EXPOSURE THERAPY FOR COMBAT-RELATED PTSD: A CRITICAL REVIEW

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ABSTRACT. This review critically examines the treatment outcome literature using exposure treatment for combat-related Posttraumatic Stress Disorder (PTSD). Although the current literature is quite underdeveloped, available data suggest that exposure is superior to wait-list controls and "standard treatment." In particular, exposure treatment results in decreased symptoms of intrusive images, cognitions, and physiological arousal. Treatment gains are maintained for as long as 6 months. Limitations of current studies, important procedural variables, patient characteristics, and issues of measurement are highlighted. Finally, efficacy of exposure alone as a treatment for PTSD and the need for addition of other behavioral treatment strategies to exposure is discussed.

IN WORKING TOWARD a comprehensive understanding of the relevant issues about exposure therapy for combat-related Posttraumatic Stress Disorder (PTSD), the current review will examine the diagnostic and clinical syndrome, empirical data from psychophysiological studies, the rationale for the use of exposure based treatment, data from the few available exposure therapy outcome studies, and limitations of those studies. Finally, future directions for clinical research will be addressed.

THE DIAGNOSTIC AND CLINICAL SYNDROME OF COMBAT-RELATED PTSD

It was not until 1980 that the Diagnostic and Statistical Manual of Mental Disorders (DSM-III; American Psychiatric Association, 1980) formally defined and included PTSD as an
Axis I anxiety disorder. In DSM-IV (American Psychiatric Association, 1994) there are six basic criteria to be met: (1) the historical antecedent of a traumatic event that involves both actual or threatened death or serious injury, and an intense response of fear, helplessness, or horror; (2) the traumatic event is persistently reexperienced through intrusive memories, dissociative flashbacks, recurrent distressing dreams, and/or psychological or physiological reactivity upon exposure to associated cues; (3) an avoidance of stimuli associated with the event, or a numbing of general responsiveness, including efforts to avoid thoughts and feelings related to the trauma, efforts to avoid activities or situations that arouse recollections of the trauma, loss of interest in significant activities, social detachment, and/or reduced affect; (4) persistent symptoms of increased arousal such as hypervigilance, sleep disturbance, irritability or outbursts of anger, impaired concentration, and/or exaggerated startle response; (5) duration of the disturbance for at least 1 month; (6) the disturbance causes clinically significant distress or impairment in social, occupational, or other important areas of functioning.

Although many of the PTSD symptoms listed in DSM-III-R (American Psychiatric Association, 1987), and contained in DSM-IV, were included primarily on the basis of extensive clinical experience, a number of studies have provided empirical support for the inclusion of most symptoms as valid diagnostic criteria (Keane, Wolfe, & Taylor, 1987; Kuhne, Baraga, & Czekala, 1988; Nezu, & Carnevale, 1987). It has been suggested that depression, guilt, and anger, which are listed by DSM-IV as "associated features," be included as major signs of the disorder (Silver, & Iacono, 1984). Although these emotions are frequent concomitants of PTSD, more recent data suggested that inclusion of these symptoms as diagnostic criteria would lessen the discriminative validity of the diagnostic category (Kuhne et al., 1988).

Accurate diagnosis of combat-related PTSD often can be complicated by the existence of concurrent disorders, especially major depression and substance abuse, and the problem of symptom overlap. Combat-related PTSD typically is accompanied by multiple comorbid Axis I and II disorders including Substance Abuse (73–84%), Major Depression (26–68%), Antisocial Personality Disorder (26–31%), and Dysthymia (21–34%) among others (Keane, Gerardi, Lyons, & Wolfe, 1988; Keane & Wolfe, 1990; Sierles, Chen, McFarland, & Taylor, 1983). Most studies of comorbidity used structured interviews for assessing Axis I disorders, and presented reasonably good interrater reliability data. Assessment of Axis II disorders is a more recent phenomena. Southwick, Yehuda, and Giller (1993) used the Personality Disorder Examination (Loranger, Susman, Oldham, & Russakoff, 1988) to assess personality disorders in 34 combat veterans with PTSD. They found high rates of character disorders across all three DSM-III-R clusters, with 76% meeting criteria for Borderline Personality Disorder. This finding is supported by data from psychometric studies (Hyer, Davis, Albrecht, Boudewyns, & Woods, 1994; Robert et al., 1985; Sherwood, Funari, & Piekarski, 1990) suggestive of high levels of characterological disturbance, particularly with Borderline, Passive–Aggressive, Schizoid, Antisocial, and Avoidant features. Nevertheless, the true extent and nature of personality disorder in combat veterans with PTSD is not understood currently and further study of Axis II psychopathology would be beneficial in delineating the role it plays in etiology as well as treatment.

Many PTSD symptoms, such as impaired concentration, sleep disturbance, irritability, social avoidance, and sense of foreshortened future are also found in other disorders. Further, additional debilitating features commonly associated with combat-related PTSD (e.g., unemployment, marital and family discord, impulsive or violent behavior, and guilt) also may be related to other types of acute mental disorders or personality variables. What seems to distinguish PTSD from other affective or anxiety
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Disorders is the reexperiencing symptoms (vivid nightmares, intrusive memories, and/or dissociative flashbacks) and the associated physiological reactivity and acute emotional distress (e.g., Foa & Riggs, 1995; Orr et al., 1990). Interestingly, these are also the symptoms most resistant to intervention. Epidemiological estimates of combat-related PTSD vary somewhat, although most put the lifetime prevalence of the disorder between 15% and 30% (Center for Disease Control, 1988; Kulka et al., 1988).

