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Combat Stress: A Collateral Effect in the Operational Effectiveness Loss Multiplier (OELM) Methodology

Sarah E. Butterworth

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14. ABSTRACT

An IDA research team designed the Operational Effectiveness Analysis (OEA) methodology to estimate a military unit's operational effectiveness on the battlefield following a chemical, biological, radiological, and nuclear (CBRN) event. As part of the OEA effort, the team developed the Operational Effectiveness Loss Multiplier (OELM) methodology to examine the collateral effects of CBRN events on operational effectiveness. Within the OELM methodology, combat stress is viewed as a collateral effect arising from the conditions and experience of CBRN events. The potential of combat stress to degrade individual and unit operational effectiveness makes it an important aspect of the OEA and OELM research and methodologies. This document discusses combat stress and its implications on operational effectiveness; combat and operational stress reaction (COSR) in service members; and civilian psychological casualties (CPC) and combat stress casualties (CSC) as a result of CBRN and non-CBRN events. It establishes clear and formal definitions of terms relevant to combat stress; discusses the current data available to model and estimate CPC and CSC resulting from CBRN and non-CBRN events; and proposes further research to aid in the estimation of CSC and CPC in the future.

15. SUBJECT TERMS

Chemical, biological, radiological, and nuclear (CBRN); combat stress; Operational Effectiveness Loss Multiplier (OELM); Operational Effectiveness Analysis (OEA); Operational Effectiveness; psychological casualties (PC); combat and operational stress reaction (COSR).

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Executive Summary

The psychological consequences of combat and exposure to chemical, biological, radiological, or nuclear (CBRN) events have long held the interest of the military analysis community. However, psychological casualties (PC) caused by combat stress have historically been difficult to define, quantify, measure, and estimate.[1] Inconsistent terminology, along with faulty data collection and reporting, has led to a scarcity of accurate quantitative data on PC, limiting the estimation and modeling capabilities of the Institute for Defense Analyses (IDA) research team in its efforts to develop an Operational Effectiveness Analysis (OEA) methodology to be applied to military units on the battlefield.

This IDA document supplements two previous IDA publications, *Operational Effectiveness Analysis (OEA)* and *A Methodology for Examining Collateral Effects on Military Operations during a Chemical, Biological, Radiological, and/or Nuclear Attack—Operational Effectiveness Loss Multiplier (OELM)*.[2] The publications propose a methodology for examining the operational effectiveness of military units using casualty estimation modeling to measure the direct effects of CBRN exposure. They also discuss collateral effects of CBRN events on operational effectiveness. In the *OELM* paper, combat stress is classified as a collateral effect that has the potential to degrade individual and/or unit effectiveness. This document expands the section on combat stress found in the *OELM* paper, providing a better understanding of combat stress, combat stress casualties (CSC), and civilian psychological casualties (CPC), and a review of the most current data.

Through a review of the literature, the IDA research team found the data on combat and operational stress (COS), combat and operational stress reaction (COSR), CSC, and CPC to be deficient in both quantity and quality. Additionally, the definitions of terms relevant to combat stress were inconsistent across civilian and military literature; little quantitative data were available on PC resulting from CBRN and non-CBRN events; and what data were presented lacked measures of accuracy and reliability. Without further research, the topic of combat stress leaves a gap in the estimation and modeling capabilities of the OELM methodology.

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1 PC comprise combat stress casualties (CSC) and civilian psychological casualties (CPC).

2 Robert A. Zirkle et al., *Operational Effectiveness Analysis (OEA),* IDA D-4666 (Alexandria, VA: IDA, August 2012); and Deena S. Disraelly et al., *A Methodology for Examining Collateral Effects on Military Operations during a Chemical, Biological, Radiological, and/or Nuclear Attack—Operational Effectiveness Loss Multiplier OELM*, IDA P-5202, Draft Final (Alexandria, VA: IDA, April 2015).

This document establishes clear and formal definitions of terms relevant to combat stress, discusses the current data available to model and estimate CPC and CSC resulting from CBRN and non-CBRN events, and proposes suggestions for further research and data to accurately estimate CSC and CPC in the future.

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1. Introduction

A research team from the Institute for Defense Analyses (IDA) is developing an Operational Effectiveness Analysis (OEA) methodology for the Joint Science and Technology Office of the Defense Threat Reduction Agency. The team is designing the OEA methodology to estimate the operational effectiveness of a military unit on the battlefield following a chemical, biological, radiological, or nuclear (CBRN) event. As part of this effort, the Operational Effectiveness Loss Multiplier (OELM) methodology is being developed to examine the collateral effects of CBRN events on operational effectiveness. Within the OELM methodology, combat stress is a collateral effect arising from the conditions and experience of CBRN events. The potential of combat stress to degrade individual and unit operational effectiveness makes it an important aspect of the OEA and OELM research and methodologies.

This publication will discuss combat stress and its implications on operational effectiveness; combat and operational stress reaction (COSR) in service members; and civilian psychological casualties (CPC) and combat stress casualties (CSC) because of CBRN and non-CBRN events.

A. Purpose

The aim of this research was to establish clear definitions of terms relevant to combat stress; to ascertain the current data available to model and estimate CPC and CSC resulting from CBRN and non-CBRN events; and to discuss what further research and data are required to accurately estimate CSC and CPC in the future.

This document is part of a series supplementing the original *OEA* document and *OELM* paper that describe combat stress, provide an initial look into its potential to decrease operational effectiveness, and provide an initial sampling of the data available. The document expands on the section on combat stress found in the *OELM* paper, providing more information on combat stress, CPC, and CSC, and a review of the most current data.

B. Background

What is now known as COSR has been recognized throughout history, but has had many different titles. Military doctors and medical professionals have used various terms over time to describe the psychological effects of combat on service members. This section discusses the historical approaches to the mental health consequences of combat and outlines the current terms, attitudes, and interventions used to prevent, identify, and treat adverse reactions to the stresses of combat and military operations.

During the American Civil War (1861–1865), physicians referred to the negative reactions of service members to combat stress as *nostalgia*, an accurate description as it was

a widely held belief that stress from battle was rooted in a deep longing to return home from war.[3] Service members experiencing psychological distress in World War I were described as being *shell shocked*. The cause of their distress was attributed to a disorder of the central nervous system, the result of intense shelling or bombing.[4]

In the post-WWI era, Freudian principles were becoming acceptable and a transition in thinking toward attributing combat stress reactions to deep-set neuroses and hysteria led to the use of the term *traumatic war neurosis*.[5] World War II (WWII) witnessed another shift in the way combat stress was viewed—one which was rooted in the idea of *expectancy*, in which an "individual is explicitly told that he is reacting normally to extreme stress and is expected to recover and return to full duty in a few hours or days."[6] Treatments for adverse reactions to combat stress were centered on the notion that service members were not sick or ill, but were simply exhausted and would soon recover and return to their duties. This attitude brought about the use of the terms *combat exhaustion* and *battle fatigue*.[7]

It is important to note that the principle of expectancy is still used today when treating CSC. It is one of the three principles of the treatment method PIE (Proximity, Immediacy, and Expectancy) and in the six principles of BICEPS (Brevity, Immediacy, Centrality/ Contact, Expectancy, Proximity, and Simplicity).[8] These treatment principles commonly used in combat and operational stress (COS) control are discussed in detail later in this IDA document.

The shift from combat exhaustion and battle fatigue to COSR was gradual and replete with inconsistency and ambiguity. In 1999, the Department of Defense (DOD) mandated the use of the term combat stress reaction (CSR).[9] Following this, the Navy, Marine Corps, and Air Force pushed to change the term to *operational stress reaction*, arguing that military-related stress could occur in peacetime as well as in war. A compromise was reached and

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3 Zahava Solomon, *Combat Stress Reaction: The Enduring Toll of War* (New York, NY: Plenum Press, 1993), 29.

4 Ibid.

5 Ibid.

6 U.S. Marine Corps (USMC), *Combat Stress*, Field Manual (FM) 90-446/6-22.5/Naval Tactics, Techniques, and Procedures (NTTP) 1-15M/Marine Corps Reference Publication (MCRP) 6-11C (Washington, D.C.: Headquarters, USMC, 2000), 52.

7 Charles R. Figley et al., *Combat Stress Injury: Theory, Research, and Management* (New York, NY: Routledge, 2007), 35.

8 When discussing BICEPS, the Marine Corps refers to the third principle as *Centrality*, while the Army refers to it as *Contact*.

9 U.S. Department of Defense (DOD), "Combat Stress Control (CSC) Programs," DOD Directive 6490.5 (Washington, DC: DOD, 1999), 8.

the term *combat and operational stress reaction* (COSR) became the standard across all Services.[10]

Although COSR is clearly defined in directives and instructions published by the military community, it is often confused in the civilian community with Posttraumatic Stress Disorder (PTSD) or Acute Stress Disorder (ASD). Medically defined terms like PTSD and ASD now encompass the symptoms commonly found in COSR, grouping them into categories and providing clear diagnostic criteria. However, this is problematic as PTSD, ASD, and COSR are not the same. As stated in a DOD Instruction which discusses mental health in the military, "COSRs do not represent mental health disorders or medically diagnosable conditions and concerns….posttraumatic stress disorder is not equivalent to or another name for COSR."[11]

COSR differs from medically diagnosable reactions to stress such as PTSD and ASD: the military views COSR as a transient reaction typical of exposure to stressful situations in combat. While it is possible for COSR to progress to a stress illness such as PTSD or ASD, it is regarded more frequently as temporary distress or loss of function.[12] Additionally, while PTSD and ASD are applicable to civilians and service members alike, COSR is solely defined in military terms—*combat* and *operational*. The symptoms of each reaction to stress vary as well. The differences between COSR and other stress reactions such as PTSD and ASD are discussed in further detail in later sections of this document.

