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A COMMON ELEMENTS APPROACH TO EVALUATING COMBAT-RELATED POSTTRAUMATIC STRESS DISORDER INTERVENTIONS

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ABSTRACT

The purpose of the current study is to apply a novel data analytic approach to identify effective routes for treatment of combat-related posttraumatic stress disorder (PTSD). The approach focuses on the practice elements (elements) of an intervention rather than the intervention program as a whole. A sample of studies specific to combat-related PTSD interventions was used to: (1) examine the frequency of use of different elements; (2) determine if the amount of elements used is related to significance; and (3) identify if certain patterns of elements are more likely to be associated with significant results. The results of this analytic approach included: psychoeducation was the element used most frequently in treatments with significant outcomes; the effective amount of elements utilized in interventions ranges from three to eight; and psychoeducation and imaginal exposure was the most common pattern of elements utilized in interventions that were found to improve outcomes of interest compared to an alternate approach to intervention. Several implications are noted such as: both the identification of upper and lower limits for the amount of elements to be used in an intervention, as well as the identification of patterns of elements may inform future research using factorial designs to open up the “black box” (i.e., to identify components and/or combinations of components that are causally related to outcomes of interest).
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Chapter 1

Introduction

Posttraumatic stress disorder (PTSD) is a condition characterized by exposure to a traumatic event and the resulting symptoms. In the DSM-5 the symptoms of PTSD are clustered into those of re-experiencing, avoidance, negative cognitions and mood, and arousal (American Psychiatric Association [APA], 2013). This disorder is more prevalent in the military population than in civilians. The National Comorbidity Survey Replication found that the lifetime prevalence of PTSD in the total U.S. population is 3.6% of men and 9.7% of women (as cited in Gradus, 2007). For those in the military, the estimated lifetime prevalence of PTSD has ranged from 10.1% of those in the Gulf War to the National Vietnam Veterans Readjustment Study’s findings of 30.9% among men and 26.9% among women veterans of the Vietnam War (as cited in Gradus, 2007). The current estimate of PTSD for those in Operation Enduring Freedom and Operation Iraqi Freedom has been found to be 13.8% by the RAND Corporation (as cited in Gradus, 2007). With the prevalence of PTSD being greater among military personnel than the general population, there is a need to find effective, and empirically supported treatments for these individuals.

Problem to be Addressed by Current Study

Given the increased operational tempo and the number of deployments as well as the nature of military engagements (i.e., close quarters combat and challenge of identifying enemy combatants from civilians), treatment of PTSD in the military population is an area of growing concern. While the Department of Defense and Department of Veterans Affairs support the use of interventions such as prolonged exposure, cognitive processing, and eye movement
desensitization and reprocessing, these suggestions are based largely on studies of limited rigor (e.g., measures with unknown psychometric properties, and research designs that fail to control alternative explanations for effects) that sample from a civilian population. The present study analyzes the literature on PTSD in combat veterans using a common elements approach (Chorpita, Daleiden, & Weisz, 2005). In the standard program evaluation approach, the program serves as the unit of analysis, resulting in an inability to determine which component or combination of components (e.g., psychoeducation, relaxation training, and thought modification) drives positive change in outcomes of interest. In contrast, the common elements approach employs the components that make up the program as the units of analyses. This common elements approach provides a means of identifying elements that are more and less strongly associated with positive outcomes. Further, the present study extends the logic of the common elements approach by analyzing the frequency with which patterns of elements are associated with positive change in outcomes of interest.

By determining common elements across effective treatments, rather than focusing on a comparison of treatments, perhaps more efficient and specific interventions can be created for combat-related PTSD. The common elements approach may help those providing PTSD treatment to military personnel determine which elements are most likely to lead to positive outcomes by opening up the black box of PTSD interventions, and in turn decrease the prevalence of PTSD in our military.

There are three aims of the current study:

1. To identify the most frequently used elements in combat-related PTSD interventions;
2. To evaluate if amount of elements used in combat-related PTSD interventions drives significant results; and
3. To assess whether certain patterns of elements drive significant outcomes in these rigorous evaluations of combat-related PTSD interventions.

**The Current State of Combat-Related PTSD Intervention Literature**

Although there are treatments that credible organizations recommend in the use of addressing combat-related PTSD, the fact is that the current empirical evidence is limited at best. Many studies conducted on PTSD treatments are not methodologically rigorous, that is, they involve: small sample sizes, the utilization of inconsistent and unvalidated measures, and inconsistent forms of treatment. An even larger problem exists; however, as most of the published studies do not focus on combat-related PTSD treatment, rather the majority of studies that have assessed PTSD treatment have been specific to women who are victims of sexual assault. Those research studies that have focused on PTSD within a military sample generally look at male veterans, usually from the Vietnam War (Creamer & Forbes, 2004; Sloan et al., 2013; Steenkamp & Litz, 2013).