Physiological Characteristics

One common problem with the diagnosis of PTSD is that the reexperiencing of symptoms constitutes a private phenomenon that is difficult to reliably assess or observe. However, an individual's reaction to trauma-related stimuli can be determined. A brief review of the information collected in psychophysiological studies of combat-related PTSD will be helpful to provide a more complete understanding of the disorder, and to delineate the strong case for use of exposure based therapy strategies. It also will provide some clues as to how effective measurement of therapeutic change may be conducted because psychophysiological measures can be used as valuable outcome variables.

Data from studies examining psychophysiological responding in combat veterans with PTSD have produced salient and consistent results. Most notable is the basic finding of heightened reactivity in combat veterans with PTSD to trauma-related cues as compared to combat veterans without PTSD (e.g., Blanchard, Kolb, & Prins, 1991; McFall, Murburg, Roszell, & Veith, 1989; Orr, 1990; Orr et al., 1990; Pitman, 1993). Typically, standardized trauma related audio-visual cues (combat sounds and pictures) are presented while physiological responses such as blood pressure (BP), heart rate (HR), forehead electromyogram (EMG), or galvanic skin response (GSR) are measured. Combat veterans with PTSD produce significantly larger BP and HR responses during cue exposure than do combat veterans without PTSD, while EMG and GSR have proven to be less reliable for purposes of differentiation (e.g., Blanchard, Kolb, Pallmeyer, & Gerardi, 1982; Blanchard, Kolb, Gerardi, Ryan, & Pallmeyer, 1986; Blanchard, Kolb, Taylor, & Wittrock, 1989; Pallmeyer, Blanchard, & Kolb, 1986).

A variation of this methodology uses script driven imagery to assess physiological reactivity. Typically, short scripts (30 seconds), developed from veteran's traumatic and nontraumatic experiences, are presented while physiological responses are assessed. Results from several studies have shown that combat veterans with PTSD show larger HR, GSR, and EMG responses during presentation of traumatic imagery than nonPTSD combat veterans (Orr, Pitman, Lasko, & Herz, 1993; Pitman et al., 1990; Pitman, Orr, Forgue, De Jong, & Claiborn, 1987; Shalev, Orr, & Pitman, 1993). In general, then, psychophysiological measures appear to provide strong discrimination between combat veterans with and without PTSD. Sensitivities and specificities for the studies cited above ranged from 70–90 and 80–100, respectively. Additionally, there is evidence to suggest that measurement of psychophysiological reactivity may provide relatively good discrimination even when individuals are attempting to exaggerate or disguise their responses (Gerardi, Blanchard, & Kolb, 1989; Orr & Pitman, 1993).

Interestingly, differences in autonomic reactivity to nontraumatic laboratory stressors or images between veterans with and without PTSD have not been reported (Blanchard et al., 1986; Blanchard et al., 1989; Orr et al., 1993; Pallmeyer et al., 1986; Shalev et al., 1993). Thus, the specificity of reactivity in PTSD patients appears similar to that of individuals with simple phobia (McNeil, Vrana, Melamed, Cuthbert, & Lang, 1993), and quite different from the lack of responsiveness to feared imagery shown by individuals with panic disorder (Cook, Melamed, Cuthbert, McNeil, & Lang, 1988).
Despite the above findings, existence of tonic elevations in PTSD still is somewhat equivocal. Although there is evidence to suggest that veterans with PTSD exhibit higher levels of cardiovascular arousal (e.g., HR and BP) than controls across settings (e.g., Blanchard, 1990; Gerardi, Keane, Cahoon, & Klauminzer, 1994), Blanchard (1990) noted that much of the literature examining this issue was flawed. Baseline recordings of resting physiological levels often occurred in sessions prior to exposure to trauma-related stimuli. In one study where combat veterans with PTSD were compared to controls, and where neither group was expecting trauma cue exposure, resting HR and BP levels did not differ significantly between the two groups (McFall, Veith, & Murburg, 1992).

TREATMENT OF COMBAT-RELATED PTSD

The treatment outcome literature for combat-related PTSD contains a number of psychosocial and pharmacological studies involving a broad range of theoretical approaches, treatment modalities, and target goals (e.g., Foy, 1992; Friedman, 1988; Hyer, McCranie, & Peralme, 1993; Solomon, Gerrity, & Muff, 1992). To date, no consensus has emerged concerning the best approach for addressing the myriad symptoms associated with this severe emotional illness (Frueh, Mirabella, Chobot, & Fossey, 1994). This is true, in part, because few existing studies represent carefully controlled clinical trials (Motta, 1993). Among the extant approaches, behavioral treatments, emphasizing various methods of intensive exposure (e.g., flooding), have been the most carefully studied and have shown the most promise to date. Unfortunately, even this area of the literature is quite underdeveloped, with only a handful of existing empirical studies. A critical review of such exposure studies should be of general interest because exposure is virtually the only psychosocial treatment with any reasonable outcome data. Although these studies have been conducted primarily with Vietnam veterans, the data should be useful for veterans from other conflicts as well.

RATIONALE FOR EXPOSURE THERAPY

Mowrer's two factor theory (1947, 1960) of fear and avoidance behavior development is a viable model for understanding how the symptomatic behaviors of PTSD emerge and persist over time, and is generally consistent with more cognitively oriented theories (e.g., Foa & Kozak, 1986; Foa, Steketee, & Rothbaum, 1989; Lang, 1968) which account for the phenomena of PTSD in a similar fashion using different terminology. Based on this conceptualization of the pathogenesis of PTSD, several procedures have been recommended for extinguishing or deconditioning the traumatically conditioned symptoms of combat-related PTSD. These include systematic desensitization (SD), which is based on the conditioning of competing responses (i.e., counterconditioning), and intensive exposure therapy (flooding or implosive therapy), which is based on an extinction paradigm where prolonged or massed exposure to aversive stimuli leads to anxiety and fear reduction. This review will focus almost entirely on the literature for intensive exposure therapy because SD has received only limited attention from clinical researchers.