C. Outline

The chapters of this document discuss relevant definitions, project methodology, findings and discussion, conclusions, and a proposed way forward. Appendices provide more in-depth information on terms defined and present sample surveys for proposed data collection. The last three appendices are the lists of illustrations (figures and tables), references, and abbreviations, respectively.

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[10] DOD, *Maintenance of Psychological Health in Military Organizations*, DOD Instruction 6490.05 (Washington, DC: DOD, 2011), 10–11.

[11] Ibid., 11.

[12] William P. Nash, "U.S. Marine Corps and Navy Combat and Operational Stress Continuum Model: A Tool for Leaders," in *Combat and Operational Behavior Health*, ed. Elspeth Cameron Ritchie (Falls Church, VA: Office of the Surgeon General, United States Army, 2011), 109–112.

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2. Definitions

For completeness and clarity, the definitions of terms related to the OEA methodology, combat stress, and PC are defined in the following sections. Many disparate terms have been used to describe what is currently defined as COSR, making it necessary to define clearly and specifically those terms when discussing the mental health consequences of exposure to combat, military operations, and CBRN events.

A. Operational Effectiveness Analysis (OEA) Cohorts

The OEA methodology consists of cohort groups that describe personnel status at a given time. These cohorts comprise unaffected, casualties (Cas), wounded in action (WIA), fatalities, symptomatic non-casualties, and losses due to OELM. The cohort groups applicable to this document are defined here for reference. More detailed information on OEA methodology cohorts can be found in the Disraelly et al. *OELM* paper.[13]

Casualties (Cas)

According to the definition given in the Disraelly et al. *OELM* paper,

> Based on the NATO definition, a casualty is "any person who is lost to his organization by reason of having been declared dead, wounded, diseased, detained, captured, or missing."[14] The HRIP [Human Response Injury Profile] methodology expanded the definition to specify that casualties occurred "as a result of exposure to a chemical agent, biological agent, radiological agent, or nuclear flash, blast, heat or radiation."[15] Casualties include both non-fatal casualties (NFCs) and fatalities. [16]

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[13] Deena S. Disraelly et al., *A Methodology for Examining Collateral Effects on Military Operations during a Chemical, Biological, Radiological, and/or Nuclear Attack—Operational Effectiveness Loss Multiplier (OELM)*, IDA P-5202, Draft Final (Alexandria, VA: IDA, April 2015), 10-4.

[14] North Atlantic Treaty Organization (NATO) Standardization Agency (NSA), NATO *Glossary of Terms and Definitions (English and French)*, Allied Administration Publication (AAP)-06, Edition 2012 Version 2 (hereafter referred to as AAP-06) (Belgium: NSA, 2012), 2-C-2.

[15] Disraelly et al., "A New Methodology for CBRN Casualty Estimation," 228.

[16] Disraelly et al., *A Methodology for Examining Collateral Effects on Military Operations during a CBRN Attack—OELM*, 11.

Casualties may be grouped into three subcategories: *wounded in action* (WIA), *psychological casualties* (PC), and *fatalities*. PC comprise combat stress casualties (CSC) and (in future versions of the OELM methodology) civilian psychological casualties (CPC).

Wounded in Action (WIA)

Casualties categorized as WIA are those personnel who experience an injury because of direct exposure or collateral effects of a CBRN event.[17] As described in the Disraelly et al. *OELM* paper, three potential casualty severity thresholds exist to categorize WIA casualties: *mild injury* (severity level 1), *moderate injury* (severity level 2), and *severe injury* (severity level 3).[18] The user of the OELM HRIP methodology determines which severity threshold to employ in any given set of calculations. For the purposes of this paper, WIA will refer to physical injuries of moderate severity (injuries that usually necessitate medical attention) or worse. For example, traumatic brain injury (TBI) is an injury that commonly causes WIA casualties in military populations.[19] Casualty severity levels and their potential applications for assessing CSC and CPC are discussed in detail later in this paper.

Fatalities

As stated in the Disraelly et al. *OELM* paper,

> A fatality represents an individual in the unit who dies outright or who dies either before or after seeking medical attention. The HRIP [Human Response Injury Profile] methodology distinguishes between two types of fatalities: those who die outright or before seeking medical attention, known as killed in action (KIA),[20] and those who die after seeking medical attention, known as died of wounds (DOW).[21] Individuals who become fatalities are considered to be operationally ineffective because they are lost to their unit permanently.[22]

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17 Disraelly et al., *A Methodology for Examining Collateral Effects on Military Operations during a CBRN Attack—OELM*, 12.

18 Ibid.

19 TBI, while neither a stress reaction nor a medically diagnosable psychological disorder, is important because of its high rate of comorbidity with stress reactions and psychological disorders in military personnel. Appendix A in this document provides more information on TBI and its relevance to the discussion of CSC.

20 NATO NSA, AAP-06, 2-K-1.

21 Ibid., 2-D-6.

22 Disraelly et al., *A Methodology for Examining Collateral Effects on Military Operations during a CBRN Attack—OELM*, 13.

B. Combat Stress Components Proposed for the OELM Methodology

The following definitions are germane to the discussion in this section on combat stress and are proposed for inclusion in the OELM methodology. While combat stress was originally included in the OELM methodology, it will be heavily expanded upon in this document. The definition of combat stress, considered part of the purpose of this document, is provided in the next section.

1. Combat Stress

Combat stress, categorized as an indirect exposure collateral effect in the OELM methodology, "includes all the physiological and emotional stresses encountered as a direct result of the dangers and mission demands of combat"[23] and is defined as "the mental, emotional or physical tension, strain, or distress resulting from exposure to combat and combat-related conditions."[24]

2. Operational Stress

Operational stress, or the "stress resulting from instantaneous or cumulative exposure to military operations, training, or life,"[25] affects service members similarly to combat stress, but does not necessitate first-hand combat experience. Operational stress reactions are defined as the "changes in physical or mental functioning or behavior resulting from the experience of military operations other than combat, during peacetime, or war, and on land, at sea, or in the air."[26]

3. Combat and Operational Stress (COS)

The COS term combines the aspects of stress caused (1) by direct exposure to combat and (2) by the exposure to military operations. COS refers to "all the physiological and emotional stresses encountered as a direct result of the dangers and mission demands of combat and other military operations."[27]

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23 Headquarters, Department of the Army (HQDA), *Combat and Operational Stress Control,* Field Manual (FM) 4-02.51 (Washington, DC: HQDA, 2006), 1-1.

24 USMC, *Combat Stress*, Preface.

25 William P. Nash, "Consensus Recommendations for Common Data Elements for Operational Stress Research and Surveillance: Report of a Federal Interagency Working Group," *Archives of Physical Medicine and Rehabilitation* 91 (2010): 1679.

26 USMC and U.S. Navy (USN), *Combat and Operational Stress Control*, MCRP 6-11C/ NTTP 1-15M (Washington, DC: Department of the Navy, Headquarters, USMC, 2010), 1-3.

27 Edward A. Brusher, "Combat and Operational Stress Control," in *Combat and Operational Behavior Health*, ed. Elspeth Cameron Ritchie (Falls Church, VA: Office of the Surgeon General, United States Army, 2011), 60.

4. Combat and Operational Stress Behavior (COSB)

COSB "is the generic term that is used for the full spectrum of combat and operational stress behaviors. It covers the range of reactions from adaptive to maladaptive" and includes adaptive stress reactions, "which enhance individual and unit performance," and maladaptive stress reactions such as COSR and misconduct stress behaviors.[28]

a. Combat and Operational Stress Reaction (COSR)

COSR refers to the adverse reactions of service members to COS. COSR is defined as "the expected and predictable emotional, intellectual, physical, and/or behavioral reactions of service members who have been exposed to stressful events in combat or noncombat military operations."[29] The term COSR is used by the U.S. military and is the standard descriptor of military-related stress reactions as it encompasses all stressors and stressful circumstances to which service members are frequently exposed.

b. Misconduct Stress Behaviors

Misconduct stress behaviors are reactions to stress that are categorized as maladaptive and "range from minor breaches of unit orders or regulations to serious violations of the Uniform Code of Military Justice (UCMJ) and the Law of Land Warfare."[30]

C. Psychological Casualties (PC)

PC are casualties that are psychological rather than physical in nature and can be caused by a wide variety of stress reactions. Personnel categorized as PC will be partially operationally effective or ineffective depending on the severity of their symptoms.[31]

1. Combat (and Operational) Stress Casualties (CSC)[32]

CSC are caused by the stresses of combat or military operations. In this document, CSC refers to service members who experience COSR or other stress reaction and are operationally ineffective while reacting or seeking treatment. When discussing CSC resulting from CBRN exposure, the term *CBRN CSC* will be used.

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28 HQDA, *Combat and Operational Stress Control*, 1-4.

29 USMC and USN, *Combat and Operational Stress Control*, Glossary 2.

30 HQDA, *Combat and Operational Stress Control*, 1-5.

31 See Chapter 4 for further information on the categorization of PC using symptom-based severity levels (27–28).

32 To streamline terms and to remain consistent with the OEA methodology, it should be noted that the designation *combat stress casualty* (CSC) includes casualties resulting from operational stress as well as combat stress.

