world is either completely safe or completely unsafe, and that she herself is either completely competent or completely incompetent, would be thought to increase her risk of developing PTSD.

2. *Trauma memory records*. Trauma memory records consist of the memory of the trauma itself and the person's beliefs *about* the trauma. Both aspects of the record are hypothesized to influence recovery from the trauma. In the case of the woman raped by a bald man holding a gun, the trauma memory record will include representations of stimulus elements (e.g., "bald man," "gun"), response elements (e.g., "scream," "freeze"), and meaning elements (e.g., "dangerous," "helpless"). Foa et al. (1989) suggest that trauma memories differ from other fear structures in that they contain a particularly large number of stimulus elements. Thus, the trauma victim with PTSD is expected to exhibit fear of not only objectively dangerous situations (e.g., gun) but also objectively safe ones (e.g., bald men). In general, the more stressful the traumatic event, the greater its effects on emotions and behavior (Baum, 1970). Accordingly, a trauma memory of a rape would be expected to have a larger number of stimulus–danger associations than would that of a simple assault. A trauma memory with a particularly large number of stimulus–danger associations may be expected to result in the perception of the world as entirely dangerous. Such perception underlies the reluctance of the rape victim to allow others to sit behind her on a bus or subway for fear that she may be attacked from behind. Similarly, it may also lead her to view all men as potential rapists, and to sleep with the lights on in her own home.

Foa and Rothbaum (1998) also propose that trauma memories differ from other fear structures by a large number of diverse response elements.

First, the perception that the world is completely dangerous engenders a particularly large number of physiological (e.g., increased heart rate) and behavioral (e.g., escape) response elements in a fear structure. Second, a trauma memory often includes representations of trauma-related responses (e.g., freezing, screaming). Trauma victims who develop PTSD seem to interpret their responses during the trauma in a negative manner; this subsequently interferes with recovery from the trauma. The rape survivor in our example interprets her feelings and behaviors during the rape as reflecting personal incompetence. She is thus thought to be at greater risk for developing PTSD than a woman who did not reach such negative conclusions about her behavior during the trauma.

3. *Posttrauma reactions of self and others*. The third factor that can impede emotional processing is what gets recorded in memory *after* the trauma, including records of posttrauma disturbances and difficulties in resuming daily functioning. Foa and Rothbaum (1998) suggest that emotional processing of the trauma is impeded when there is a tendency to interpret initial emotional difficulties (e.g., PTSD symptoms) as a further sign of incompetence. The tendency to generate such dysfunctional interpretations can be influenced by pretrauma schemas, as well as the traumatic memory itself. Posttrauma records also include information about the reactions of others. For example, the rape survivor whose posttrauma interpersonal interactions suggest to her that the trauma was her fault, or that her reactions are inappropriate, may be at greater risk for developing PTSD than if she had experienced reasonable levels of interpersonal support after the trauma. Janoff-Bulman (1985) suggests that the reactions of others may influence the degree to which the trauma victim blames him- or herself for the event; this, in turn, is hypothesized to influence the person's recovery from the trauma. Empirical studies indicate that negative social interactions (e.g., victim blame or disbelief) have strong negative effects on victim adjustment, whereas positive reactions from others have little impact on adjustment (Davis, Brickman, & Baker, 1991; Ullman, 1995). This asymmetry may be due to a general negative interpretation of other people's reactions, and this bias creates a vicious cycle that serves to reinforce the victim's perceptions of world as dangerous and of herself as incompetent.