Regarding intensive exposure, although the terms flooding and implosion often are used interchangeably, and they both are based on extinction paradigms, there are some procedural and theoretical differences between the two strategies. According to the learning theory principles upon which they are based, flooding (continuous presentation of in vivo or imaginal trauma-related stimuli) and implosive therapy (an
extension of flooding, incorporating exposure to hypothesized psychodynamic cues) lead to a reduction of fear and anxiety responses, as inherently safe fear-related cues are presented in the absence of any actual threat. This allows for the conditioned response to be extinguished (Baum, 1970; Boudewyns & Shipley, 1983; Foa & Kozak, 1986; Levis, 1980; Levis & Hare, 1977; Stampfl & Levis, 1967). Obviously, in vivo presentation of war zone trauma cues is accomplished through use of stimuli associated with the trauma (e.g., helicopter sounds, AK-47 gunfire) rather than actual experience. Thus, flooding and implosive therapy usually are conducted via presentation of script driven imagery or reproduced in vivo cues related to an individual's traumatic experiences.

Several detailed descriptions of flooding and implosive therapy techniques have been offered (e.g., Baum, 1970; Boudewyns & Shipley, 1983; Levis & Hare, 1977; Lyons & Keane, 1989; Stampfl & Levis, 1967). Both procedures are based upon the principle of extinction. However, there are a number of differences and inconsistencies between various descriptions of the procedure as it is applied to the treatment of combat veterans. Also, several authors use the terms flooding and implosive therapy interchangeably, which is perhaps understandable given that even Levis and Hare (1977), in their extensive description of implosive therapy, do the same. Although Levis and Hare (1977) ultimately do draw distinctions between the two forms of exposure, others do not (e.g., Garfield, 1974). This confusion of terminology is more than a rhetorical problem because it is accompanied by procedural differences across outcome studies. Some authors reported use of exposure to therapist hypothesized cues (e.g., feelings of guilt, fear, anger), while others only described use of cues associated with actual reported events. For purposes of this paper we will adopt the phrase exposure therapy as a general term for the category of treatments, and will differentiate between intensive exposure (e.g., flooding) and graduated exposure (e.g., systematic desensitization). Furthermore, when we use the term extinction within the context of intensive exposure therapy, we are referring to the process of using trial durations that are sufficiently long for anxiety to diminish, rather than the Pavlovian definition of extinction via presentation of a series of CS-alone trials. We now turn to the literature evaluating use of these strategies with combat related PTSD.

TREATMENT OUTCOME WITH EXPOSURE BASED THERAPIES

Single Case Studies With Exposure Therapy

Examination of a number of single case studies will provide an effective introduction to use of exposure therapy with combat-related PTSD because they detail how the procedure might be used with this population, and demonstrate moderate to excellent therapeutic success using a variety of outcome measures and designs. Keane and Kaloupek (1982) used imaginal flooding to treat the anxiety symptoms of a 36-year-old, divorced black male Vietnam combat veteran during a 22-day inpatient psychiatric hospitalization. Presenting problems included alcohol abuse, panic attacks (2–3/week), catastrophic nightmares (2/week), insomnia, flashbacks, depression, social anxiety, and vocational problems. The patient identified three specific traumatic events that he reexperienced with great distress on a frequent basis. From these events, three exposure scenes were constructed. Following baseline, treatment sessions were 90 minutes long and included the following: 10 minutes of relaxation during which baseline physiological measurements were taken, and approximately 40 minutes of scene presentation. The description of treatment does not specify how the other 40 minutes of the session were used.
The patient completed daily self-monitoring of anxiety levels, hours of sleep, frequency of nightmares/flashbacks, and the Spielberger State-Trait Anxiety Inventory (STAI) before each therapy session. In addition, in-session heart rate reactivity was recorded. A multiple baseline design across sessions was used to assess treatment outcome over the 22-day hospitalization. Results indicated a marked decrease in anxiety on subjective ratings and the STAI. Daily self-monitoring of sleep went from a baseline of 0 to just below 7 hours a night, and nightmares/flashbacks were reduced dramatically. Furthermore, heart rate measures declined from pre- to posttest for each of the scenes, including Scene 3 which was not directly treated. The authors hypothesized that the observed treatment generalization to Scene 3 may have occurred because the assessments themselves functioned as active treatment, and the scene contained cues similar to the first two scenes that were treated (i.e., treatment generalization). Follow-up assessment after 3 and 12 months found that the patient continued to report only low levels of anxiety, had only rare nightmares and flashbacks (e.g., 1 every 2 months), was not engaging in abusive alcohol drinking, was not using anxiolytic medication, and was gainfully employed.

Another single case study (Fairbank & Keane, 1982) examined the extent to which extinguished anxiety to one traumatic memory generalized to other traumatic memories. Using a multiple baseline design across memories, Fairbank and Keane treated two Vietnam combat veterans with PTSD, each with multiple traumatic experiences. Assessment included Subjective Units of Distress (SUDS) ratings for both patients, frequency of skin conductance responses (SCR), and heart rate for one patient. Treatment consisted of 60–120 minutes of imaginal flooding to specific combat scenes, although the authors cited the implosive technique detailed by Levis (1980). Only one scene was presented during each treatment session, and each scene was used only one time. The sequence of scene presentation was determined randomly. The authors concluded that the imaginal flooding procedure was successful in leading to significant decreases of reported anxiety, nightmares, flashbacks, and physiological arousal, but that generalization from one traumatic scene to another occurred only when the two scenes were similar to each other in the nature of their events.