2. Civilian Psychological Casualties (CPC)

CPC occur in non-military personnel and are caused by adverse reactions to the stress of CBRN events or other trauma. CPC that occur as a result of a CBRN event will be referred to as *CBRN CPC*.

D. Other Reactions and Disorders

1. Acute Stress Reaction (ASR)

Similar to COSR, ASR is "a transient condition that often develops within zero to four days from exposure to a traumatic event."[33] For ASR the "onset of at least some signs and symptoms may be simultaneous with the trauma itself, within minutes of the traumatic events, or may follow the trauma after an interval of hours or days…in most cases, symptoms will disappear within days."[34]

ASR and COSR are similar reactions to stress, but it is important to note the key difference between the two to avoid confusion: ASR may affect both civilians and military personnel while COSR applies only to service members. Also note that many of the symptoms characteristic of ASR and COSR overlap. Detailed information regarding the symptomatology[35] of both reactions is presented in Table 5 and in Appendix A.

2. Acute Stress Disorder (ASD)

Acute Stress Disorder (ASD) is a disorder which may be diagnosed in service members or civilians after experiencing symptoms of intrusion, avoidance, arousal, negative mood, and dissociation for at least three days to one month following a traumatic event which is experienced directly, indirectly, or witnessed, and may be civilian or military in nature.[36]

Again, while COSR is defined solely in military terms, ASD can affect service members and civilians alike. In addition, ASD is a medically diagnosable psychological disorder. COSR, on the other hand, is not treated as a disorder, but rather a transient reaction to stress. ASD symptoms include intrusive negative thoughts and memories, avoidance of reminders of the traumatic event, increased or inappropriate arousal, and dissociation; and must be experienced for at least three days to one month following trauma in order to be

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[33] DOD and U.S. Department of Veterans Affairs (VA), *Posttraumatic Stress Disorder* [PTSD] *Pocket Guide* (Arlington, VA: DOD, Defense Centers of Excellence for Psychological Health & Traumatic Brain Injury, 2013), 13.

[34] Ibid., *PTSD Pocket Guide*, 13.

[35] *Merriam Webster*, s.v. symptomatology refers to the symptoms of a disease in a given case taken as a whole.

[36] American Psychiatric Association, *Diagnostic and Statistical Manual of Mental Disorders: DSM-5* (Arlington, VA: American Psychiatric Publishing, 2013), 280–286.

diagnosed. More detailed information on the symptomatology of ASD can be found later in Table 5 and Appendix A.

3. Posttraumatic Stress Disorder (PTSD)

PTSD is a disorder that may be diagnosed in service members or civilians after experiencing symptoms of intrusion, avoidance, arousal, and negative cognitions and mood for at least one month following a traumatic event that is experienced directly or indirectly, or is witnessed, and the traumatic event can be civilian or military.[37]

PTSD is distinctly different from COSR. Whereas COSR is considered a transient, typical response to the stress of combat and military operations experienced by service members, PTSD is a medically diagnosable psychological disorder that affects civilians and service members alike and can be caused by a wide variety of civilian or military-related trauma. In addition, specific symptoms of intrusion, avoidance, arousal, and negative cognitions and mood must be experienced for at least one month for PTSD to be diagnosed. COSR, on the other hand, may be identified and treated as soon as it occurs. More detailed symptomatology of PTSD and COSR is described later in Table 5 and in Appendix A.

For clarity, Table 1 displays the categorization of military and civilian reactions to stress. Contingent upon factors such as duration of symptoms and deployment length, stress reactions that may occur either peri- or post-trauma and cause PC are listed in the table.

Table 1. Categorization of Military and Civilian Stress Reactions

	Military	Civilian
Peri-trauma	COSR, ASR, ASD	ASR, ASD
Post-trauma	ASD, PTSD	ASD, PTSD

[37] Ibid., 271–274.

3. Project Methodology

To thoroughly research combat stress and its potential to degrade operational effectiveness, the IDA research team conducted a comprehensive literature review. Through this approach, inconsistent and incorrect terms were identified and accurate terms were either located or created. Because of the influx of inaccurate terms, the research team formed specific assumptions while reviewing the literature in order to guide their findings and subsequent conclusions. The following sections describe the approach taken to review the literature and the assumptions made as a result.

A. Approach

The IDA research team began research on combat stress with a review of the literature, including peer-reviewed journal articles, books, web sources; military manuals, documents, and briefings; and medical textbooks. Whenever possible, the information in the latest editions of military publications was applied to the analysis; however, older versions of documents were also used if they still contained relevant information not found in current documentation. The objectives of this approach were threefold: to establish clear definitions of terms relevant to combat stress, to review the current data on PC, and to determine whether the data available were sufficient to accurately model PC.

It is important to note that the original focus of this work was on combat stress related to CBRN events in military environments, but after reviewing the literature, the IDA research team realized that there was a paucity of available research on this approach. The scope of the research was therefore broadened to include the psychological effects of CBRN and non-CBRN events experienced by both civilians and military personnel.

To thoroughly research combat stress, the research team used resources discussing the topics of combat stress, COS, and CSC. The team conducted online searches using Google, Google Scholar, the Published International Literature on Traumatic Stress (PILOTS) database, and the IDA library catalog. Search terms included the following:

- combat stress
- combat stress casualties
- operational stress
- combat and operational stress
- combat and operational stress reaction
- psychological stress
- psychological casualties

Because of the traditionally imprecise use of the term *combat stress* (discussed previously in chapter 1), the team felt it was necessary to include as many phrases linked to *combat*

stress as possible to capture fully its history. Sources that used improper or imprecise language were included in the review of the literature only if the reaction described reflected the modern definition, common characteristics, or indicative symptoms of COSR.

Literature describing PTSD and ASD was also reviewed since COSR has been frequently mistaken for these disorders. The research team catalogued the critical differences between these reactions to stress to maintain a clear set of attributes of COSR and to highlight how it differs from PTSD and ASD. Resources describing PTSD and ASD were omitted from the review of the literature unless it was clear that the reactions to stress being described were actually COSR, not brain injuries or psychological disorders.

As part of this effort, the IDA research team created a comprehensive annotated bibliography of resources reviewed, which is available from the author upon request.[38]

B. Assumptions

The following assumptions were made as part of the review of the literature relevant to combat stress.

- Individuals labelled "worried well" in the literature were considered to be PC.[39]
- Older resources describing COSR as *battle fatigue* or *shell shock* were considered to be COSR if the same characteristics and indicative symptoms as outlined in more modern sources were present.[40]

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38 POC: Sarah E. Butterworth, sbutterw@ida.org, 703-845-6837.

39 The research team would like to note that the term *worried well*, while consistently used in the literature, carries with it a stigmatized connotation. However, for lack of a more accurate term, it is used in this document, albeit reluctantly.

40 Indicative symptoms and common characteristics of COSR can be found in Table 5 and in Appendix A.

4. Findings and Discussion

The IDA research team's review of the literature found a dearth of consistent quantitative data on combat stress, COSR, and PC, especially in CBRN-related events. However, data were found on the adverse psychological effects of military service; combat and operational stressors which can lead to COSR and CSC; and COS control program effectiveness. In addition, the team identified the data needed to model PC, including the number of individuals affected, the severity level of those affected, the duration of the effect, and the onset of symptoms associated with the effect. Data that falls into these categories, and could be used to accurately model PC include the following: return to duty (RTD) ratios and ratios of CSC and CPC to physical casualties; the symptoms of COSR, ASR, ASD, and PTSD and their division into severity levels; and RTD rates and symptom duration.

Findings are broken into two sections, General Findings and Model-Specific Findings. General Findings contains the data on the psychological consequences of military service, combat and operational stressors, and COS control. Model-Specific Findings contains the data on the number of individuals affected, the severity level of those affected, the duration of the effect, the initiation of the effect, and the type of effect. The last section is Discussion and focuses on scope—the original and broadened concentration applied to this research, and limitations—the factors that affected the comprehensiveness of the research outlined in this document.

A. General Findings

1. Psychological Consequences of Military Service

It is evident that combat and military operations have the potential to take a serious toll on the mental health and physical well-being of service members. Exposure to the stresses of combat has been linked to the subsequent development of psychiatric disorders, physiological diseases, anger problems, depression, and PTSD.[41] In addition, "military personnel with untreated health problems are at an increased likelihood of engaging in

[41] Edward A. Brusher, "Combat and Operational Stress Control," *International Journal of Emergency Mental Health* 9, no. 2 (2007): 112.

unethical behavior (i.e., injuring noncombatants or destroying property), substance abuse, and homelessness."[42]

It is estimated that 20 to 40 percent of U.S. service members returning from combat experience mental health symptoms.[43] The prevalence of PTSD is approximately 19 to 30 percent in Vietnam veterans[44], 10 percent in Gulf War veterans[45], 6 to 11 percent in Operation Enduring Freedom (OEF) veterans[46], and 12 to 20 percent in Operation Iraqi Freedom (OIF) veterans.[47] In a recent survey, 53 percent of Iraq and Afghanistan veterans reported having a mental health injury, 44 percent were diagnosed with PTSD, 31 percent reported having thought about taking their life since joining the military, and 40 percent knew at least one Iraq or Afghanistan veteran who had committed suicide.[48]

COSR is linked to a variety of negative mental health consequences, especially when left untreated. Solomon et al. found that service members who experience COSR during military operations demonstrate more general psychiatric symptomatology, more social functioning problems, lower perceived self-efficacy in combat, and more physical health problems following military operations than those who do not.[49] Prior COSR has been linked to a greater likelihood of experiencing subsequent COSR and to more severe, longer-lasting PTSD symptoms.[50] Additionally, Israeli veterans of the 1973 Yom Kippur war who had experienced COSR were found to more frequently demonstrate physical symptoms of stress and anxiety such as rapid pulse, excess perspiration, weakness and fatigue, headaches, vision

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[42] Bret A. Moore et al., *Military Psychologists' Desk Reference* (New York, NY: Oxford University Press, 2013), 189.