Studies that have been conducted show that PTSD treatment in military personnel is consistently found to be less effective than treatment with other populations. Some suggest that combat-related PTSD is more complex and chronic than other causes of PTSD (Bisson et al., 2007; Creamer & Forbes, 2004). Stewart (2009) notes that unlike civilians with PTSD, military personnel can fit the category of both perpetrator and survivor in terms of trauma (p. 460). This juxtaposition of roles can cause self-image problems that are difficult to address. Combat veterans also have experiences that make their PTSD unique from other traumas such as: (a) having been exposed to constant threat and therefore prolonged hyperarousal; (b) having developed a threat appraisal system that is not appropriate in the civilian world; and (c) witnessing acts that make them question their worldview (Creamer & Forbes, 2004).
Although some believe PTSD in the military is inherently different from PTSD in civilians, others feel that all PTSD treatments can be assessed as efficacious if they are found to be so in any one population. Solomon (2002) makes a clear case for this generalizability. Her argument is that although traumas appear different (e.g., rape, combat, child abuse, and terrorism), any traumatic event causes victims to experience “a violation of pre-existing schemata of the self and the world. Trauma has been described as shattering three basic assumptions: the belief in personal invulnerability, the perception of the world as meaningful, and the positive view of self” (Solomon, 2002, p. 948).

Within the field there is no overwhelming consensus regarding if conclusions about effective PTSD intervention for the military population can be drawn from a civilian sample or if they need to be drawn from an exclusively military sample. In addressing the problem, the Institute of Medicine (IOM) is currently conducting studies on PTSD treatment specifically for the military population, as they feel that the evidence for combat-related PTSD treatments is still inadequate (as cited in Kitchiner, 2012). Following the lead of the IOM, this study uses a sample that is composed entirely of studies concerning military-specific PTSD interventions.

**Recommended Treatment Models**

At the current time, both the Substance and Mental Health Services Administration (SAMHSA) and the joint effort of the Department of Veteran Affairs (VA) and Department of Defense (DoD) have identified treatments for combat-related PTSD that they believe have enough empirical support to be considered effective; however, this support is drawn largely from research on civilian samples. These organizations support the use of psychotherapies that are trauma focused, which include components of exposure and/or cognitive restructuring therapies, and stress inoculation training (Department of Veterans Affairs/Department of Defense
The most common of these trauma-focused therapies include prolonged exposure, cognitive processing therapy, and eye movement desensitization and reprocessing (VA/DoD, 2010).

The National Center for PTSD provides guidelines of what each of the recommended psychotherapies to address PTSD entail. Prolonged Exposure therapy (PE) and Cognitive Processing Therapy (CPT) are both under the broader category of Cognitive Behavioral Therapy (CBT). The goal of prolonged exposure therapy is to decrease the stress experienced when thoughts, feelings, or situations related to the trauma arise. This is accomplished through four parts of treatment: (1) education, (2) breathing retraining, (3) real world practice, and (4) talking through the trauma (National Center for PTSD, 2011). The other CBT, Cognitive Processing Therapy, approaches treatment of PTSD by teaching the patient to examine and challenge their thoughts about trauma. CPT also has four main parts: (1) learning about PTSD symptoms and how treatment can help, (2) becoming aware of thoughts and feelings, (3) cognitive restructuring (i.e., challenging current thoughts), and (4) understanding the common changes in beliefs that occur after trauma (National Center for PTSD, 2011).

The third trauma-focused treatment the National Center for PTSD identified as effective is eye movement desensitization and reprocessing (EMDR). This therapy is conducted by having the patient perform rapid eye movements while using mental imagery to work through traumatic memories. The idea is that this process allows the brain to more easily work through the trauma and provides an opportunity to learn better skills for dealing with stress. This therapy also has four parts: (1) identification of a target memory, (2) image and belief about the trauma, (3) desensitization and reprocessing, replacing distressing thoughts and images with positive ones, and (4) body scan (i.e., focusing on physiological response to trauma) (National Center for PTSD, 2011).
In the *VA/DoD Clinical Practice Guideline for the Management of Post-Traumatic Stress* one additional type of cognitive behavioral therapy is recommended that is not considered to be explicitly trauma-focused: stress inoculation training (SIT). SIT was first used in treating anxiety disorders and was later adapted for patients suffering from PTSD. SIT targets trauma-related avoidance, anxiety, and cognitions through techniques such as muscle relaxation and deep breathing. SIT also includes cognitive elements and often incorporates exposure techniques. Research findings indicate that SIT may be equal in efficacy to trauma-focused approaches (VA/DoD, 2011).

Although these treatments are the ones that have been identified by the VA/DoD as having the strongest evidence for effectiveness, they provide several other treatment options that may be beneficial in their clinical guidelines, including: relaxation techniques, image rehearsal therapy, hypnotic techniques, brief psychodynamic therapy, and group therapy (VA/DoD, 2011). Scholars suggest that the utilization of a combination of therapies may be more effective than one therapy in alleviating PTSD symptoms (Steenkamp & Litz, 2013).