Thus, pretrauma schemas, trauma memory records, and records of the posttrauma reactions of self and others combine to influence the likelihood of recovery versus the development of PTSD. Figure 3.3 depicts a schematic model of these cognitive factors involved in the emotional processing of trauma. External events are symbolized by the solid rectangles, and their representations in memory are depicted by broken-line rectangles. As can be seen in Figure 3.3, the various cognitive factors can influence each other in an adaptive or maladaptive manner. For example, pretrauma records impact the person's self and world schemas. These schemas subsequently exert

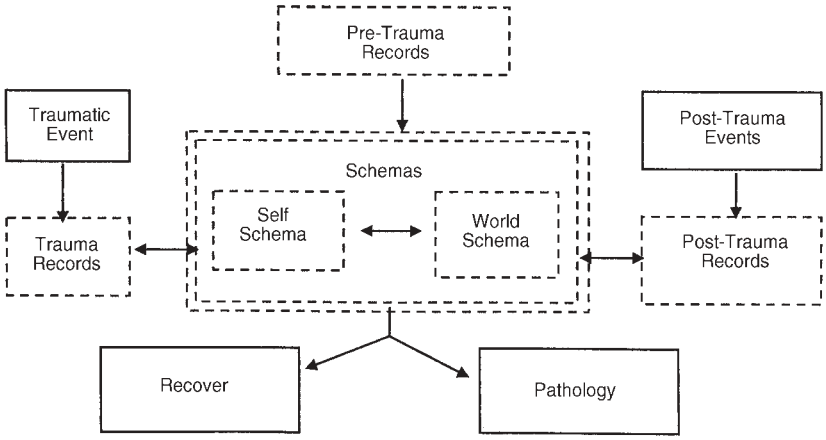

FIGURE 3.3. A cognitive model of trauma processing. From Foa and Rothbaum (1998). Copyright 1998 by The Guilford Press. Reprinted by permission.

influence on the representations of the traumatic event. Trauma records, in turn, influence the representations of posttrauma events. Pretrauma records also affect the posttrauma records, again, via their impact on self and world schemas. Thus, pretrauma and posttrauma records and schemas work in concert to determine whether a trauma victim will recover or will develop PTSD.

WHY ARE MALES LESS LIKELY TO DEVELOP PTSD THAN FEMALES?

Given the relatively high rates of trauma among males, why is the prevalence of PTSD lower in males than in females? Perhaps sex differences stem from the same factors thought to underlie individual differences in trauma recovery (see Figure 3.3): trauma memory representations (both the trauma memory itself and beliefs about the trauma), beliefs about the self, and beliefs about the world. To the extent that the cognitive factors specified by emotional processing theory do indeed play a role in sex differences in vulnerability to develop PTSD, then sex differences should be evident in one or more of these domains. In this section, we examine the empirical literature relevant to the following questions:

1. *Do males and females differ in their trauma memory records?* Emotional processing theory maintains that the trauma memory record is an important factor in recovery. As described earlier, the trauma memory re-

cord consists of the memory of the trauma itself (e.g., "what," "where," and "when" issues), as well as the person's thoughts, beliefs, and appraisals *about* the trauma (e.g., "why" issues). Accordingly, this question can be subdivided into two different inquiries:

a. *Do females experience more severe forms of trauma on average than do males? If so, does this difference explain the differential prevalence of PTSD?* Because the trauma memory record contains the recorded details of the traumatic event, it follows that more severe kinds of trauma will lead to more intense and pathological memory records. If females are found to experience more severe forms of traumas than males, it might be concluded that differences in trauma severity (and therefore differences in the trauma memory record) underlie differences in PTSD. However, in order to isolate this factor, it is necessary to examine differences in PTSD prevalence and severity even when controlling for type of trauma. If sex differences in PTSD remain even when controlling for trauma factors, then it will be necessary to examine whether other cognitive factors can account for the remaining differences.
b. *Do females have more negative and personalized attributions about traumatic events than do males?* The trauma memory record contains not only the details of the traumatic event but also the person's thoughts about the trauma. A trauma victim whose memory records contain an excessive amount of self-blame or guilt-related beliefs, for example, would be presumed to be at greater risk for developing PTSD. Thus, we compare males' and females' negative attributions about the trauma.