[43] Alan L. Peterson et al., "Combat Stress Casualties in Iraq. Part 2: Psychiatric Screening Prior to Aeromedical Evacuation," *Perspectives in Psychiatric Care* 44, no. 3 (2008): 160.

[44] Bruce P. Dohrenwend et al., "The Psychological Risks of Vietnam for U.S. Veterans: A Revisit with New Data and Methods," *Science* 313 (2006): 979.

[45] Han K. Kang et al., "Post-Traumatic Stress Disorder and Chronic Fatigue Syndrome-like Illness among Gulf War Veterans: A Population-Based Survey of 30,000 Veterans," *American Journal of Epidemiology* 157, no. 2 (2003): 145.

[46] Charles W. Hoge et al., "Combat Duty in Iraq and Afghanistan, Mental Health Problems, and Barriers to Care," *New England Journal of Medicine* 351, no. 1 (2004): 16.

[47] Ibid.

[48] Iraq and Afghanistan Veterans of America (IAVA), *2014 IAVA Member Survey: Perceptions and Views from Iraq and Afghanistan Combat Veterans on the Challenges and Successes of the New Greatest Generation of Veterans*, (New York, NY: IAVA, 2014), 8–13.

[49] Zahava Solomon et al., "Aftermaths of Combat Stress Reaction: A Three-Year Study," *British Journal of Clinical Psychology* 31 (1992): 29.

[50] Zahava Solomon, *Combat Stress Reaction,* 60–61.

loss, and poor appetite 18 years after the war.[51] Rates of adverse health practices such as smoking and self-medication were also found to be higher in service members who had experienced COSR than those who had not.[52]

2. Combat and Operational Stressors

The underlying stress of combat and military operations is generally well-understood, but it is essential to the discussion of COS to identify the specific stressors to which service members are exposed on a regular basis. Stressors can be organized as organizational, environmental, interpersonal, or personal;[53] physical or psychological;[54] or broken down as combat or operational in nature.[55] Stressors commonly encountered in a military setting include the imminent threat of death or injury; sight of death or injury in others; loss of commanders and buddies; physical deprivations of food, water, or sleep; lack of privacy; exposure to extreme weather; and inadequate shelter.[56]

Hoge et al. studied stressful combat experiences in soldiers and marines deployed to Iraq and Afghanistan, compiling a list of the most commonly experienced stressful situations in a combat environment.[57] These findings, which highlight the omnipresent stress found in combat and military operations across Services, are displayed in Table 2.

3. Combat and Operational Stress Control

Managing COS in order to prevent COSR has been a prominent goal of the U.S. military in recent years. Various COS control programs have been developed, including the Army program Battlemind, the Marine Corps COS Control Program, the Navy Operational Stress Control Program, and the Air Force program Landing Gear.[58]

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51 Yuval Neria et al., "Do Combat Stress Reaction and Posttraumatic Stress Disorder Relate to Physical Health and Adverse Health Practices? An 18-Year Follow up of Israeli War Veterans," *Anxiety, Stress, and Coping: An International Journal* 16, no. 2 (2003): 231–233.

52 Ibid., 236–237.

53 Nader K. Takla et al., "Combat Stress, Combat Fatigue, and Psychiatric Disability in Aircrew," *Aviation, Space, and Environmental Medicine* (1994): 859.

54 Zahava Solomon et al., "Combat Stress Reaction—Clinical Manifestations and Correlates," *Military Psychology* 1 (1989): 37.

55 HQDA, *Combat and Operational Stress Control Manual for Leaders and Soldiers,* FM 6-22.5 (Washington, DC: HQDA, 2009), 1-2.

56 Solomon et al., "Combat Stress Reaction—Clinical Manifestations and Correlates," 37.

57 Hoge et al., "Combat Duty in Iraq and Afghanistan, Mental Health Problems, and Barriers to Care," 18.

58 Drew T. Doolin, "Healing Hidden Wounds: The Mental Health Crisis of America's Veterans," *Joint Force Quarterly* 54 (2009): 77–78.

Table 2. Stressors Experienced in Iraq and Afghanistan in 2004

Combat Experience	Army in Afghanistan (%)	Army in Iraq (%)	Marines in Iraq (%)
Being attacked or ambushed	58	89	95
Receiving incoming artillery, rocket, or mortar fire	84	86	92
Being shot at	66	93	97
Shooting at the enemy	27	77	87
Being responsible for the death of an enemy combatant	12	48	65
Being responsible for the death of a noncombatant	1	14	28
Seeing dead bodies	39	95	94
Handling human remains	12	50	57
Seeing dead or seriously injured Americans	30	65	75
Knowing someone seriously injured or killed	43	86	87
Participating in demining operations	16	38	34
Seeing injured women or children you were unable to help	46	69	83
Being wounded or injured	5	14	9
Clearing or searching buildings	57	80	86
Saved the life of a soldier or civilian	6	21	19

Source: Hoge et al., "Combat Duty in Iraq and Afghanistan," 18.

The most widely used and most effective treatment of COSR is frontline treatment based on the principles of Brevity, Immediacy, Centrality/Contact, Expectancy, Proximity, and Simplicity (BICEPS).[59] These six principles have been shown to be the most effective in treating COSR, with a majority of sources agreeing that medically evacuating CSC should be avoided except in serious cases.[60] In past wars, medically evacuating CSC was the norm, whereas today, psychiatric patients usually comprise less than 10 percent of all patients evacuated.[61]

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59 Zahava Solomon et al., "Frontline Treatment of Combat Stress Reaction: A 20-Year Longitudinal Evaluation Study," *American Journal of Psychiatry* 162 (2005): 2313.

60 Solomon et al., "Frontline Treatment of Combat Stress Reaction," 2313.

61 Alan L. Peterson et al., "Combat Stress Casualties in Iraq. Part 1: Behavioral Health Consultation at and Expeditionary Medical Group," *Perspectives in Psychiatric Care* 44, no. 3 (2008): 150.

Israeli soldiers who received frontline treatment using the three principles of PIE (Proximity, Immediacy, and Expectancy) during the Lebanon wars (1982–1985) had lower rates of posttraumatic and psychiatric symptoms, had better rates of social functioning, and reported experiencing less loneliness 20 years after the war than similarly traumatized soldiers who did not receive frontline treatment.[62]

BICEP's principle Brevity encourages treatment of CSC to be short term, minimizing the time that service members are away from their units.[63] Although it is important to adhere to the principle of brevity when treating CSC, it is necessary to ensure that service members are confident in their ability to return to duty before they do so. Solomon et al. found that CSC who received frontline treatment and returned to duty before they felt they had recovered had more problems in occupational and social functioning and showed significantly more posttraumatic symptoms than those who felt sure in their fitness to return to duty.[64]

B. Model-Specific Findings

1. Number of Individuals Affected

The first pieces of data essential to the modeling of PC are the number of individuals affected by combat stress. Through a review of the literature, the research team identified two sources of data that may be used to estimate the number of individuals affected: the ratios of *psychological* casualties to *physical* casualties, and RTD ratios, or the percentage of service members who return to duty after being treated for CSC.

a. CPC, CSC, and Physical Casualty Ratios

Research on CPC and CSC in CBRN and non-CBRN events from military and civilian sources yielded little reliable quantitative data that could be used to estimate ratios of psychological casualties to physical casualties (CSC:Cas or CPC:Cas). Previous IDA researchers faced similar issues when attempting to find data on CSC:total casualties and PC:total casualties. Disraelly et al. found that

> …research was not able to find a consistent military or civilian standard for CSC:total casualties (WIA+KIA) or PC:total casualties, because the definitions of CSC and PC are inconsistent and there is no uniform measure of the total casualties. Most documented military

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62 Solomon et al., "Frontline Treatment of Combat Stress Reaction," 2313.

63 USMC, *Combat Stress*, 51.

64 Solomon et al., "Frontline Treatment of Combat Stress Reaction," 2132.

CBRN events provide little to no quantitative data on combat stress, psychological, or PTSD casualties.[65]

Despite the paucity of consistent quantitative data on the ratios of CSC:Cas and CPC:Cas, some data were found in the literature that may be used to estimate the number of individuals affected by combat stress for modeling purposes. Table 3, originally featured in the Disraelly et al. *OELM* paper, has been updated for this document; it demonstrates the most current data on CSC and CPC available.

Table 3. CSC:Cas and CPC:Cas Ratios

Event	Year(s)	Event Type	CSC to Cas	CPC to Cas
WWI (Gas warfare casualties)[a]	1914–18	CBRN	2 to 1	
European Theater WWII[b]	1942–5	NON-CBRN	1 to 3	
European Theater WWII (Airborne Forces)[b]	1942–5	NON-CBRN	1 to 10	
Okinawa WWII (1 month)[b]	1945	NON-CBRN	1 to 1.8	
Pacific Theater WWII[c]	1942–5	NON-CBRN	1 to 1	
Israel[c]	1967	NON-CBRN	1 to 1	
Vietnam[c]	1955–75	NON-CBRN	1 to 10	
Goiania, Brazil (includes all contaminated)[d]	21	CBRN		500 to 1
Goiania, Brazil (close medical surveillance only)[d]	1987	CBRN		2500 to 1
Israeli Scud Attack I (includes all casualties)[d]	1991	NON-CBRN		16 to 1
Israeli Scud Attack I (excluding unjustified Atropine injections)[d]	1991	NON-CBRN		8 to 1
Lebanon (height of war)[e]	1982	NON-CBRN	1 to 1	

[a] Tian P. S. Oei et al., "Psychological Dysfunction in Battle: Combat Stress Reactions and Posttraumatic Stress Disorder," *Clinical Psychology Review* 10 (1990): 355.