**Advancing the Treatment of PTSD**

As noted above, the state of the field of combat-related PTSD treatment is limited and there are several areas for improvement. Advances are needed in: conducting more randomized controlled trials, or at least robust quasi-experimental studies, of specific treatment protocols in military-specific populations; implementing consistent evaluation measures; and ensuring that treatment protocols are implemented with fidelity. Moreover, high-quality comparative research on treatment protocols (i.e., which treatment is most effective and for whom?) is needed as well as research in terms of treatment processes.
This emphasis on treatment processes is evident in the recommendations of many researchers. Steenkamp and Litz (2013) suggest that processes help us to understand what treatment aspects promote and mediate change; in other words, why a certain treatment is working. They further indicate that identifying these processes may allow for multidimensional and multi-component treatments to be formed, as these strategies could lead to greater effectiveness when targeting specific symptoms (Steenkamp & Litz, 2004, p. 51).

Other researches have also pushed for this exploration into the value of multimodal treatments versus individual treatments, thinking that the integration of many approaches may lead to greater effectiveness (Stewart, Thomas & Wrobel, 2009; Van Etten & Taylor, 1998). For instance, Solomon (2002) suggests the possible benefits that may result from looking at the effectiveness of treatment components or of combined treatments, the effect of comorbidity on treatment approach and outcomes, and the optimal treatment length and timing in differing populations with PTSD (p. 957). If interventions can be examined as elements as opposed to a “packaged” treatment that was performed one time, in one population, researchers could better determine what specific parts of the treatments are leading to significant effects. Evaluation research is needed to assess combat-related PTSD interventions beyond the theoretical level to the practical level, such as effective elements of practice, to reach the goal of identifying more effective treatment options for this population.

The Common Elements Approach

The common elements approach can be employed to identify elements that are frequently used in PTSD treatment for military personnel. The concept of common elements was developed Dr. Bruce Chorpita in order to address the lack of evidence-based interventions used in children’s mental health services (Chorpita, Bernstein, & Daleiden, 2011; Chorpita & Daleiden, 2009;
Chorpita, Daleiden, & Weisz, 2005). A practice element is defined as, “a discrete clinical technique or strategy (e.g., ‘time out’ or ‘relaxation’) used as part of a larger intervention plan […]” (Chorpita, Daleiden, & Weisz, 2005, p. 11). These elements can be defined, can be reliably coded across interventions, and different treatments share them in common (Chorpita, Daleiden, & Weisz, 2005, p. 11). Chorpita, Daleiden, & Weisz (2005), used the common elements approach to work toward closing the gap between research and clinical practice, which is due to several factors.

First, evaluations of different therapeutic approaches generally focus on one specific implementation effort at a time, making generalizations across different demographics difficult. In PTSD research, this problem comes in the form of trying to implement practices used in populations such as assault or accident victims in military personnel, but not knowing if these are truly effective outside of the tested sample (Chorpita, Daleiden, & Weisz, 2005). Second, treatments under the same name are often not implemented in the same manner. In other words, two studies may provide support for the claim that cognitive processing therapy is effective, yet the specific practices used in each of these treatments may not be the same. This means that even when promising results are found, it is likely they have not been replicated and re-tested; therefore, conclusions cannot be drawn concerning the reliability of the findings for any one intervention (Chorpita, Daleiden, & Weisz, 2005). These and other problems lead to the challenge faced when selecting optimal PTSD treatments; there is no way that looking at individual studies of specific treatments used in specific samples can guarantee effectiveness for a more general population, such as military personnel diagnosed with PTSD.

Using the common elements approach, however, turns the conventions of program evaluation on its head. The focus is not on the program as a whole, but on the separable elements that make up a program. Using Chorpita’s method, efficacious studies are broken down into their treatment elements (Chorpita, Becker, & Daleiden, 2007; Chorpita, Daleiden, & Weisz, 2005).
These elements are then extracted from all treatments being examined. Once identified, analyses are run in order to determine which of these elements are most common (i.e., seen most often in effective treatments) in the treatment of the population of interest.

There are some drawbacks to the common elements approach. The most problematic of which is that there cannot be causation drawn from the identification of frequently used practice elements within interventions showing significant effects on outcomes of interest (Chorpita, Daleiden, & Weisz, 2005). In other words, although these elements are found most frequently in effective treatments of the targeted population, there is no way to knowing if these are the same elements that are directly causing the benefits. This inability to identify causal relations between elements and outcomes is driven primarily by the lack of control over which elements occur in different programs. If, for instance, studies focused on systematic manipulation of elements (i.e., a factorial approach to analysis of elements), then statements about effective elements or combinations of elements would be more readily available. A final concern is that this method does not analyze all aspects of treatment, such as sequencing of components and supervision of treatment (Chorpita, Daleiden, & Weisz, 2005).