Mueser, Yarnold, and Foy (1991) treated four Vietnam combat veterans with 4–17 imaginal exposure sessions that lasted between 45 and 120 minutes. Outcome measures included self-report inventories, self-monitoring ratings and heart rate measurements. Using statistical procedures for single case designs, it appears that two patients improved significantly, maintaining improvement at 3- and 15-month follow-ups. One veteran improved marginally and one veteran’s symptoms worsened after treatment.

Several other single case studies and reports also support use of exposure with WWII veterans (Black & Keane, 1982), use of exposure in combination with antidepressant medications (Mirabella, Frueh, & Fossey, 1995), and self-directed exposure (Frueh, in press).

Conclusions From Single Case Studies

In summary, these single case studies demonstrate that exposure therapy could be used to successfully treat symptoms of anxiety, fear, and physiological arousal associated with PTSD and provided the impetus for subsequent group comparison studies. The outcome reported in these studies is particularly impressive due to a number of factors which may have limited the overall efficacy of the treatments implemented. First, the amount of time patients were exposed to trauma related cues was relatively short, ranging as low as 40 minutes per session. Generally, it is recommended that
scene presentation in exposure therapy for anxiety disorders last until significant reduction in anxiety has occurred within each session, which often takes 120–150 minutes in initial sessions (Levis & Hare, 1977; Turner, Beidel, & Jacob, 1994). If sessions are not conducted until within session extinction is achieved, the general recommendation is that exposure be maintained for at least 90 minutes (Craske, Rapee, & Barlow, 1992). A second limitation of these studies is the number of treatment sessions used. Typically, exposure treatment for anxiety disorders requires approximately 20 sessions for maximum efficacy (e.g., Levis & Hare, 1977; Turner et al., 1994; Turner, Beidel, Long, & Greenhouse, 1992), somewhat longer than was carried out in most of the single case studies.

Finally, although several studies indicated that implosive therapy was used, each of them deviated from the prescribed procedures for implementing the technique (e.g., Levis, 1980; Levis & Hare, 1977) in two ways. First, hypothesized psychodynamic cues were not used (or reported) as is typical for implosion (i.e., the treatment might best be described as “flooding”), and therefore it was unclear whether “core fears” were accessed by the exposure scenes. The second variation was use of relaxation techniques in conjunction with exposure. These issues will be revisited in discussing the group comparison studies that follow.

Group Outcome Studies With Exposure Therapy

In the initial randomized clinical trial, Keane, Fairbank, Caddell, and Zimering (1989) compared “implosive (flooding) therapy” to a waiting-list control. Twenty-four Vietnam combat veterans were randomly assigned to either an exposure therapy group or a wait-list control group. Both groups received therapist ratings of PTSD symptom severity at pre and posttreatment and completed standard psychological inventories, including the Beck Depression Inventory, Zung Depression Scale, MMPI, Spielberger State and Trait Anxiety Inventories, Fear Survey Schedule, and a measure of social adjustment developed for use in this study. The control group was reassessed an average of 4.5 months later, and the exposure therapy group was reassessed after therapy was concluded. The two groups did not differ from each other on demographic variables of age, education, marital status, race, service branch, enlistment status, service connected status, or degree of combat exposure, nor did they differ from each other on psychometric instruments prior to treatment.

The eleven subjects in the experimental group received 14–16 exposure therapy sessions from one of four individual therapists. Of this group, four were inpatients, while seven were outpatients; and six received some form of anxiolytic, sleep, or pain medication at some point during the treatment phase. Before treatment began, traumatic memories were identified using the Jackson Structured Interview for PTSD (Keane, Fairbank, Caddell, Zimering, & Bender, 1985). Therapy then began with two to three sessions of relaxation training before the exposure component was introduced. The authors noted the seemingly paradoxical use of relaxation training in an extinction based paradigm. However, they justified its inclusion on the grounds that it facilitated use of exposure techniques by teaching patients that they can have some control over their feelings, giving them a skill to help manage anxiety outside of therapy, enhancing the vividness of imagery, and allowing a more rapid return to baseline levels of arousal once the exposure component was completed. Typical therapy sessions were approximately 90 minutes in length, with 15 minutes for “recounting inter-session activities,” 10 minutes of relaxation, 45 minutes of exposure, 10 minutes of relaxation, and 10 minutes of “integrating any new information or emotions.” The
primary focus of the exposure procedure was the "gradual" presentation of trauma-related cues in context of the entire event. This included the time prior to, during, and after the event, with inclusion of details about the patients' behavioral, cognitive, and physiological responses during each of the three phases of the event. In addition, hypothesized cues were incorporated into the scenes, although the nature of these cues was not specified. With regard to the control group, 10 of the 13 subjects received some form of anxiolytic medication, and many were treated by Vet Center programs or continued to see psychiatrists in a Mental Hygiene Clinic while they waited for specialized PTSD treatment.

At posttreatment, the exposure therapy group was significantly lower than the control group on the Beck Depression Inventory, but not on the Zung Depression Scale; lower on the Spielberger State Anxiety Inventory, but not on the Trait Anxiety Inventory; lower on the Fear Survey Schedule; lower on several of the MMPI scales (1, 2, & 3); and lower on therapist ratings of startle responses, memory and concentration, depression, anxiety, impulsivity, irritability, and legal problems. The noted reduction in symptom severity across dependent measures was maintained at the 6-month follow-up. Furthermore, none of the subjects in the exposure therapy group showed adverse effects from the treatment. Significant differences were not found for therapist ratings of emotional numbing or sleep disturbance; nor were they found on any of the social adjustment measures.