[b] USMC, *Combat Stress*, 1.

[c] HQDA, *Leaders' Manual for Combat Stress Control*, FM 22-51 (Washington, DC: Headquarters, Department of the Army, 1994), 1-4.

[d] Ross H. Pastel and Elspeth Cameron Ritchie, "Terrorism and Chemical, Biological, Radiological, Nuclear, Explosive Weapons," in *Combat and Operational Behavior Health*, ed. Elspeth Cameron Ritchie (Falls Church, VA: Office of the Surgeon General, United States Army, 2011), 597.

[e] USMC, *Combat Stress*, Preface.

b. Return to Duty (RTD) Ratios

A key component of the CSC discussion is the percentage of service members who will successfully return to duty after being treated for COSR or other stress reaction. Reported RTD rates vary widely across the literature but are important to review as they could be used

[65] Disraelly et al., *A Methodology for Examining Collateral Effects on Military Operations during a CBRN Attack—OELM*, IDA P-5202, 36.

to estimate the effects of COSR on the degradation in unit or on individual operational effectiveness. RTD rates have been reported to range from 15 percent to 85 percent, depending on the conflict in which service members are engaged, the type of treatment used, and the protocol for medically evacuating injured service members.[66] For example, Table 4 displays reported RTD ratios across events in history that may be used to estimate the average time CSC will be operationally ineffective.

Table 4. Return to Duty (RTD) Data

Event	Year(s)	RTD Rate (%)
WWI[a]	1914–18	80
WWII[a]	1942–45	50
WWII (British troops)[a]	1942–45	40
Korea[a]	1950–53	65–75
Yom Kippur War (returned to original units)[a]	1973	39
Iraq War (OIF)[b]	2003–10	94
Afghanistan War (OEF)[b]	2001–present	93
Vietnam[c]	1955–75	94
Bosnia[c]	1955	85
Haiti[c]	1995	94

[a] Edgar Jones et al., "'Forward Psychiatry' in the Military: Its Origins and Effectiveness," *Journal of Traumatic Stress* 16, no. 4 (2003), 411.

[b] Alan L. Peterson, "Combat Stress Casualties in Iraq. Part 2: Psychiatric Screening Prior to Aeromedical Evacuation," *Perspectives in Psychiatric Care* 44, no. 3 (2008): 161.

[c] Bryan L. Bacon et al., "A Historical Overview of Combat Stress Control Units of the U.S. Army," *Military Medicine* 168, no. 9 (2003): 692.

2. Severity of Effect

Symptom-based severity levels are an important part of an effort to accurately model PC. The common symptoms of stress reactions that may cause PC and the development of PC severity levels based on the OELM HRIP methodology are discussed in the following sections.[67]

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[66] Todd Helmus C. et al., *Steeling the Mind: Combat Stress Reactions and Their Implications for Urban Warfare* (Arlington, VA: RAND, 2005), xviii; and HQDA, *Leaders' Manual for Combat Stress Control*, 1-4.

[67] Disraelly et al., *A Methodology for Examining Collateral Effects on Military Operations during a CBRN Attack—OELM*, 40.

a. Symptoms of Stress Reactions

COSR, ASR, ASD, and PTSD often have overlapping symptoms, which can lead to confusion in the identification and treatment of reactions to stress. Understanding the symptomatology of different reactions to stress allows for the potential identification of symptom-based severity levels similar to those found for WIA in the OELM HRIP methodology. Table 5 depicts the common symptoms of stress reactions and helps to demonstrate the importance of well-evidenced differential diagnoses. This table, created using the most commonly reported symptoms for each stress reaction, is regarded only as a brief overview of typical symptoms. Appendix A presents more detailed information on the creation of this table and on COSR, ASR, ASD, and PTSD symptomatology and key differential characteristics.

Table 5. Common Symptoms of COSR, ASR, ASD, and PTSD

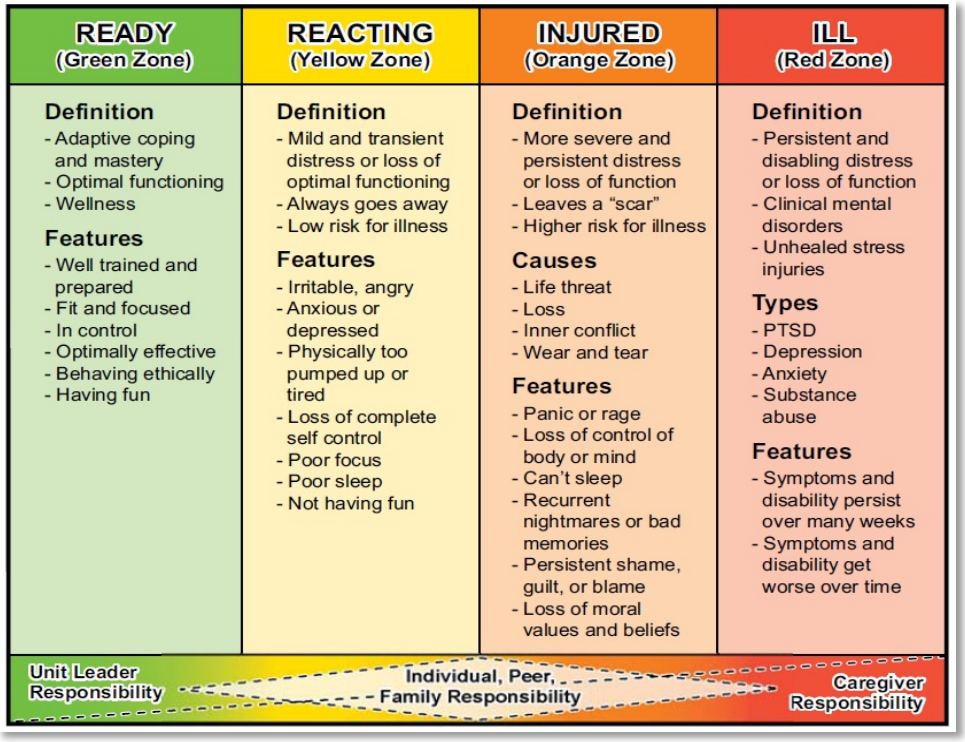
Symptom	COSR	ASR	ASD	PTSD
Anger	X		X	X
Anxiety	X	X	X	X
Avoidance of stimuli associated with trauma		X	X	X
Depression	X	X	X	X
Diarrhea	X			
Difficulty concentrating	X			
Dissociation		X	X	X
Dizziness	X			
Exaggerated negative beliefs				X
Fatigue	X	X		
Fear	X		X	X
Forgetfulness	X			
Guilt	X	X		X
Headaches	X			
Hypervigilance	X	X	X	X
Insomnia	X		X	X
Intrusive negative thoughts and memories		X	X	X
Irritability	X		X	X
Jumpiness	X	X	X	X
Memory loss	X	X		
Nausea	X			
Nightmares	X		X	X

Symptom	COSR	ASR	ASD	PTSD
Panic	X		X	X
Racing heart	X			
Social withdrawal	X		X	X

Note: Symptoms are the most commonly reported and are not a comprehensive list of all possible symptoms experienced on a case-by-case basis.

b. Severity Levels

Symptom-based severity levels for PC similar to those found in the OELM HRIP methodology for physical casualties are a necessary aspect of the effort to accurately model PC. The Marine Corps COS Continuum Model (Figure 1) illustrates the possible levels of severity associated with COSR and other stress reactions.[68] Like the four injury severity levels employed in the OELM HRIP methodology, the severity of stress reaction symptoms can be divided into four zones: Ready (Green Zone), Reacting (Yellow Zone), Injured (Orange Zone), and Ill (Red Zone).



Source: USMC and USN, *Combat and Operational Stress Control*, 1-8.

Figure 1. USMC COS Continuum Model

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68 USMC and USN, *Combat and Operational Stress Control*, 1-8.

3. Duration of Effect

A vital aspect of the modeling of PC is the time during which individuals are affected. This is demonstrated by data from two sources: the duration of symptoms of various stress reactions and the RTD rates demonstrating the time during which service members are operationally ineffective.

a. COSR, ASR, and ASD Symptom Duration

COSR, ASR, and ASD are best distinguished by their symptoms and by the duration of these symptoms. Symptom duration can be used to identify the duration of the effect, a piece of data essential to the modeling of PC. Table 6 provides clear information on the duration of symptoms found in each stress reaction.

Table 6. COSR, ASR, and ASD Symptom Duration[69]

Stress Reaction	COSR	ASR	ASD
Symptom Duration	0–4 days	0–4 days	3 days–1 month

b. RTD Rates

RTD rates reflect the time during which service members are operationally ineffective and are a manner of identifying the duration of the effect of combat stress for modeling and estimation purposes. Data on RTD rates vary across the literature the research team had reviewed, but several sources agree that approximately 85 percent of service members return to duty within one to three days following COSR.[70] Table 7 and Table 8 display RTD rates by source and by event, respectively.