Despite these concerns, the common elements approach has strengths that justify its use when evaluating intervention programs. Two main routes of action can be based upon the results of identifying the practice elements that are most frequently associated with improvements in outcomes. One route is choosing a treatment manual that most closely fits the practice elements that are found to be most frequently effective in the targeted population. The other route is to design a new treatment by using each of the most frequently used practice elements for the given population. Each has pros and cons, and would likely need to be decided in terms of the specific situation (Chorpita, Daleiden, & Weisz, 2005). Regardless of route taken after identifying the common elements, this approach shows promise for improving the implementation of intervention programs.
As the current state of the field is such that treatment recommendations for the military population diagnosed with PTSD are based on civilian samples, this study uses an exclusively combat-related PTSD intervention sample. There have been suggestions that looking at the processes and specific components of the current interventions may lead to more effective treatment strategies as opposed to focusing on the “packaged” treatments (Steenkamp and Litz, 2004; Steenkamp and Litz, 2013; Solomon, 2002). The current study looks to Bruce Chorpita’s common elements approach to determine the frequency of elements across combat-related PTSD interventions of high rigor. The common elements analytic strategy is then taken a step further, by identifying if the amount of elements employed in an intervention influences significant results as well as exploring the possibility of patterns of elements driving significant outcomes.
Chapter 2

Methods

To address the aims of the present study, the following methods were employed. First, a literature search was conducted on combat-related PTSD interventions. Second, a database was created toward the end of determining common elements across all studies in the sample of combat-related PTSD interventions identified through the literature search. Third, the data was analyzed in three ways. The first data analysis involved collecting the frequency of each element across all studies of high rigor and significant outcomes. The second data analysis consisted of separating the interventions by amount of elements used (amount of elements is defined as the number of elements used in a single intervention). The goal of this analysis was to determine if amount of elements implemented is related to significant outcomes. The third data analysis consisted of identifying patterns of elements that occurred across studies, and seeing if these patterns may drive significant outcomes (a pattern of elements is defined as a particular combination of elements used in more than one intervention).

Literature Search

A search of the military PTSD literature was conducted. Articles were found using two different procedures. The first search procedure was a search of multiple databases. Databases used included PsychNet, PILOT, ScieneDirect, JAMA, Taylor and Francis, Wiley Online, and Google Scholar. Terms used included combinations of “PTSD”, “combat-related PTSD”, “PTSD in the military”, and “military PTSD”, with “treatment”, “cognitive-behavioral therapy”, “exposure therapy”, “EMDR”, “stress inoculation therapy”, “present-centered therapy”,
“mindfulness therapy”, “supportive therapy”, and “relaxation training”. The second search procedure was to extract resources from the reference section of studies found through the database search.

The differing structures of comparison among the studies created difficulties in forming inclusion criteria for the sample. Some studies compared one intervention against another intervention, some compared variations of one type of intervention against another, others compared the treatment condition to the baseline of the participant and other studies had a true treatment and control group. In order to balance the needs for rigor in the analytic technique on the one hand and the need to retain as many of the small number of studies on this population as possible, a decision was made to include studies that employed any of these styles of comparison, as long as participants were randomly assigned to condition.

Studies were included in the sample if their procedures were of high rigor, meaning they had an appropriate sample size, used a randomization protocol for assignment of the sample to condition, and used consistent and validated measures (n=17). Exclusion criteria included studies: (1) that considered comorbid conditions (i.e. alcoholism and PTSD); (2) that looked only at symptoms that were not of interest in the current study (e.g., nightmares); (3) that did not list any elements; (4) case studies; and (5) studies that did not employ random assignment to condition.

**Database Description**

A database was created in Excel to organize information about the different PTSD treatment protocols. The database includes information about particular studies (e.g., use of a control group, the study sample, and measures used to assess effects) and information about the particular treatment protocol under consideration (e.g., elements included in the protocol). This
database was used to conduct analyses of the elements within and across treatment protocols, taking into account significant effects of each treatment protocol.

A decision was made to code specific constructs (e.g., PTSD diagnosis status, clinician report of PTSD symptoms [re-experiencing, hyperarousal, and avoidance], patient report of PTSD symptoms, and depression) to be able to document at what level each treatment protocol produced effects, regardless of whether a standard or idiosyncratic measure was used. For example, depression was generally measured using Beck’s Depression Inventory, but a few studies measured depression with QIDS (Quick Inventory of Depression Symptomology). Though this decision likely affects analyses in a number of ways (e.g., different measures of one construct may not have the same outcome), there was not enough data with which to conduct analyses controlling for type of measure used. Outcomes were coded as significant if p<.05 for that respective construct. In those studies that compared one intervention against another, or those comparing different forms of the same treatment, the intervention that led to more significant outcomes was coded as significant on relevant measures, while the other was coded non-significant on those measures. If the study compared more than one treatment to a baseline measure, all interventions found to be significant compared to baseline were coded as such on appropriate outcomes.