2. *After a traumatic event, do males and females hold different beliefs about themselves and the world?* The emotional processing model also suggests that recovery from trauma is influenced by persons' schemas about themselves and the world. Normal trauma memory structures tend not to contain global, negative beliefs; rather, the trauma is viewed as a unique event without distorting the person's overall beliefs. By contrast, pathological trauma memory structures are thought to contain beliefs such as "I am completely incompetent" and "The world is completely dangerous." Thus, this question can be divided into two inquiries:

a. *Are female trauma victims more likely than male victims to view themselves as incompetent?* If female trauma victims' self-schemas differ from those of males, then females would be expected to view themselves as more incompetent, worthless, or damaged than do males. We will examine the prevalence of these beliefs among male and female trauma victims.
b. *Are female trauma victims more likely than male victims to view the world as dangerous?* Similarly, if females' and males' world schemas differ, then female victims should hold more beliefs that

the world is a dangerous and unpredictable place than do males. We examine the degree to which males and females endorse such beliefs.

Below, we review the empirical literature relevant to each hypothesis.

Do Males and Females Differ in Their Trauma Memory Records?

Foa and Rothbaum (1998) posited that trauma records in memory influence the likelihood that the victim will develop PTSD. The trauma record consists of information not only about the trauma itself but also about the victim's interpretation of the trauma and subsequent attributions and beliefs about the trauma.

Do Females Experience More Severe Forms of Trauma on Average Than Do Males?

Judging the relative severity of different types of trauma is inherently difficult, but severity might be surmised from the rates of PTSD among both males *and* females experiencing the event. Large-scale studies suggest that rape and sexual assault (e.g., Kessler et al., 1995) and combat (e.g., Weiss et al., 1992) are associated with higher rates of PTSD among both sexes than are other types of trauma.

Another way of defining severity is the degree to which the trauma violates existing beliefs about one's self, the world, or the future. Traumas that force victims to change their global, deeply held beliefs might be judged as more severe than traumas that do not elicit such radical cognitive changes. Rape, for example, may lead victims to perceive themselves as completely incompetent or the world as completely dangerous (Foa & Rothbaum, 1998). They may also feel guilty or responsible for the rape; this attitude may be reinforced by others in the victims' environment, because many people still tend to blame the victim (e.g., Best, Dansky, & Kilpatrick, 1992). Child sexual abuse (CSA) takes place during important developmental stages and often is perpetrated by trusted caregivers; thus, CSA victims may feel particularly betrayed and powerless (Finkelhor, 1986). Combat's sustained threat of death or serious injury, along with the horror of witnessing or participating in atrocities, may lead to pervasive beliefs that one is vulnerable and that the environment is unpredictable and dangerous (Weathers, Litz, & Keane, 1995). It might be argued that traumas such as natural disasters or motor vehicle accidents, although they may be quite distressing, do not elicit the same massive disruptions of one's core beliefs and attitudes.

In their comprehensive review of studies in this book, Norris and colleagues (Chapter 1) report that females are more likely than males to expe-

rience rape and other forms of sexual assault. Males, on the other hand, are more likely than females to experience nonsexual traumas such as physical assault, combat, and accidents. This pattern of gender differences in trauma experience was observed across epidemiological and convenience-sample studies of varying ages and demographic backgrounds, spanning multiple countries.

Recently we (Tolin & Foa, 2002) completed a meta-analysis of studies showing the prevalence of various types of traumas among males and females. We calculated effect size *r* for differences in prevalence, weighted according to sample size. All effect size estimates were for female gender; therefore, positive effect sizes indicate a greater prevalence of trauma among females; negative effect sizes indicate a greater prevalence among males. An effect size of $r = 0$ indicates no difference between males and females; *r* is considered significantly different from 0 ($p < .05$) when its 95% confidence interval does not include 0. Effect size estimates of .1, .3, and .5 correspond to small, medium, and large effects, respectively.