Table 7. RTD Rates by Source

Source	RTD within 1–3 days (%)	RTD within 1–2 weeks (%)	Fail to RTD (%)
Army FM 22-2[a]	50–85	15–20	5–10
Campise et al.[b]	85		
Army FM 6-22.5[c]	65–85	15–20	5–10

[a] HQDA, *Leaders' Manual for Combat Stress Control*, D-10b.
[b] Campise et al., "Combat Stress," 225.
[c] HQDA, *Combat Stress*, 54.

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69 US DOD and US VA, *PTSD Pocket Guide*, 13.

70 Rick L. Campise et al., "Combat Stress," in *Military Psychology: Clinical and Operational Applications* (New York, NY: Guilford Press, 2006), 225; HQDA, *Leaders' Manual for Combat and Operational Stress Control,* D-10b; and HQDA, *Combat Stress*, 54.

Table 8. RTD Rates by Event

Event	RTD within 1–3 days (%)	RTD within 3–5 days (%)	RTD within 1–2 weeks (%)	Fail to RTD
WWI & WWII[a]	80			
Korean War[a]	85		10	5
Iraq War (OIF)[b]		95–98		

[a] Campise et al., "Combat Stress," 224.

[b] Enrique Smith-Forbes et al., "Combat Operational Stress Control in Iraq and Afghanistan: Army Occupational Therapy," *Military Medicine* 179 (2014): 281.

4. Initiation of Effect

The initiation of effect, or when the onset of symptoms occurs, is a parameter essential to the modeling effort. For now, based on historical evidence, (including the Tokyo Sarin attack (1995) and Israeli Scud attacks (during the first Gulf War, 1990–1991), the IDA research team assumes that the initiation of effect occurs immediately upon onset of physiological symptoms following an event.[71]

5. Type of Effect

The research team posits the following five types of effect that may present in PC following a traumatic event: hypochondriasis, sympathetic, psychosocial, "worried well," and vicarious traumatization. Each is briefly discussed in the following sections.

a. Hypochondriasis

The hypochondriasis effect is characterized by "the preoccupation with the fear of having, or the idea that one has, a serious disease based on the person's misinterpretation of bodily symptoms."[72]

b. Sympathetic

Sympathetic effects are reflective of the symptoms of others. Symptoms are solely sympathetic in nature and are not attributable to exposure to a traumatic event.

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[71] Pastel and Ritchie, 598; and Tetsu Okumura et al., "Report on 640 Victims of Tokyo Subway Sarin Attack," *Annals of Emergency Medicine* 28, no. 2 (1996): 130.

[72] World Health Organization (WHO), "ICD-10-CM Diagnosis Code F45.21," *The ICD-10 Classification of Mental and Behavioral Disorders: Clinical Descriptions and Diagnostic Guidelines* (Geneva, CH: WHO, 1992), 131.

c. Psychosocial

The term *psychosocial* is defined as "pertaining to the influence of social factors on an individual's mind or behavior."[73] Psychosocial effects are characterized by behavioral reactions as a result of exposure to a traumatic event or to the interaction with individuals who have been exposed to a traumatic event. These behavioral reactions may present as anxiety, stress, anger, disorientation, or misconduct behaviors.

d. "Worried well"

The worried well effect is witnessed in PC who "…have minimal or no exposure to a CBRN agent…" but "will seek medical care and slow down medical treatment of genuinely affected patients."[74] The categorization of the worried well effect is applicable to persons "encountering health services with feared condition which was not demonstrated" and those "encountering health services in which problem was normal state."[75]

e. Vicarious Traumatization

The effect of vicarious traumatization is defined as "the deleterious effect of trauma therapy" on trauma workers (such as non-medical personnel providing assistance (buddy aid) and personnel conducting decontamination operations, as well as medical and mortuary personnel).[76] Vicarious traumatization occurs through exposure to "descriptions of and reactions to trauma" which "may actually indirectly cause distress and traumatization."[77]

C. Discussion

1. Scope

The original scope of this research was limited to the effects of combat stress caused by exposure to military-related CBRN events. As mentioned previously, the scope of this research was broadened from its primary focus to include CPC and CSC resulting from a wide range of events related to combat and military operations and non-CBRN events. This shift in focus and the broadening of scope were to the result of finding little data on the

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[73] Pekka Martikainen et al., "Psychosocial Determinants of Health in Social Epidemiology," *International Journal of Epidemiology* 31 (2002): 1091.

[74] Fred P. Stone, *The "Worried Well" Response to CBRN Events: Analysis and Solutions* (Maxwell, AL: U.S. Air Force (USAF) Counterproliferation Center, 2007), 1.

[75] WHO, "ICD-10-CM Diagnosis Code Z71.1," 243.

[76] Laurie Anne Pearlman et al., "Vicarious Traumatization: An Empirical Study of the Effects of Trauma Work on Trauma Therapists," *Professional Psychology: Research and Practice* 26, no. 6 (1995): 558.

[77] Rachel Sabin-Farrell et al., "Vicarious Traumatization: Implications for the Mental Health of Health Workers?" *Clinical Psychology Review* 23 (2003): 449.

psychological consequences of CBRN events alone, especially when limited to CBRN events occurring in a military setting.

2. Limitations

The main limitation of this research is in the paucity of data available on CPC and CSC. A shortage of clear, consistent definitions of terms such as *combat stress*, COS, and COSR have led to misleading and misreported numbers, making the estimation of potential CSC that occur after combat problematic. As stated by Disraelly et al.,

> The root of the challenge in estimating CSC is in the lack of available data and the lack of clarity in the data that is captured. For example, depending on the definition of combat stress being used at the time the data were collected, recorded ratios—particularly those pertaining to CBRN events—range widely…[78]

The IDA research team identified five limitations that may have influenced the scarcity of accurate quantitative data on PC including: the generalization of military data applied to civilian populations and vice versa; the generalization of general military data to CBRN-related military data; cultural differences affecting research and reporting; and the confusion of CSC for PTSD and other terms. Having identified these potential challenges to data collection, reporting, and generalizability, the research team was able to identify factors that may have skewed data reported from certain time periods, countries, or sources.

Lastly, research was limited to open sources. Classified or closely held military documents were not included in the review of the literature.

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[78] Disraelly et al., *A Methodology for Examining Collateral Effects on Military Operations during a CBRN Attack—OELM,* 36.

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5. Conclusions and Way Ahead

A. Conclusions

Through a review of the literature, the research team found the data on COS, COSR, CSC, and CPC to be deficient in both quantity and quality. Definitions of terms relevant to combat stress were inconsistent across civilian and military literature; little quantitative data were available on PC resulting from CBRN or non-CBRN events; and what data were available lacked measures of accuracy and reliability.

Despite what is known about the potential detrimental effects of combat and military operations on the mental health of service members, it is clear that little reliable quantitative data exists. As stated by Edward A. Brusher, "there exists a scarcity of rigorous, empirical research conducted explicitly on the mental health and well-being of service members…during periods of major military operations."[79]

This shortage of rigorous research and quantitative data on CSC and CPC has led to an area of incompleteness in the estimation and modeling capabilities of the OELM methodology. Without further research, the topic of combat stress creates a gap in the operational effectiveness degradation estimation and modeling capabilities of the OELM methodology.

1. Non-CBRN Events

Estimating PC resulting from non-CBRN events is a challenging endeavor given the current data available. Much of the collected and reported data are presented in the literature without the accompaniment of clarifying information such the definitions of CPC and CSC or the methodology used to undertake the task of categorizing and treating PC. Because of this ambiguity, much of the already limited quantitative data found on rates of non-CBRN CSC are unreliable when attempting to accurately estimate and model the degradation of operational effectiveness.

Current reported data on non-CBRN CSC and CPC can be used to establish standards going forward, but the research team found it clear from the existing literature that further research is needed for accurate casualty estimation and modeling.

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[79] Brusher, "Combat and Operational Stress Control," *International Journal of Emergency Mental Health*, 112.

2. CBRN Events

Given the difficulty of estimating PC as a result of non-CBRN events, the estimation and modeling of CBRN events is nearly impossible given the lack of data found in the current literature. As stated by Fred P. Stone in his analysis of "worried well" casualties after CBRN events,

> The psychological reactions of the direct victims of CBRN have rarely been properly studied. Despite confident claims that the worried well are a significant problem, the review of the literature for this study failed to find a single, scientifically-valid study of this phenomena.[80]

Reported values regarding PC following CBRN events vary widely, with different sources frequently reporting conflicting values for the same event. Often no data regarding PC are reported; and when they are, it is unclear how PC were defined or treated. Thus, of the limited quantitative data available on PC following CBRN events, much of it is insufficient for estimation and modeling purposes.

B. Way Ahead

Because of the insufficiency of the data found on CPC and CSC in the literature for estimation and modeling purposes, further research is necessary. Fortunately, numerous opportunities are available for further research to be conducted to improve the understanding of the psychological effects of the exposure to CBRN events and the stresses of combat and military operations. The IDA research team proposes suggestions for the improvement of RTD data, the implications of the development of PC severity levels, and methods for collecting data on PC that would aid to augment the existing quantitative data available.

1. Non-CBRN Combat Stress Casualties (CSC)

The first step in accurately estimating and modeling CSC is the consistent reporting of the rates at which service members are rendered operationally ineffective as the result of COSR. COS control teams deployed with service members should collect and report data consistently on the rates of COSR, CSC, and RTD. These practices will improve the existing quantitative data on the effects of COSR and CSC on the mental health of service members during deployment.