Keane et al. (1989) concluded that exposure therapy, when compared to a "waiting-list" control group (receiving treatment in other clinics), produced "both statistically and clinically meaningful changes in some Vietnam veterans with combat-related PTSD" (p. 256). They noted several limitations of their study, including the small sample size in each group, the failure to examine for the possibility of a drug/psychotherapy interaction, the lack of control for the possibility that therapist contact time was responsible for the differences between groups, and the absence of information regarding possible comorbid diagnoses. Because therapists were not blind, therapist ratings may have been biased by knowledge of the subjects' condition. Also, although there clearly were therapeutic gains, the patients showed no improvement in one of the central features of PTSD (emotional numbing), as well as in sleep disturbance and social adjustment. Thus, it appears that the treatment was only partially efficacious.

Two other studies (Boudewyns & Hyer, 1990; Cooper & Clum, 1989) have used similar methodology to evaluate the efficacy of imaginal flooding in the treatment of combat-related PTSD. Cooper and Clum (1989) compared the outcome results of seven patients who received both imaginal flooding and "standard" treatment (traditional psychotherapeutic and pharmacological approaches) to a control group of seven patients who received standard treatment only. A yoked design ensured that the two groups were similar with respect to race, age, marital status, combat exposure, comorbid diagnoses, and psychotropic medication usage. Patients in each group participated in weekly 1-hour individual therapy sessions, and weekly 2-hour group therapy sessions. In addition, subjects in the imaginal flooding group received 6–14 flooding sessions that ran for a maximum of 90 minutes each. The number of sessions received "was determined by the successful reduction of anxiety responses (self-report of three or less on the SUDS scale) to all accessible traumatic scenes" (p. 384). Cues triggering relatively low anxiety were targeted first, and relaxation procedures were used to end sessions where anxiety reduction was not achieved after 90 minutes of exposure. Dependent measures included self-monitoring (of flashbacks, hours of sleep, nightmares, and intrusive thoughts), the BDI, the Modified Vietnam Experiences Questionnaire, a Behavioral Avoidance Test, the Spielberger
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State and Trait Anxiety Inventories, and heart rate during scene presentation. Results showed that the implosive therapy group generally showed significant improvement as compared to the control group on most measures, but especially on indices of reexperiencing and sleep disturbance. There was no difference for heart rate, and only minimal differences were found for symptoms of trait anxiety, depression, and violent tendencies. The authors concluded that imaginal flooding was likely an important component of PTSD treatment and should be used to supplement other standard approaches.

Boudewyns and Hyer (1990) used a comprehensive set of physiological recordings (heart rate, EMG, and skin conductance) and self-report inventories as outcome measures. They randomly assigned 51 psychiatric inpatient combat veterans with PTSD to either an exposure therapy group or an individual counseling control group, 38 of whom completed the entire study. Patients with comorbid diagnoses of Antisocial Personality Disorder, psychosis, organic brain syndrome, or dementia were excluded from the study. None of the patients was taking any form of psychotropic medication during their hospitalization. Exposure therapy subjects received two 1-hour treatment planning clinical interviews, followed by 10–12 50-minute sessions of exposure. Subjects in the exposure therapy group showed modest, albeit significant, improvement across most of the psychological and behavioral rating measures when compared to the control group. However, there was no difference between the groups on physiological parameters. Interestingly, regardless of treatment condition, those subjects who did show decreased physiological responding to imaginal scenes after treatment, also showed improvement on psychological inventories at 3-month follow-up. This suggests that reductions in physiological responding was a critical element of efficacious therapy and might be a predictor of long-term treatment success.

An additional study by Boudewyns, Hyer, Woods, Harrison, and McGarrie (1990) supported the conclusion that exposure therapy is an important element of PTSD treatment. In an inpatient milieu therapy setting, patients who received 10–12 50-minute exposure therapy sessions (in addition to the regular coping skills training and group therapy) were more likely later to be classified as therapeutic “successes” than a group who received an equivalent amount of “conventional therapy or counseling.”

Conclusions From Group Outcome Studies

Perhaps the most striking aspect of these group design outcome studies is the fact that there are so few of them, with only four to be found in the literature. Nevertheless, results from this relatively small number of group studies seem to indicate clearly that exposure therapy does have a therapeutic effect in PTSD, particularly when exposure is maintained long enough for within-session extinction to occur. Results from existing studies appear to reveal significant insight into the effects of exposure therapy. First, reductions in nightmares and intrusive symptoms, two core features of PTSD, occurred. Second, imaginal exposure was associated with a reduction of psychophysiological parameters, which is especially important given the findings of Boudewyns, Stwertka, Hyer, Albrecht, and Sperr (1993) that reduction of psychophysiological responses were related to improvement at posttreatment and at long-term follow-up regardless of the treatment strategy used.

Importantly, however, it cannot be determined that exposure is necessarily better than other specific treatments, such as relaxation training, stress inoculation, or pharmacological options because comparisons were not made to these alternative treatment strategies. Additionally, results of these group studies were achieved despite the
fact that exposure may not have been implemented in the most optimal fashion in many cases (i.e., sessions were in most cases of relatively short duration).

In the Keane et al. (1989) study, treatment deviated from traditional exposure therapy procedures by including relaxation training. Although this likely was implemented for clinical reasons, use of relaxation (i.e., a response incompatible with the experience of anxiety) seems to run counter to the theoretical rationale for exposure therapy based on an extinction model. In fact, several studies with other anxiety disorders have shown that distraction can interfere with the extinction process (e.g., Baum, 1987; Levis & Hare, 1977; Rodriguez & Craske, 1993). It is not clear whether relaxation necessarily functions as a distractor. However, certainly there is no empirical support to date for use of relaxation techniques in combination with intensive exposure therapy. Also, average time for exposure within each session was only 45 minutes, well below the usual average of 90 minutes (e.g., Levis & Hare, 1977; Turner, Beidel, & Jacob, 1994). Thus, it seems unlikely that within session anxiety reduction was sufficient to produce maximal reduction of PTSD symptoms over time. Additionally, as noted, therapist ratings were made with knowledge of treatment condition, and differences reported on psychological inventories were unimpressive (especially given the different significance levels used for individual measures and the failure to consider family-wise error rates in the analyses).