Results of our meta-analysis, as shown in Table 3.1, suggest that the prevalence of certain types of trauma is higher among females and that the prevalence of others is higher among males. Specifically, females appear more likely than males to experience sexual assault and CSA. Males, on the other hand, appear more likely to experience nonsexual traumas such as combat, physical assault, accidents, and witnessing death or injury. Thus, the meta-analytic findings corroborate the narrative review of Norris et al. in Chapter 1 of this volume. However, it should be noted that despite the

TABLE 3.1. Meta-Analysis of the Prevalence of Different Types of Trauma among Males and Females

Trauma category	Number of comparisons	*r*	95% CI
Adult sexual assault	12	.17	.13–.21
Child sexual abuse	16	.15	.12–.18
Nonsexual child abuse or neglect	4	.03	.02–.05
Disaster or fire	8	–.03	–.06 – –.01
Witnessing death or injury	15	–.06	–.11–.00
Serious illness or injury	4	–.15	–.12–.03
Accident	10	–.08	–.10 – –.06
Nonsexual assault	16	–.08	–.11 – –.06
Combat, war, and terrorism	10	–.15	–.22–.07

Note. *r* = effect size estimate; CI = confidence interval.

[a]Females > males, $p < .05$.

[b]Males > females, $p < .05$.

large number of significant differences, most of the effect sizes are smaller than might be expected from narrative reviews of gender differences in trauma. Across studies, only the estimates for sexual assault, CSA, and combat exceeded the threshold for a "small" and significant effect.

Do females experience more severe forms of trauma than do males? The empirical results are not clear. Females are more likely to experience sexual traumas, which appear to be highly likely to elicit PTSD. On the other hand, males are more likely to experience combat, which may be equally likely to elicit PTSD. Furthermore, epidemiological studies indicate that males are approximately as likely to experience combat as females are to be raped (e.g., Kessler et al., 1995; Norris, 1992). More research is needed to link specific aspects of the traumatic experience with the onset of PTSD before this matter can be settled.

Do Differences in Trauma Type Explain Sex Differences in PTSD? In order to investigate whether gender differences in PTSD can be attributed to differential trauma experience, it is necessary to examine studies that allow gender comparisons within different types of trauma. In their review in this book, Norris et al. compared the rates of PTSD for males and females exposed to disaster and community or political violence. Females were found to be at greater risk than males for developing PTSD following disaster, although results were more ambiguous following community and political violence.

In our quantitative review (Tolin & Foa, 2002), we used meta-analysis to summarize males' and females' PTSD symptoms after several specific types of trauma. In most studies, the dependent variable was dichotomous (i.e., the presence or absence of PTSD). Some studies, however, used continuous measurement (i.e., severity of PTSD symptoms). Studies using dichotomous and continuous measurement were analyzed separately, using the effect size estimate *r*, weighted according to sample size. As before, all effect size estimates are for female gender. Therefore, positive effect sizes indicate a greater prevalence or severity of PTSD among females; negative effect sizes indicate a greater prevalence or severity among males.

As shown in Table 3.2, most gender differences did not reach statistical significance; that is, their 95% confidence intervals included 0. However, it is possible that some of these null results are due to small numbers of comparisons; therefore, we will consider size of the effect as well as statistical significance. Females were significantly more likely than males to meet diagnostic criteria for PTSD following disaster or fire, accident, nonsexual assault, and civilian exposure to combat, war, or terrorism (although it should be noted that the effect sizes for combat trauma did not exceed the threshold for a small effect). Effect sizes that were not significantly different from 0 but still exceeded the threshold for a small effect suggested that fe-

TABLE 3.2. Meta-Analysis of the Prevalence of PTSD among Males and Females Exposed to Specific Types of Trauma