A column was added to collapse this data as a result of two data challenges. First, many measures coded were looking at the same construct (e.g., both PTSD diagnosis status and CAPS [Clinician Administered PTSD Scale] are measures of presence of PTSD diagnosis). Second, since not every study used every measure, there were many cells in the file that had missing data. Thus the collapsed column was named “collapsed outcome” (combining PTSD diagnosis status, CAPS total, PCLS [Patient Checklist Assessment Measure-PTSD], and depression). Collapsing protocol addressed, albeit crudely, missing data concerns thereby resulting in an ability to conduct a general analysis linking elements to outcomes.
The final piece of the database includes the elements that were identified through the literature review, taking information from the methods sections of the identified articles and extracting what was actually implemented in treatment. Elements included psychoeducation, in vivo exposure, imaginal exposure, EMDR, cognitive therapy/restructuring, self-monitoring, therapist support, homework, physiological monitoring, relaxation/breathing retraining, problem-solving skills, anger management, social/communication skills, relapse prevention, group support, coping skills, ignoring the trauma, and alternative methods (see Table 2-1 for description of each element). An element generally justified coding if the article used precise wording that matched the element (e.g., imaginal exposure was the term used to describe the practice employed during session); however, sometimes there were slight differences in wording. When an intervention element was labeled something other than the elements that were being coded, but fit into a specific element category, it was coded as such (e.g., treatment rationale was coded as psychoeducation).

<table>
<thead>
<tr>
<th>Table 2-1. Description of elements</th>
</tr>
</thead>
<tbody>
<tr>
<td>Element name</td>
</tr>
<tr>
<td>Alternative Methods</td>
</tr>
<tr>
<td>Anger Management</td>
</tr>
<tr>
<td>Cognitive Therapy/Restructuring</td>
</tr>
<tr>
<td>Coping Skills</td>
</tr>
<tr>
<td>EMDR (Eye Movement Desensitization and Reprocessing)</td>
</tr>
<tr>
<td>Group Support</td>
</tr>
<tr>
<td>Homework</td>
</tr>
<tr>
<td>-------------------</td>
</tr>
<tr>
<td>Ignoring the Trauma</td>
</tr>
<tr>
<td>Imaginal Exposure</td>
</tr>
<tr>
<td>In vivo Exposure</td>
</tr>
<tr>
<td>Physiological monitoring</td>
</tr>
<tr>
<td>Problem Solving Skills</td>
</tr>
<tr>
<td>Psychoeducation</td>
</tr>
<tr>
<td>Relapse Prevention</td>
</tr>
<tr>
<td>Relaxation/Breath Retraining</td>
</tr>
<tr>
<td>Self-Monitoring</td>
</tr>
<tr>
<td>Social/Communication Skills</td>
</tr>
<tr>
<td>Therapist Support</td>
</tr>
</tbody>
</table>

**Analytic Approach**

Three major data analyses were conducted. The first analysis involved determining the frequency of elements that were used in rigorous studies of combat-related PTSD interventions,
and was based on Chorpita’s common elements approach (Chorpita, Daleiden, & Weisz, 2005). The second analysis involved determining if a relationship exists between significant findings and the amount of elements included in an intervention. The third analysis worked to identify if certain patterns of elements are more strongly related to significant findings than other patterns.

**Frequency of Elements**

In order to run the first data analysis, an equation was used in the excel database that resulted in the frequency count of each element. This equation was expanded with a more specific inclusion criteria, thereby making it possible to count the frequency of elements in relation to the collapsed outcome measure. This data provides a clear indication as to which elements are seen most often in treatments with significant outcomes, tested by high quality studies. To increase the understanding of how these elements are distributed, the amount of times each element was found to be used in an intervention that was non-significant was also collected. These results were entered into a bar graph (Figure 3-1) in order to display the frequency counts of each element in both significant interventions (black portion of the bar), and in non-significant interventions (gray portion of the bar) (e.g., psychoeducation was used in a total of 19 interventions, 14 of those interventions were significant, 5 of those interventions were non-significant). For ease of conceptualization, the elements are ordered from most to least frequently as they occur in treatments with significant effects on collapsed outcome.

**Amount of Elements**

An excel equation was used to determine the amount of elements used per intervention (i.e., how many treatments incorporated one element). The result of conducting this equation was
a new column in the database that gave a number value to the amount of elements used in the corresponding treatment. In order to make this data useful, an additional column was added to the database, this time adding the criterion of being significant. This column shows how many interventions, separated by amount of elements, were significant (e.g., three of the six interventions with three elements were significant). In a final added database column is the percentage of total interventions that were significant, as separated by amount of elements in interventions (e.g., 50% of interventions with three elements were significant). This data was entered into Table 3-1.

**Patterns of Elements**

After isolating the treatments by amount of element, the patterns of co-occurring elements in significant versus non-significant interventions were assessed. Two tables were made, one for interventions found to be significant (Table 3-2), and another for those found to be non-significant (Table 3-3). Interventions were labeled by their amount of elements and a subscript A-D as per the order in which they were coded (e.g., there were three significant interventions that contain three elements each, and they are labeled 3A, 3B, and 3C). For the analysis of patterns of elements, the treatments were separated by amount of element in order to most easily identify patterns. Those treatments with a greater amount of elements may have a dilution effect, meaning that there may only be a few elements truly driving significance, while the other elements are producing no real effect. Those interventions with a lesser amount of elements may give the simplest patterns (the least amount of elements that are still driving significance). This issue of drawing out which elements may be driving significance versus those that have no effect is addressed later in the current study.
Patterns were coded within each amount of elements, first for interventions with significant effects on outcome (Table 3-2). Patterns of elements were identified as possibly being linked to a greater likelihood of significant findings if a pattern was present in greater than 50% of the interventions per each amount of element (e.g. cognitive methods and self-monitoring were used in greater than 50% of treatments that used three elements). The first identified pattern’s elements were coded X₁; if there was a second pattern its elements were coded X₂. If an element occurred in more than one pattern, it was coded X₁,₂. Dashes signify elements that were used in the intervention but were not found to be involved in a pattern (e.g., intervention 3A used homework, but homework was not found to be part of a pattern).