Cooper and Clum (1989) acknowledged a problem with generalizability in that their sample was small and the length of treatment was quite short. They improved on previous research by using longer flooding sessions and by including physiological recordings and self-monitoring ratings among their outcome measures. However, they too relied on relaxation to bring about anxiety reduction if it had not occurred through extinction by the end of a certain time period of exposure. Clinically, this may have been a good decision in some cases, but the question remains as to whether using relaxation in this way retards the effectiveness of flooding. Longer sessions sometimes are required to achieve extinction when flooding is used.

The Boudewyns and Hyer (1990) study was perhaps the most rigorous of the three exposure trials discussed because it used a larger sample, and included self-monitoring ratings and physiological measurements. But again, exposure was limited to only 50 minutes (as it was for the Boudewyns et al. [1990] study), and this may have lessened the effectiveness of the exposure treatment, leaving one to speculate what results might have been achieved if exposure sessions were closer to 90 minutes in length, or until within session extinction was achieved.

The four studies examined here represent an important beginning, but further research is needed to advance our understanding of intensive exposure for treatment of combat-related PTSD.

Studies on Other Exposure Based Strategies

Although intensive exposure therapy is the most commonly cited exposure strategy in the combat-related PTSD literature, other treatments using elements of exposure have been suggested. These include systematic desensitization (Bowen & Lambert, 1986; Kipper, 1977), the Koach project (Avraham, Mikulincer, Nardi, & Shoham, 1992; Solomon, Bleich, Shoham, Nardi, & Kardi, 1992; Solomon, Shaley, Spiro, Dolev, Bleich, Waysman, & Cooper, 1992), and eye movement desensitization and reprocessing (EMD/R; Boudewyns, Stwertka, Hyer, Albrecht, & Sperr, 1993; Jensen, 1994; Shapiro, 1989a, 1989b, 1991, 1994).
**Systematic desensitization.** Systematic desensitization has a strong theoretical rationale (Wolpe, 1973), and well accepted treatment strategy for specific phobias, but very little empirical data has been reported on its use with PTSD. This lack of research could be due to the belief that SD does not lend itself very well to the intense nature of anxiety-provoking cues in veterans with PTSD because many believe that memories of combat situations are so powerful that they do not allow for gradual presentation or for maintenance of relaxation on the part of the patient. However, the present authors have treated combat-related PTSD with SD as the primary intervention with positive results, and there is some empirical evidence supporting its efficacy in the treatment of rape victims (e.g., Turner & Frank, 1981). Further, the speculation about difficulties using SD with this populations has not been demonstrated empirically.

**The Koach project.** The Koach project for treatment of combat-related PTSD was an ambitious residential program sponsored by the Mental Health Department of the Israel Defense Forces (IDF) Medical Corps. This treatment project incorporated a strong element of in vivo exposure to military stimuli among its treatment components (Avraham et al., 1992; Bleich, Shalev, Shoham, Solomon, & Kotler, 1992; Solomon, Bleich et al., 1992; Solomon, Shalev et al., 1992). Participants were combat veteran members of the IDF suffering from “war-induced psychopathology,” who spent one month at a military base camp and were treated by a group of “commander-therapists” who also were combat veterans. Treatment consisted of behavioral and cognitive interventions (e.g., goal setting, cognitive reframing, relaxation training, assertiveness training, gradual exposure to anxiety-provoking stimuli) in a supportive milieu environment. Participants were “pressured” into overcoming avoidance and actively doing the things they feared (e.g., shooting a gun, sleeping in military tents, wearing uniforms, and performing other routine military duties). Despite the fact that in vivo exposure was a major component of the treatment program, specific exposure procedures were not described carefully. However, it was evident that in vivo exposure took the form of successful completion of feared activities only, without any attempt to extinguish distress arising from those activities.

Unfortunately, although there was some subjective evidence that therapists and participants initially thought the Koach experience was helpful (Shalev, Spiro, Solomon, Bleich, & Cooper, 1992; Solomon, Spiro et al., 1992), psychometric data and long-term follow-up did not support the efficacy of the program (Solomon, Shalev, Spiro, Dolev, Bleich, Waysman, & Cooper, 1992). In fact, 9 months after treatment Koach participants actually were worse than a control group that received no therapy at all during that time. Possible reasons for the failure of this treatment program are many (Bleich et al., 1992), but perhaps the most obvious explanation may be that exposure was not administered in a manner consistent with the underlying rationale of extinction or counterconditioning. Thus, procedures deviated significantly from the main principle of flooding or implosive therapy and may, in fact, have created a situation where participants were actually sensitized to traumatic cues, accounting for the subsequent deterioration in their conditions that was noted later.