	Diagnosis			Continuous measurement		
Trauma category	Number of comparisons	*r*	95% CI	Number of comparisons	*r*	95% CI
Adult sexual assault	3	.03	–.25–.31	0	—	
Child sexual abuse	2	.08	–.17–.32	4	.12	–.61–.28
Nonsexual child abuse or neglect	10	.17	–.13–.44	1	.24	–.04–.49
Disaster or fire	21	.10[a]	.06–.14	12	.12	–.07–.40
Witnessing death or injury	14	.06	–.01–.12	2	.14	–.01–.29
Serious illness or injury	2	–.11	–.24–.02	0	—	
Accident	18	.14[a]	.09–.20	2	.22[a]	.08–.35
Nonsexual assault	10	.30[a]	.16–.43	4	.13	–.07–.32
Combat, war, and terrorism	16	.06[a]	.01–.11	11	.12	–.03–.26
Veteran	5	.03	–.05–.12	5	0.15	–.22–.49
Civilian	11	.06[a]	.01–.11	6	0.13[a]	.11–.16

Note. *r* = effect size estimate; CI = confidence interval.

[a]Females > males, $p < .05$.

males were more likely than males to meet criteria for PTSD following nonsexual child abuse as well. Studies of the severity, rather than diagnosis, of PTSD indicated that females reported significantly greater symptoms of PTSD than did males following accidents and civilian exposure to combat, war, and terrorism. Effect sizes that were not significantly different from zero but still exceeded the threshold for a small effect suggested that females reported more severe PTSD symptoms than did males following CSA, nonsexual child abuse, disaster or fire, witnessing death or injury, nonsexual assault, and veteran exposure to combat. It should be noted that some of these comparisons were based on a very small number of studies and thus must be interpreted cautiously. Males, on the other hand, showed a small but nonsignificant effect for a greater probability of the PTSD diagnosis following unspecified serious illness or injury (although this finding is based on only two studies). The only trauma category in which no gender differences were found either in terms of effect size or statistical significance was adult sexual assault, although only three studies were available for this comparison. Thus, although the evidence is inconsistent, there does seem to be a general trend toward greater PTSD among females than among males exposed to the same traumas.

In interpreting these findings, it is important to bear in mind that there may be great variability in trauma severity within the same general cate-

gory. For example, male Vietnam veterans typically experienced more severe combat exposure than did female veterans. Similarly, female nonsexual assault victims may be more severely injured, more frequently assaulted, or more likely to be assaulted by a friend, relative, or partner than are males. These differences in severity may lead to over- or underestimations of true gender differences in vulnerability to develop PTSD.

Substantial gender differences in trauma severity have been reported in studies of CSA. For example, the use of force is reported in 10–15% of male sexual abuse cases, compared to 19% of female cases (Finkelhor, Hotaling, Lewis, & Smith, 1990; Risin & Koss, 1987). Moreover, male victims are likely to report the use of positive coercion (reward or promised reward), whereas female victims are likely to report negative coercion (force or threats; Fritz, Stoll, & Wagner, 1981). These details are hypothesized to lead to important differences in the trauma record by creating stronger associations between the trauma and appraisals of danger. Similarly, compared to males, female CSA victims are more likely to report multiple victimizations and to have been abused by a close family member (Fischer, 1992). The greater number of victimizations is thought to increase the associative strength between elements of the trauma memory network. Victimization by a family member may create new associations between elements of danger and those representing interpersonal trust or love. Such associations may lead to impaired interpersonal relatedness, particularly when the victimization occurs during periods critical to the development of healthy cognitive representations. Thus, even within the domain of CSA, gender differences in the nature of the trauma may have far-reaching effects on the trauma memory record.

Whereas CSA severity might be greater in some aspects for females than for males, adult sexual assault may yield the opposite pattern. Male sexual assault victims may be more likely than female victims to have been assaulted by multiple perpetrators, to have been attacked multiple times, and to have been physically beaten during the sexual assault (Kaufman, Divasto, Jackson, Voorhees, & Christy, 1980; Pino & Meier, 1999). According to the cognitive model, such factors would be expected to result in stronger connections between benign stimuli and danger. The masculine gender role (e.g., Eagly, 1987) may also lead victims of such assaults to have increased connections between the trauma and cognitive elements of helplessness, vulnerability, and incompetence. These factors may have inflated PTSD rates among males, thus making it difficult to detect gender differences in trauma response.