This procedure was repeated for the table of non-significant findings (Table 3-3). The logic behind the analysis is to look for patterns of elements that are differentially associated with significant findings (e.g., patterns that more often appear in interventions that demonstrate significant improvement in outcomes than in those interventions that do not show significant improvement in outcomes).
Chapter 3

Results

The results of this study focus on frequency of elements across rigorous studies. This was extended to: examine if the amount of elements within an intervention is linked to how often significant findings were reported; and determine if a certain pattern of elements is more likely to lead to significant findings than other patterns.

Frequency of Elements

In Figure 3-1 a visual description of the frequency counts of elements can be seen. The amount of times an element was found to be in an intervention that reported significant findings on the collapsed outcome measure ranged from zero to fourteen (see black bars in Figure 3-1). The only element that was found zero times was eye movement desensitization and reprocessing. The element that was found fourteen times was psychoeducation.

In order to more accurately portray the use of the elements, the amount of times each element was found to be in non-significant interventions is also included in Figure 3-1 (seen as gray bars). By comparing the amount of units each color of an element’s bar occupies, the ratio of how often each element was found to be in significant versus non-significant interventions could be drawn. For example, six of the total ten interventions that used self-monitoring as an element were found to be significant, while four were non-significant, therefore 60% of the interventions that included self-monitoring were significant.
An effort was made to determine whether statistical significance on outcomes of interest was driven by the amount of elements per intervention. That is, are different amounts of elements related to an intervention being effective? Table 3-1 shows the results of the analysis conducted using the data from the present study. The first column represents the amount of elements per intervention. For example, an intervention with three elements may have conducted an
intervention comprised of cognitive therapy, in vivo exposure, and psychoeducation. The second column reports the total amount of interventions that were coded for each amount of elements. The third column shows how many of the interventions were found to be significant for each amount of elements. The final column is the percent at which the interventions per amount of elements were significant, and is of interest in answering the question: is the amount of elements used in an intervention related to significant findings?

In regards to the current study, interventions that used three, four, or five elements were found to be significant 50-67% of the time. Interventions that used six, seven, or eight elements were significant 100% of the time. In the current sample, the amount of elements per intervention with significant outcomes ranged from three to eight. The importance of this type of analysis will be further explained in the discussion section.

### Table 3-1.

**Descriptive data of amount of elements per intervention**

<table>
<thead>
<tr>
<th>Amount of elements in intervention</th>
<th>How many interventions per amount of elements</th>
<th>How many interventions found to be significant per amount of elements</th>
<th>% Significant interventions out of total interventions per amount of elements</th>
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<tbody>
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<td>1</td>
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<td>6</td>
<td>3</td>
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<td>4</td>
<td>6</td>
<td>4</td>
<td>67%</td>
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<td>5</td>
<td>7</td>
<td>4</td>
<td>57%</td>
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<td>6</td>
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<td>7</td>
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Patterns of Elements

There was also an effort to determine if certain patterns of elements were more likely to lead to significant outcomes. Tables 3-2 and 3-3 display the elements that were used per intervention, separated by amount of elements. Upon reviewing Tables 3-2 and 3-3, some recurring patterns of elements were identified.

For those treatments with three elements (n=3), cognitive therapy/restructuring and self-monitoring was a pattern of elements that occurred in more than 50% of the significant interventions (2 out of 3). Psychoeducation and cognitive therapy/restructuring was another pattern that occurred in more than 50% of three element interventions that were significant (2 out of 3). In contrast, no patterns of elements were found in the non-significant treatments with three elements (n=3).

No patterns of elements were found in the significant interventions with four elements (n=4). In non-significant interventions with four elements, imaginal exposure and self-monitoring was found to be a pattern of elements in more than 50% of the interventions (2 out of 2).

In treatments with five elements (n=4), the pattern of psychoeducation and imaginal exposure was found in more than 50% of the significant treatments (3 out of 4). In those treatments that were non-significant with five elements (n=3), two patterns of elements emerged in more than 50% of the treatments. The first pattern was psychoeducation and homework (2 out of 3); the second was psychoeducation and problem-solving skills (2 out of 3).

All interventions that included six (n=3), seven (n=2), and eight (n=1) elements resulted in significant findings. Two patterns emerged in greater than 50% of six element interventions, the first pattern being imaginal exposure and therapist support (2 out of 3), and the second pattern being psychoeducation and imaginal exposure (2 out of 3). One pattern emerged for more than
50% of treatments with seven elements; this pattern was psychoeducation, in vivo exposure, and cognitive therapy/restructuring (2 out of 2). As there was only one significant treatment with eight elements, it was not possible to identify a pattern in equal to or greater than 50% of the sample.
Table 3-2.