**Eye movement desensitization and reprocessing (EMD/R).** EMD/R is a controversial new treatment strategy, combining multisaccadic eye movements with a cognitive and exposure element. Unfortunately, its theoretical rationale is poorly developed, and the outcome data are limited and inconsistent. Although Shapiro, the founder of the technique, reported several successful case studies (1989b; 1991), and a group comparison study (1989a), she primarily has relied on the subjective reports of her
patients as evidence of treatment efficacy. Randomized clinical trials using combat veterans comparing EMD/R to control groups showed that EMD/R subjects reported decreased immediate subjective distress, but did not differ significantly from controls on standardized measures (Boudewyns et al., 1993; Jensen, 1994). It is possible that whatever therapeutic success EMD/R may be shown to have is due to the limited element of exposure incorporated into the procedure. In fact, some authors (Boudewyns et al., 1993; Skeketee & Goldstein, 1994) have postulated that the technique may be comparable to exposure therapy, such as systematic desensitization, with the rapid eye movements functioning as the reciprocally inhibiting response. For a more comprehensive literature review and discussion of relevant issues regarding empirical validation and dissemination of knowledge regarding the EMD/R technique, see Acierno, Hersen, Van Hasselt, Tremont, and Meuser (1994).

Conclusions From Studies of Other Exposure Based Strategies

Studies on other exposure based strategies provide some insights into several important parameters about the practical implementation of exposure. It seems apparent from the Koach project that mere exposure outside of a structured and systematic framework is insufficient to bring about therapeutic change. In other words, exposure must address specifically the relevant parameters of the trauma and must be maintained long enough to allow for reductions in anxiety, otherwise veterans may become sensitized by the exposure and experience increased symptomatology, as was the case with many of the Koach participants. This has clear implications for use of “psychodramas,” a strategy popular with many inpatient facilities, wherein patients “act” out their traumatic events one or two times. In all likelihood, this degree of exposure is insufficient and may serve to exacerbate anxiety and fear. Regarding use of EMD/R and SD, adequate controlled studies are almost nonexistent at this point, but may be worth further investigation, particularly as alternative methods of exposure for patients unsuitable for or unwilling to try more intensive forms of exposure.

METHODOLOGICAL AND PROCEDURAL ISSUES

As noted above, the treatment outcome literature for PTSD is quite underdeveloped compared to other anxiety disorders, with only four extant group comparison studies. These studies, as important as they are, are marked by methodological and procedural limitations, most notably the short amount of time devoted to actual exposure within sessions, the inclusion of theoretically contradictory techniques (i.e., relaxation), and lack of long-term follow-up. Thus, outcome data at this time are incomplete. Furthermore, a number of important issues pertaining to the practical implementation of exposure therapy, and the manner in which it is best combined with other treatment strategies, have yet to be examined systematically with adequate measurement strategies.

Patient Characteristics

Virtually no studies exist on patient characteristics that might interact either positively or negatively with exposure treatment for PTSD. In a survey of 18 clinicians “recognized nationally for their use of (exposure therapy) with PTSD,” Litz, Blake, Gerardi, and Keane (1990) found general agreement that patients with certain characteristics were not appropriate for exposure therapy. These characteristics included comorbid disorders of psychosis, substance abuse, or cognitive deficits; Axis II pathology, particularly Borderline and Antisocial Personality Disorders; a history of treat-
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ment noncompliance; an inability to image; "unresolved life crises"; and poor physical health, especially disorders of the circulatory system.

Unfortunately, no published studies have attempted to systematically examine these potential exclusionary criteria for exposure therapy with veterans suffering combat-related PTSD. Clinical lore from the literature on phobic and obsessive-compulsive disorders (e.g., Jenike, Baer, Minichiello, Schwartz, & Carey, 1986; Minichiello, Baer, & Jenike, 1987) generally supports exclusion of patients exhibiting the characteristics identified in the Litz et al. (1990) survey, and these were the general exclusion criteria for the Boudewyns and Hyer (1990) study. However, until empirical data are available, a common sense clinical approach should be used in making treatment decisions on a case by case basis. Clinicians are urged not to categorically eliminate all patients meeting one or more of these criteria from consideration for exposure therapy, and to consider the possibility that creative engineering of exposure scenarios may allow the treatment to be applicable and feasible in many of these cases (Frueh, Mirabella, & Turner, in press).

Personality features are of special concern in this population. As with most anxiety disorders (e.g., Klass, DiNardo, & Barlow, 1989), individuals suffering from combat-related PTSD have a high prevalence of Axis II comorbidity (Keane & Wolfe, 1990; Southwick et al., 1993). The impact of these personality factors on treatment outcome needs to be determined, especially since it is clear that some personality characteristics are likely to be more problematic than others. It is possible that exposure therapy may not be suitable for individuals with PTSD and certain personality characteristics (e.g., Litz et al., 1990), although there is evidence that behavioral treatments seem to work with panic disorder, obsessive-compulsive disorder, and social phobia patients with a broad range of Axis II pathology (Barlow, 1994; Feske, Perry, Chambless, Renneberg, & Goldstein, in press; Mavissakalian, Hammen, & Jones, 1990; Turner et al., 1994). Again, the issue is more related to what modifications are necessary to facilitate exposure, rather than if the treatment works.

Potential Risks Associated With Exposure Therapy

Exposure therapy has been thought by some to contain risks above what might be present in other therapies (Kilpatrick & Best, 1984; Litz et al., 1990; Pitman et al., 1991). However, in the studies represented here, there were some patient dropouts and some who failed to improve, but only one reported case of a patient's condition worsening. Furthermore, dropout rates were no higher than would be expected with other treatment strategies, a finding consistent with comparison of dropout rates in studies of exposure for other anxiety disorders and other treatments (e.g., Stanley & Turner, 1995; Turner, Beidel, & Jacob, 1994). It is unclear why the perception of exposure therapy as a risky treatment continues despite data to the contrary. Of course, degree of comfort with intensive exposure is related directly to understanding the theory and having received supervision and experience in its use. Furthermore, patients should be screened carefully prior to treatment to ensure that they do not have any condition which would contraindicate use of exposure. In our view, when precautions are exercised, exposure therapy has few unique risk factors associated with its use. However, we do think it wise to conduct exposure long enough for extinction within session to occur. This ensures that anxiety has abated before releasing the patient from supervision.