In summary, males and females tend to experience different types of trauma, with females experiencing more sexual traumas and males tending to experience more violent, nonsexual traumas. These experiential differences create different trauma memories, which in turn influence the remainder of the memory structure. However, the results of Norris et al.'s qualita-

tive review and our quantitative review suggest that this factor cannot fully account for the differences in PTSD. Even within trauma types, females still appear to be at somewhat greater risk for PTSD. More subtle differences in the traumatic memory might play a role, as might differences elsewhere in the cognitive structure. We next consider the potential role of beliefs *about* the traumatic event.

Do Females Have More Negative and Personalized Attributions about Traumatic Events Than Do Males?

As described earlier, the trauma memory record contains not only the details of the trauma itself but also the person's thoughts, beliefs, and appraisals *about* the trauma. This element of the trauma memory may also differ for males and females. For example, in surveys of trauma survivors, males rated motor vehicle accidents as less frightening than did females (Ehlers, Mayou, & Bryant, 1998), and described CSA as more neutral or positive and less negative than did females (Fritz et al., 1981; Nash & West, 1985; Rind, Tromovich, & Bauserman, 1998; Schultz & Jones, 1983).

Differences in trauma appraisal have been detected by epidemiological research and may confound its results. As described by Norris and colleagues (Chapter 1) in this book, most epidemiological studies have measured only the first DSM-IV (American Psychiatric Association, 1994) criterion (the person was confronted with actual or threatened death or injury to self or others) but not the second (the person responded with intense fear, helplessness, or horror). When the second criterion is added, males' trauma prevalence decreases more than does that of females; resulting in rates that are comparable across genders (Norris et al., Chapter 1, this volume; Perkonigg, Kessler, Storz, & Wittchen, 2000). This suggests that across different kinds of trauma, males are less likely to report that the trauma led them to experience extreme fear. However, these findings should be interpreted with caution, because the same sociocultural factors that lead males to underreport certain kinds of trauma may also bias their reported interpretations.

Another aspect of the trauma memory is attribution of responsibility for the trauma. Recently, Foa, Ehlers, Clark, Tolin, and Orsillo (1999) developed the Post-Traumatic Cognitions Inventory (PTCI), a measure of trauma-related thoughts and beliefs. The PTCI consists of three empirically derived scales: Negative Cognitions about Self, Negative Cognitions about the World, and Self-Blame. The first two scales are discussed in later sections; the Self-Blame scale provides additional information about elements of the trauma record. Items on the Self-Blame scale include "The event happened because of the way I acted" and "Somebody else would have stopped the event from happening." We reanalyzed Foa et al.'s (1999) data to examine gender differences on this scale. In addition to standard significance

testing, for each comparison we also calculated an estimate of effect size for gender, using *r*.

Using data from 120 male and 183 female adults who reported a negative life event, females endorsed significantly more self-blame items than did males ($p < .05$, $r = .13$), indicating a higher degree of self-blame for the traumatic event. Similar results were found among participants reporting a trauma that met both DSM-IV trauma criteria, with females endorsing significantly more self-blame beliefs than did males ($p < .05$, $r = .14$). It should be noted, however, that this finding may confound gender with trauma type. No gender differences were found within any single trauma type, although the number of participants per cell may have been too small to detect real differences. Thus, although females may be slightly (i.e., small but significant effect) more likely than males to blame themselves after a traumatic event, it is not clear whether this difference reflects a direct effect of gender, an indirect effect of gender as a result of the type of trauma experienced, or a combination of the two.