Patterns of elements in significant interventions separated by amount of elements per intervention

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**Note:** PE=psychoeducation, EXP=in vivo exposure, IMAG=imaginal exposure, EMDR=eye movement desensitization and reprocessing, COG=cognitive therapy/restructuring, SM=self-monitoring, TS=therapist support, HW=homework, PHYS=physiological monitoring, RELAX=relaxation/breathing retraining, PROB=problem solving skills, AM=anger management, SS=social/communication skills, RP=relapse prevention, GS=group support, CS=coping skills, IGN=ignoring the trauma, ALT=alternative methods; see Table 2-1 for examples of elements
Table 3-3.

Patterns of elements in non-significant interventions separated by amount of elements per intervention

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*Note:* PE=psychoeducation, EXP=in vivo exposure, IMAG=imaginal exposure, EMDR=eye movement desensitization and reprocessing, COG=cognitive therapy/restructuring, SM=self-monitoring, TS=therapist support, HW=homework, PHYS=physiological monitoring, RELAX=relaxation/breathing retraining, PROB=problem solving skills, AM=anger management, SS=social/communication skills, RP=relapse prevention, GS=group support, CS=coping skills, IGN=ignoring the trauma, ALT=alternative methods; see Table 2-1 for examples of elements.
Chapter 4

Discussion

The present study was the first to apply Chorpita’s method of determining common elements and element frequency to the field of combat-related PTSD interventions. This study extended his approach to examine if the amount of elements and patterns of elements have implications with regard to significant treatment findings.

The frequency analysis indicates that psychoeducation is the element that is used most frequently in treatment with significant effects on outcome. This finding suggests that psychoeducation may be an element that, upon inclusion, could make an intervention more likely to have significant results. Because there are limitations to this approach, as addressed by Chorpita, the current study extended the research to data analyses concerning the possibility of amounts of elements in an intervention driving significant outcomes, and identifying patterns of elements which may be more likely to result in significant outcomes than other patterns (Chorpita, Becker, & Daleiden, 2007).

In addressing the analysis of the amount of elements in interventions with significant outcomes, the present study found that interventions with six, seven, or eight elements might be more likely to lead to significant findings than interventions with other amounts of elements. The findings also suggest that interventions that are too narrow, or those that try to do too much may not be as effective in treating PTSD. In fact, in the sample of interventions used in the present study no interventions with significant findings used less than three elements or greater than eight elements. This range may exist due to publication bias, meaning that interventions with less than three, or more than eight elements are not put through to publication due to an inability to identify...
statistically significant results or because of other limitations involving study design. This range
could also be the result of those implementing interventions acknowledging that they do not
believe that interventions that go beyond this range of amount of elements will be effective.
These possible reasons for the range evident in this sample strengthen the finding that
interventions using between three and eight elements may be the most effective in treating
combat-related PTSD.

In identifying patterns of elements, it was found that certain patterns of elements were
more often found in significant interventions than others. Psychoeducation and imaginal exposure
was the most common pattern, occurring in more than 50% of treatments with five elements (3
out of 4), and more than 50% of treatments with six elements (2 out of 3); therefore, there was a
total of five occurrences of this pattern across all treatments in the sample. Other patterns that
occurred in greater than 50% of interventions per their respective amount of elements, though
they did not occur as frequently, included cognitive therapy/restructuring and self-monitoring,
psychoeducation and cognitive therapy/restructuring, imaginal exposure and therapist support,
and the three-element pattern of psychoeducation, in vivo exposure, and cognitive
therapy/restructuring. Because these patterns of elements are seen across more than one
intervention, it is possible that interventions using these patterns of elements may be more likely
to result in significant findings than those that do not use these patterns.

Patterns of elements were also identified in those treatments that had non-significant
findings. The patterns identified included: imaginal exposure and self-monitoring,
psychoeducation and homework, and psychoeducation and problem-solving skills. As these
patterns were found to exist in multiple non-significant interventions, it is possible that
interventions that include these patterns of elements may be less likely to have significant
outcomes than those that avoid using these patterns.
Taken together, the findings of the analyses point to psychoeducation as the potentially most useful element, but also that it should not be used alone, as the second analysis suggests that the effective range of amount of elements is three to eight for any one intervention. Applying this finding, the minimum amount of elements needed for an intervention to have positive effects on outcome is three. Looking to patterns of elements, psychoeducation, cognitive therapy/restructuring, and imaginal exposure may be the pattern of elements most likely to result in significant outcomes in combat-related PTSD interventions. Beyond being the most frequently used elements in significant interventions, these three elements are the elements that are most likely to show up in any pattern that is associated with significant results (e.g., psychoeducation & imaginal exposure, psychoeducation & cognitive therapy/restructuring). The third most frequent element in significant interventions was homework, but this element never occurred in a pattern of elements in significant interventions.
Chapter 5
Limitations and Future Directions

Limitations

As this is a new way to look at the treatment of military-related PTSD, there are weaknesses that need to be addressed. These weaknesses result from both the current state of the literature concerning combat-related PTSD interventions and in the data analytical approaches used in the present study.