Procedural Parameters

Regarding the issue of exposure implementation, there are a host of parameters known to affect therapy outcome that have not been investigated with combat-related
PTSD. For example, exactly how best to engineer the stimulus cue presentation in exposure therapy remains unclear. As previously mentioned, the extant literature often uses the phrases *flooding* and *implosive therapy* interchangably, leading not only to confusion of terminology, but also of treatment procedures. Future studies should attempt to be specific about the exposure therapy terms and stimulus cues that they use. It is unknown whether exposure must address each discrete and actual event, or if anxiety reduction will generalize better with use of “core fears” or certain hypothesized cues. It also is unclear if audio-visual cue presentations are likely to be less or more powerful than imaginal cues, or whether or not they would enhance the exposure sessions. Similarly, little attention has been devoted to whether homework for self-directed exposure can be used to enhance outcome. Also, due to the well documented chronicity of PTSD (e.g., Long et al., 1989), and the time lag between traumatization and treatment, numerous environmental cues not part of the original trauma might have become associated with combat trauma (e.g., crowds, conflict situations, current events portrayed in the media, VA hospitals) through the mechanism of higher order conditioning, and thus might need to be incorporated into exposure therapy sessions.

Session length is another area of concern. Examination of the available literature shows a great deal of variance in average treatment session time for exposure across studies with PTSD, ranging from a low of 45 minutes per session (Keane et al., 1989) to a maximum of 90 minutes per session (Cooper & Clum, 1989). Results from exposure therapy outcome studies with other anxiety disorders (e.g., Craske et al., 1992; Levis & Hare, 1977; Turner, Beidel, & Jacob, 1994) certainly suggest that the exposure phase should last long enough for extinction to occur, often upwards of 120–150 minutes in early sessions. In fact, theoretically this is a critical parameter because sensitization may occur if exposure sessions are ended prematurely. Overall, the average length of exposure needed for most anxiety disorders to be successfully treated appears to be about 90 minutes. But even this might not be long enough for extinction to occur in initial sessions.

Finally, it is believed widely that exposure therapy by itself is not sufficient to treat the broad spectrum of symptoms typical of combat veterans with PTSD (Cooper & Clum, 1989; Keane, 1993). Keane (1993) suggested that exposure therapy should be used after initial stabilization and learning of relaxation/coping skills have taken place. Others have asserted that PTSD patients require separate treatment for “first generational” symptoms (e.g., reexperiencing, physiological reactivity) and “second generational” symptoms (e.g., social and occupational dysfunction), given that 20–30 years typically have elapsed between combat trauma and the delivery of treatment (Johnson, Feldman, Southwick, & Charney, 1994). Because existing studies clearly did not demonstrate that all symptoms were alleviated via exposure, it seems likely that a package of different treatment strategies directed at specific areas of dysfunction is needed to achieve optimal outcome. Certainly, exposure treatment for other anxiety disorders (e.g., social phobia) has been enhanced by the addition of other strategies (e.g., social skills training; Turner, Beidel, Cooley, Woody, & Messer, 1994). Preliminary evidence suggests that social skills training may also enhance exposure in veterans with PTSD (Turner, Beidel, & Frueh, 1995). Furthermore, it is unclear how psychiatric medications or physical settings (inpatient vs. outpatient) may facilitate or complement exposure therapy.

**Outcome Measurement**

Because PTSD consists of multiple symptoms of various types, outcome studies need to use a multidimensional assessment strategy. For example, self-report inventories and
structured interviews may provide evidence of changes in Axis I and core symptomatology, self-ratings may be the best measure of behavioral changes and differences in specific symptoms (e.g., frequency of nightmares), and reduction in psychophysiological variables may provide the most critical index of treatment outcome and prediction of long-term maintenance of treatment outcome. Furthermore, the literature with VA combat veterans indicates that a number of issues will be critical in attempts to determine treatment outcome, including symptom overreporting (e.g., Hyer et al., 1988; Smith & Frueh, in press), malingering (e.g., Fairbank, McCaffrey, & Keane, 1985; Frueh & Kinder, 1994; Lees-Haley, 1989), and compensation seeking behavior (e.g., Atkinson, Henderson, Spar, & Deale, 1982; Frueh, Smith, & Barker, in press; Lyons, Caddell, Pittman, Rawls, & Perrin, 1994). Psychophysiological assessment shows promise in providing an objective measure of change in patients otherwise unaware of or reluctant to admit to therapeutic progress (Gerardi et al., 1989; Orr & Pitman, 1993). Finally, real life changes should be assessed via collateral reports, employment status, psychiatric hospitalization rates, sobriety, and legal status.

**SUMMARY**

There is considerable evidence that intensive exposure to trauma-related cues is beneficial to patients suffering from combat-related PTSD, particularly in alleviating the hallmark features of the disorder: symptoms of intrusion and physiological reactivity to stimuli associated with the traumatic events. At this point, however, the data do not indicate that exposure therapy has a significant effect upon the “negative” symptoms of PTSD, (e.g., avoidance, social withdrawal, and emotional numbing), nor on certain aspects of emotion management (e.g., anger control). Clearly, then, further research is needed on how exposure may best complement other behavioral interventions, and on a host of issues related to the practical implementation of intensive exposure. Despite the underdeveloped state of the exposure therapy for combat-related PTSD literature, at this point it appears to be the most carefully studied treatment strategy for combat-related PTSD and the supporting data indicates that it has promise for being a highly efficacious treatment strategy.

**REFERENCES**


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