As noted by Foa and Rothbaum (1998), erroneous trauma records stem from inappropriate stimulus–stimulus and stimulus–response pairings related to the trauma. Thus, females' greater fear may be related to an increased "conditionability" of fear-related responses. Experimental data on this issue are mixed. Stamps and Porges (1975) examined trace conditioning in newborn infants by measuring heart rate deceleration in response to a conditioned stimulus (tone) and in anticipation of an unconditioned stimulus (blinking lights). Females, but not males, showed heart rate deceleration in response to the conditioned stiumulus and in anticipation of the unconditioned stimulus. Furthermore, the gender effect appeared to be mediated by females' greater heart rate variability. These results suggest that female neonates may be more physiologically reactive, and are hence more likely to acquire learned physiological responses. However, these results should be interpreted cautiously for two reasons. First, it is not clear whether data obtained from neonates reflect processes occurring in adults. Second, the conditioned response was heart rate deceleration, not acceleration; hence, similar results might not have been found for a more fear-congruent response. In an investigation of gender differences in fear conditioning among undergraduate volunteers, Fredrikson, Hugdahl, and Öhman (1976) paired electric shock with slides of fear-congruent (snakes and spiders) and fear-incongruent (flowers and mushrooms) stimuli. Females evidenced significantly greater anticipatory electrodermal responses to phobic slides than to neutral slides, with the opposite pattern seen among males. This finding might suggest greater susceptibility to fear conditioning among females. However, the gender difference disappeared when range correction was used, suggesting that the effect may be due to greater overall physiological reactivity among females rather than genuine differences in fear conditioning. Furthermore, the gender difference disappeared alto-

gether during an extinction phase, indicating that any gender differences were transitory. Clearly, more research is needed in gender differences in conditionability of fear responses. Nevertheless, these results provide an interesting perspective about gender differences in cognitive appraisals that we noted in our sample of trauma survivors.

After a Traumatic Event, Do Males and Females Hold Different Beliefs about Themselves and the World?

According to Foa and Rothbaum (1998), dysfunctional schemas about the self and the world underlie the development of PTSD symptoms. These schemas can be inferred by the presence of negative beliefs about the self, such as "I am totally incompetent," and negative beliefs about the world, such as "The world is completely dangerous." We next examine whether male and female trauma victims differ according to these beliefs.

Are Female Trauma Victims More Likely Than Male Victims to View Themselves as Incompetent?

To investigate gender differences in self-schemas following a trauma, we reanalyzed data from the PTCI's Negative Cognitions about Self scale (Foa et al., 1999). Items on this scale include "I am a weak person" and "I can't trust myself." Among those whose index events did not meet both DSM-IV criteria for a trauma, there was a nonsignificant trend for females to endorse more negative self-beliefs than did males ($p < .08$, $r = .13$). Among participants whose index event met criteria for a trauma, the difference was significant, with females endorsing more negative self-beliefs than did males ($p < .05$, $r = .14$). There were no gender differences when participants were separated according to type of trauma; therefore, we cannot rule out the alternative explanation that gender differences in negative self-schemas resulted from different trauma experiences.

Are Female Trauma Victims More Likely Than Male Victims to View the World as Dangerous?

To investigate gender differences in world schemas following a trauma, we reanalyzed data from the PTCI's Negative Cognitions about the World scale (Foa et al., 1999). Items from this scale include "I have to be on guard all the time" and "The world is a dangerous place." Among those whose index events did not meet DSM-IV criteria for a trauma, females endorsed significantly more negative world statements than did males ($p < .05$, $r = .17$), indicating a higher degree of negative world-related thoughts. Similar

results were obtained for those whose index event met criteria for a trauma, with females endorsing significantly more negative world beliefs than did males ($p < .05$, $r = .16$). Small cell sizes prevented accurate comparisons within many types of trauma, as was the case with the Negative Cognitions about Self scale. However, there was a significant gender difference for the larger sample of participants that experienced nonsexual assault by a stranger, with females endorsing significantly more negative world beliefs than did males ($p < .05$, $r = .45$). Thus, world schemas of female trauma victims appear to be more negative (e.g., beliefs that the world is dangerous) than are those of male victims. However, as was the case with self-schemas, it is not clear whether this difference reflects a direct effect of gender or of severity of trauma. More research is needed in order to determine the extent to which this is dependent on the type of trauma experienced.