Limitations of the Sample

The limitations of the sample used in the current study have been addressed in the previous chapters. Generally, the literature examining the interventions for combat-related PTSD lacks standardization and generalizability. There are a small number of studies in this area, and those studies that have been conducted are often based on an all-male sample. Further, the studies do not have standardized measures (e.g., not all studies used CAPS to measure PTSD diagnosis status) or methods of design (e.g., some studies compared participants to baseline, while others compared two interventions, etc.). If measures and methods were more consistent across studies, outcomes could be more easily compared (e.g., if all studies used CAPS to measure PTSD diagnosis status). Another limitation of the sample is that there are factors of each study which cannot be accounted for in terms of what may be driving significant results, these include such things as: therapist experience/length of training; duration of intervention; order in which
elements are presented; time of data collection points; and many more specifics of design that are beyond the scope of this study.

Limitations of the Analytic Approach

Aside from the weaknesses that were due to the dearth of research literature in the field, there are limitations in the data analyses used in this study. First, there are weaknesses of the common elements approach: analyzing the frequency of elements. As mentioned when discussing Chorpita’s approach, identifying the most frequently used elements cannot disclose any information regarding causation of a specific element on driving significant outcomes. In practice, this means that an element that has a high frequency among highly rigorous, significant studies, may actually have no effect on the outcome of the treatment. Instead, less frequently used elements, combinations of elements, or other considerations (e.g., dosing, timing of administration of measures, therapist effects) may be the components that are influencing overall significant outcomes of an intervention. In an ideal world in which elements were systematically controlled, one could assess causal relations between elements and outcomes. The limitations of the frequency count analysis led to the move toward new data analytic approaches; examining the effects of amount of elements and patterns of elements on significant outcomes.

The second data analysis, determining if amount of elements per intervention drove statistical significance on outcomes, also has its limitations. The results of the present indicate that those interventions using six, seven, or eight elements may be more likely to have significant outcomes than those with any other number of elements. This is a possible conclusion because 100% of the interventions for these amounts of elements were significant. However, there are many other factors involved. First, there were fewer interventions with six, seven, and eight elements (three, two, and one intervention, respectively) than those with three, four or five
elements (six, six, and seven interventions, respectively). This means reaching 100% significance does not necessarily relate to the idea that six, seven, and eight elements are superior to any other number; as in a probabilistic sense it is easier to reach 100% when there are fewer interventions to provide disconfirmatory results.

The third analysis, involving the patterns of elements, is an effort to determine if the combination of elements has an effect on the statistical significance of outcomes for an intervention. A major limitation of looking to patterns of elements being related to significant outcomes is similar to a limitation of the frequency analysis. That is, a high frequency of use for an element may not be related to that element driving significant results. Applied to this study, even though psychoeducation and imaginal exposure was the most common pattern of elements, and psychoeducation was the most frequent element overall, psychoeducation could be a non-necessary element.

Using the results of patterns of elements would have more meaning for improving the field if there were a larger sample size of studies done on interventions, as this would give more support to one pattern being effective over another. While the current data is not a good sample for this type of analysis, there may be utility in designing a data analytic framework for contexts in which enough data exists to conduct such analyses, as discussed in future directions.

**Future Directions**

The purpose of this study was to explore the possibility of looking at the treatment of combat-related PTSD in a new way. Instead of strictly adhering to one therapy style or another, certain patterns of elements could be implemented in order to potentially increase effectiveness (minimal amount of elements with maximum effects), or pre-existing treatment manuals could be chosen based on their patterns of elements, if these patterns are known to be more likely to lead to
significant outcomes (Chorpita & Daleiden, 2009). Determining specific patterns of elements that drive significant outcomes as opposed to studying broad therapies such as Cognitive Behavioral Therapy, or Exposure Therapy, would help to open up the black box of effective interventions for treating combat-related PTSD.

To the end of identifying those patterns of elements, or single elements, that drive significant outcomes, a factorial design is suggested. This type of design would test different combinations of elements, manipulating one element at a time to ensure that conclusions can be made about which components are related to outcomes. For example, a study could test whether psychoeducation is an essential element in PTSD interventions, varying elements factorially (e.g., testing cognitive therapy/restructuring, self-monitoring, imaginal exposure, and psychoeducation against an intervention that uses cognitive therapy/restructuring, self-monitoring, and imaginal exposure, excluding psychoeducation.). If psychoeducation were an essential component, then one would predict that the intervention that excludes psychoeducation would not reveal significant findings, while the intervention that did include psychoeducation would show significant effects on outcomes of interest.

The current study is an initial start to improving the field of PTSD treatment for the military population. Those with PTSD in the military are in need of effective treatments, if not for the elevated PTSD prevalence rates in this population, then for the sacrifices they have made while serving our country.


ACADEMIC VITA

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