The second step is collecting additional data on COS and CSC from situations that mimic the experience of combat such as military training and exercises. The research team proposes that further data on COS be collected following military operations in urbanized terrain (MOUT) training in which units practice completing missions in shoot houses,[81]

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[80] Stone, *The "Worried Well" Response to CBRN Events: Analysis and Solutions*, 37.

[81] Shoot houses, also referred to as kill houses, are live ammunition shooting ranges.

urban assault courses, breach facilities,[82] and combined arms collective training facilities.[83] These training sessions or practices prepare service members for combat by replicating the conditions often present in battle, including the noises, smells, and sounds. Live fire, or blank ammunition, programmable Human Urban Targets, smoke, heat, noise, obstacles, and limited visibility are all potential aspects of the training, making it an ideal opportunity to collect data on the psychological stress levels of service members following exercises.[84]

For example, data could be collected through self-report surveys on military bases where military operations on urban terrain (MOUT) training takes place. These surveys could be administered by IDA researchers and/or operational psychologists, working collaboratively. One survey would be administered immediately after service members complete training exercises and a follow-up survey would be sent via email or administered by base personnel one week later. Survey items would be created using the information regarding COSR and ASR that the research team has gleaned from reviewing the literature and modeled after the PTSD Checklist-Military Version[85] and the Stanford Acute Stress Reaction Questionnaire.[86]

In some instances, items may be directly taken from these established scales. These items would be designed to assess stress level, COSR symptoms, and perceived operational effectiveness following MOUT training completion. The survey would be brief—ideally no more than 20 items—in an attempt to avoid disrupting the flow of the MOUT training process. In the survey, service members would be instructed to rate their level of agreement with statements assessing stress level, COSR symptoms, and perceived operational effectiveness on a Likert scale.[87] Additionally, demographic information would be collected, including gender and age. An anonymous subject code would allow for the tracking of

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82 Breach facilities are designed to train military personnel on techniques to breach buildings, including locked doors and windows.

83 HQDA, *Training for Urban Operations*, Training Circular 90-1 (Washington, DC: HQDA, 2002), 1-3.

84 Ibid., 1-11.

85 Armed Force Crossroads, "PTSD Checklist – Military Version (PCL-M)," https://www.afcrossroads.com/famseparation/rem_docs/amc/McChord_PTSD_checklist_template.pdf.

86 Stanford Center on Stress Health Center, "Stanford Acute Stress Reaction Questionnaire," http://stresshealthcenter.stanford.edu/research/documents/GenericversionofSASRQ-30ASDitems.pdf.

87 A Likert scale is a psychometric tool widely used in assessing survey responses. Typically, respondents rate their level of agreement or disagreement with statements provided on a five- or seven-point scale. For example, choices may be Strongly Agree, Agree, Neither Agree nor Disagree, Disagree, and Strongly Disagree.

individual responses across both surveys.[88] Sample surveys for proposed data collection are provided in Appendix B.

2. CBRN PC

CBRN events present an area in which a great deal of further research should be conducted. In the future, PC should be classified using standard, universal definitions such as the ones put forth in chapter 2. Recognizing the differences between PC will help to categorize them more accurately for the purposes of treatment and reporting. The psychological effects of CBRN events are yet to be well understood but are important to study as psychological stress has the potential to severely degrade operational effectiveness. By setting forth clear definitions of the possible types of PC and consistently reporting their incidences following CBRN events, future research will be better informed and thus better able to estimate and model PC.

Disasters, whether natural or man-made (e.g., plane crashes, terrorist attacks), provide a potential arena for further CBRN-related research to be conducted. Disasters often carry immense psychological consequences similar to those of CBRN events, and occur much more regularly than CBRN exposures or attacks. The research team proposes that data on PC resulting from natural and man-made disasters be collected and made available, making extrapolation to CBRN events possible. While disasters do not account for all unique aspects of CBRN events, they might act as a starting point to set standards for collecting data on PC that will then carry over to CBRN disaster response, modeling, and analysis.

3. RTD Rates and Severity Levels

RTD data should be collected and reported consistently, including factors such as duration and intensity of conflict, type of treatment, and policy on medical evacuations. By doing so, conclusions may be drawn regarding COS control and CSC treatment effectiveness. By examining the RTD rates of service members treated with differing COS control interventions, it may be possible to definitively identify a treatment program that is the most effective—one which treats service members effectively and ensures that they are operationally ineffective for the least amount of time possible.

In addition, consistently reported RTD rates can be used to aid in the estimation of CSC. Service members classified as CSC are considered to be operationally ineffective while being treated for COSR, thus the duration of their treatment before returning to full duty can be used as a measure of the severity level of their reactions. As discussed in chapter

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[88] The anonymous subject code comprises the first two letters of the respondent's mother's maiden name, the first two letters of the city in which the respondent was born, and the first two numbers of the month in which the respondent was born. For example, a respondent whose mother's maiden name was Smith and was born in Fairfax in May would have the subject code SMFA05.

4, further research can be conducted using the severity levels put forth by the Marine Corps in its COS Continuum Model. Developing severity levels similar to those found for WIA will aid leaders and medical professionals in the triage and treatment of CSC in the future.

4. Potential Areas of Future Study

The IDA research team identified several areas of interest as potential opportunities for follow-on work and future study. These areas, which may influence rates and severity of PC, include social factors such as stigma, group cohesion, and social support. Additionally, factors such as individual history, previous trauma, length and intensity of deployment, and number of deployments were identified as potential areas for future study. The study of these factors may aid in the development a better understanding of the variables that affect the rates and severity of PC.

Finally, in reviewing the literature on combat stress the research team found a paucity of reliable quantitative data on PC, especially those resulting from CBRN events. The research team identified the data needed for the modeling of PC:

- the number of individuals affected,
- the severity of the effect,
- the duration of the effect,
- the onset of symptoms associated with the effect, and
- the type of effect.

Although data from select sources were located to fulfill these pieces of the modeling effort, further research is necessary to ensure that the data used to model PC is reliable and consistent. As a way ahead, the research team proposes that data on PC be collected following disasters, allowing for extrapolation to CBRN events.

In addition, the research team identified a potential data collection opportunity following urban operations training on military bases. This proposed data collection would supplement the current available data on CSC, allowing for more accurate modeling and estimation.

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Appendix A
Memo: Understanding the Differences between COSR, ASR, ASD, PTSD, and TBI

IDA SFRD

MEMORANDUM FOR THE RECORD

27 August 2014

To: Dr. Deena Disraelly, Dr. Bob Zirkle, and Ms. Terri Walsh

From: Ms. Sarah Butterworth

Subject: Understanding the Differences between Combat and Operational Stress Reaction (COSR), Acute Stress Reaction (ASR), Acute Stress Disorder (ASD), Posttraumatic Stress Disorder (PTSD), and Traumatic Brain Injury (TBI).

Summary: This memo contains information on Combat and Operational Stress Reaction (COSR), Acute Stress Reaction (ASR), Acute Stress Disorder (ASD), Posttraumatic Stress Disorder (PTSD), and Traumatic Brain Injury (TBI) gathered from a review of the literature in an effort to describe the key characteristics of brain injury and reactions to stress and to highlight their similarities and differences. Information is presented on the types of trauma which can cause stress reactions and brain injury, common symptoms, and duration of symptoms. This information is broken into two main sections: psychological stress, which includes COSR, ASR, ASD, and PTSD; and brain injury, which includes TBI. Table 1 illustrates the common symptoms of each stress reaction and Tables 2 and 3 display their characteristics. In addition, working definitions created from a review of the literature on combat stress are provided.

Psychological Stress

Traumatic events

Trauma that may lead to the development of psychological stress can occur in the following ways:

- Directly experiencing traumatic events
- Witnessing the event as it occurred to others
- Learning the event occurred to close family members or friends
- Experiencing repeated or extreme exposure to aversive details of the event[1]

Combat and Operational Stress Reaction (COSR)

Symptoms

The symptoms associated with COSR can be grouped into the following two categories:

- **Physiological**: aches and pains, diarrhea, dizziness, fatigue, headache, hypervigilance, insomnia, jumpiness, loss of appetite, nausea, panic, racing heart, trembling

- **Psychological**: anger, anxiety, depression, difficulty concentrating, fear, forgetfulness, guilt, intrusive negative thoughts and memories, irritability, memory loss, nightmares, social withdrawal[2]

Duration of symptoms

Symptom onset may be simultaneous with trauma and symptoms may last for up to four days following trauma.[3]

Notes[4]

Traumatic events are restricted to those that occur as a result of experiencing combat or military operations.

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1 American Psychiatric Association, *Diagnostic and Statistical Manual of Mental Disorders: DSM-5* (Arlington, VA: American Psychiatric Publishing, 2013), 271–286.

2 U.S. Marine Corps (USMC) and U.S. Navy (USN), *Combat and Operational Stress Control*, MCRP 6-11C/ NTTP 1-15M (Washington, DC: Department of the Navy, Headquarters, USMC, 2010), 4-4; and Headquarters, Department of the Army (HQDA), *U.S. Combat Stress Control Handbook*, (Guilford, CT: Lyons Press, 2003), 80–84.

3 U.S. Department of Veterans Affairs (VA) and U.S. Department of Defense (DOD), *Posttraumatic Stress Disorder* [PTSD] *Pocket Guide* (Arlington, VA: DOD, Defense Centers of Excellence for Psychological Health & Traumatic Brain Injury, 2013), 16–17.