SUMMARY AND CONCLUSIONS

Several studies indicate that although males generally report a greater number of traumatic experiences than females, overall, they have a lower prevalence of PTSD. In this chapter, we have attempted to account for this gender difference using Foa and colleagues' cognitive model of trauma processing (Figure 3.3). Our first question was whether males and females differ in terms of their trauma memory record. The available data seem to indicate that this may be the case. Females are much more likely than males to experience sexual forms of assault such as rape and CSA. Males, on the other hand, are more likely than females to experience traumas such as combat, motor vehicle accidents, and nonsexual assaults. It seems reasonable to conclude that these different traumas are represented differently in memory. Indeed, rape, particularly, appears to have a high probability of eliciting PTSD in both male and female victims. However, whereas this factor seems to contribute substantially to gender differences in PTSD prevalence, it does not appear to be the sole explanation for this difference, because females are more likely than males to meet criteria for PTSD after traumas other than rape, such as a motor vehicle accident or disaster, and because combat may be as equally likely to elicit PTSD as is rape. Data from our own research and that of others suggest that females' trauma records may contain a stronger element of self-blame for the trauma. However, it is not known whether this represents a direct effect of gender or differences in the type of trauma experienced (e.g., rape may elicit more self-blame than does a motor vehicle accident in both males and females).

Next we examined whether the self- and world schemas of males and females are affected differently by trauma. Data from our own research

suggest that female trauma victims hold more negative beliefs about themselves and their abilities. However, this finding was confounded by type of trauma. An alternative hypothesis is that rape victims' self-schemas are more strongly affected than are those of motor vehicle accident victims. More research is needed to parse out these factors. Our research found stronger support for the hypothesis that female trauma victims are more likely to view the world as dangerous than are male trauma victims. Preliminary evidence suggests that this cannot be attributed solely to the type of trauma experienced. Thus, the perception of the world as dangerous may mediate gender differences in PTSD. It is important to note, however, that any mediating variables appear most influential with less severe forms of traumas. With extremely severe traumas (e.g., rape, combat) the data are more mixed, with some studies showing PTSD rates among males that are comparable to or greater than those of females. Perhaps the extreme severity of some traumas can outweigh the effects of other predictor variables such as gender. More research should examine whether the pattern is linear (i.e., each incremental increase in trauma severity narrows gender differences by the same degree), or nonlinear (e.g., trauma severity overshadows other mediators only past some threshold of severity).

In conclusion, it appears that the cognitive model of PTSD can provide useful information about potential mediators of gender differences in the prevalence of PTSD. Males and females tend to be exposed to different forms of trauma; this creates differences in trauma memory records that may account for much (but not all) of the difference. Furthermore, once a trauma has been experienced, males and females differ in terms of their cognitive schemas. Specifically, females appear more likely to blame themselves for the trauma, to hold more negative views of themselves, and to view the world as more dangerous than do male trauma victims. This may be due in part to differences in the trauma itself, or it may be due to other gender-specific factors that have not yet been identified. The net effect of these cognitive differences is that males are less likely than females to develop PTSD following a trauma.

The cognitive model of gender differences in PTSD has raised at least as many questions as answers. One of the most pressing questions is whether gender differences in cognitive response are independent of gender differences in traumatic experience. Additional research is needed that assesses trauma attributions, self-schemas, world schemas, and PTSD symptoms among males and females exposed to similar traumas. Another issue concerns pretrauma beliefs about one's self and the world. Longitudinal research examining the presence of rigid, positive or negative beliefs may identify gender differences in these factors that contribute to vulnerability to develop PTSD. Finally, the cognitive model may be used to identify gender differences in posttraumatic responses other than PTSD, such as substance abuse, externalizing behaviors, and somatic problems.

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