4 HQDA, *Combat and Operational Stress Control Manual for Leaders and Soldiers,* FM 6-22.5 (Washington, DC: Headquarters, Department of the Army, 2009), 1-2; and USMC, *Combat and Operational Stress Control*, 2010.

Since COSR is not a distinct entry in the Diagnostic and Statistical Manual of Mental Disorders (DSM), specific symptoms and diagnostic criteria are not officially outlined by the civilian community. The U.S. Department of Veterans Affairs (VA), the military, and some civilian sources have published defining characteristics of COSR, however. These resources were used to compile a set of common symptoms.

It is important to note that responses found in COSR are typical given the training and mentality of service members, but require attention in order to prevent them from causing significant distress or loss of function.

The operational piece of the term COSR is important to encompass all potential causes of stress reactions in service members. Operational stress is characterized by reactions to exposure to military operations, unlike combat stress, which is characterized by direct combat experience.[5]

Acute Stress Reaction (ASR)

Symptoms

Symptoms of ASR can be grouped into the following categories:

- **Physical**: exhaustion, hyperarousal, somatic complaints, or symptoms of conversion disorder
- **Emotional**: anxiety, depression, guilt, hopelessness
- **Cognitive**: amnesia, dissociation, hypervigilance, paranoia, intrusive re-experiencing
- **Behavioral**: avoidance, problematic substance use[6]

Duration of symptoms

Symptom onset may be simultaneous with trauma and symptoms may last for up to four days following trauma.[7]

Notes

ASR is not a medically diagnosable psychological disorder, unlike ASD.

While ASR and COSR are quite similar reactions to stress, ASR is applicable to civilians and military personnel alike and COSR is only found in service members.

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5 USMC, *Combat and Operational Stress Control*, 2010, 1-3.

6 VA and DOD, *PTSD Pocket Guide*, 13.

7 Ibid.

Acute Stress Disorder (ASD)

Symptoms

There are five clusters of symptoms associated with ASD. They are as follows:

- **Arousal**: increased or inappropriate levels of arousal, including symptoms such as hypervigilance, sleep disturbance, and exaggerated startle response
- **Avoidance**: avoidance of stimuli associated with the trauma, including distressing thoughts and memories and physical reminders of the trauma, such as people and places
- **Dissociation**: altered sense of reality and/or the inability to remember important aspects of the traumatic event
- **Intrusion**: distressing memories, thoughts, and/or dreams related to the trauma
- **Negative mood**: inability to experience positive emotions[8]

Duration of symptoms

Symptoms may only be present from three days to one month following trauma in order for ASD to be diagnosed.[9]

Notes[10]

Traumatic events can be defined in military or civilian terms.

Individuals' reaction to trauma frequently meets criteria for ASD immediately following trauma, but it cannot be diagnosed until symptoms have persisted for at least three days per the diagnostic criteria outlined by the DSM.[11]

Guilt, catastrophic thoughts, and panic attacks are common features of ASD, and are not usually present in PTSD.

After experiencing symptoms of ASD for more than one month, individuals may progress to a diagnosis of PTSD.

Dissociation is not part of the diagnostic criteria for PTSD as it is for ASD. Rather, there is a distinction between PTSD and PTSD Dissociative Type.

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8 American Psychiatric Association, *DSM-5*, 2013, 280–281.

9 Ibid., 281.

10 Ibid., 280–286.

11 Ibid., 281.

Posttraumatic Stress Disorder (PTSD)

Symptoms

There are four clusters of symptoms associated with PTSD. They are as follows:

- **Arousal**: increased or inappropriate levels of arousal, including symptoms such as hypervigilance, sleep disturbance, and exaggerated startle response
- **Avoidance**: avoidance of stimuli associated with the trauma, including avoidance of distressing thoughts and memories and physical reminders of the trauma, such as people and places
- **Intrusion**: distressing memories, thoughts, and/or dreams related to the trauma
- **Negative cognitions and mood**: distorted cognitions and negative emotions, including feelings of detachment and exaggerated negative beliefs[12]

Duration of symptoms

Symptoms must be present for at least one month before PTSD can be diagnosed.[13]

Notes

Traumatic events can be defined in military or civilian terms.

Recent revisions made to the definition of PTSD in the DSM 5:

- The methods of being exposed to traumatic events have been expanded to include instances in which an individual has not experienced a traumatic event firsthand, including:
    - Trauma that occurs to a close family member or friend
    - Repeated or extreme aversive exposure to details of the traumatic event; not through media, photos, or television unless work-related
- PTSD has been moved from the section on anxiety disorders to the section on stress and trauma-related disorders
- Four clusters of symptoms are currently described. Formerly, symptoms were grouped into three clusters: intrusion, avoidance, and arousal
- The criterion of "fear, helplessness, or horror" in response to a traumatic event has been eliminated
- The distinction between acute and chronic PTSD has been eliminated
- Two subtypes are added:
    - PTSD Preschool Subtype, which occurs in children younger than age six

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[12] American Psychiatric Association, *DSM-5*, 271–274.

[13] Ibid., 272.

- PTSD Dissociative Subtype, which is characterized by prominent and persistent dissociative symptoms[14]

Brain Injury

Traumatic events

Brain injury can be caused by a wide variety of traumatic events in which the skull and brain are damaged, including the following:

- Explosive blasts or other combat injuries
- Falls
- Sports injuries
- Vehicle-related collisions
- Violence[15]

Traumatic Brain Injury (TBI)

Symptoms

The following symptoms can be indicative of TBI:

- Anxiety
- Disorientation and/or confusion
- Dizziness
- Fatigue
- Headaches
- Irritability
- Issues with memory or concentration
- Nausea
- Sensitivity to light or sound
- Sleep disturbance[16]

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[14] American Psychiatric Association, "Posttraumatic Stress Disorder," last accessed June 13, 2014, http://www.dsm5.org/Documents/PTSD%20Fact%20Sheet.pdf.

[15] John Bruns, "The Epidemiology of Traumatic Brain Injury: A Review," *Epilepsia* 44 (2003): 2–10.

[16] Michelle Costanzo, "Connecting Combat-Related Mild Traumatic Brain Injury with Posttraumatic Stress Disorder Symptoms through Brain Imaging," *Neuroscience Letters* (2014): 2; and Nancy Landre, "Cognitive Functioning and Postconcussive Symptoms in Trauma Patients with and without Mild TBI," *Archives of Clinical Neuropsychology* 21 (2006): 255–273.

Duration of symptoms

Symptoms can occur at any time, from immediately following trauma to days or weeks later.[17]

Notes[18]

There is a high comorbidity rate between PTSD and TBI, making it necessary to differentiate between psychological PTSD symptoms and TBI-related neurocognitive symptoms during diagnosis.

There are three types of TBI characterized by severity: mild, moderate, and severe.

TBI-causing injuries can be categorized as closed or open, blast or non-blast, and combat or non-combat. Closed or open (also referred to as perforating or penetrating) refers to whether the trauma penetrated the skull. Blast or non-blast TBI refers to whether the trauma was a result of an explosion, while combat or non-combat refers to whether the trauma occurred in a combat or military setting.

Service members are most likely to suffer from blast-related or combat-related mild TBI (mTBI).

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[17] Mayo Clinic, "Traumatic Brain Injury," last accessed June13, 2014, http://www.mayoclinic.org/diseases-conditions/traumatic-brain-injury/basics/symptoms/con-20029302.

[18] Elizabeth Moy Martin, "Traumatic Brain Injuries Sustained in the Afghanistan and Iraq Wars," *Journal of Trauma Nursing* 15, no. 3 (2008): 94–99.

Table A-1. Common Symptoms of COSR, ASR, ASD, PTSD, and TBI

Symptom	COSR	ASR	ASD	PTSD	TBI
Anger	X		X	X	
Anxiety	X	X	X	X	
Avoidance of stimuli associated with trauma		X	X	X	
Depression	X	X	X	X	
Diarrhea	X				
Difficulty concentrating	X				X
Disorientation					X
Dissociation		X	X	X	
Dizziness	X				X
Exaggerated negative beliefs				X	
Fatigue	X	X			X
Fear	X		X	X	
Forgetfulness	X				X
Guilt	X	X		X	
Headaches	X				X
Hypervigilance	X	X	X	X	
Insomnia	X		X	X	X
Intrusive negative thoughts and memories		X	X	X	
Irritability	X		X	X	X
Jumpiness	X	X	X	X	
Memory loss	X	X			X
Nausea	X				
Nightmares	X		X	X	
Panic	X		X	X	
Racing heart	X				
Sensitivity to light and sound					X
Social withdrawal	X		X	X	

Note: Symptoms are the most commonly reported and are not a comprehensive list of all possible symptoms experienced on a case-by-case basis.

Table A-2. Differences between COSR, ASR, ASD, and PTSD

Term	Military/Civilian	Symptom Duration	Type of Response
COSR	Military	0 to 4 days	Typical
ASR	Civilian or Military	0 to 4 days	Typical
ASD	Civilian or Military	At least 3 days to 1 month	Exaggerated typical which causes distress or impaired functioning
PTSD	Civilian or Military	At least 1 month	Exaggerated typical which causes distress or impaired functioning

Table A-3. Characteristics of TBI

Term	Military/Civilian	Symptom Duration	Type of Response
TBI	Civilian or Military	No set duration	Appropriate symptoms as a result of brain injury

Definitions[19]

COSR: The typical and usually transient reactions to stress, including physiological and psychological symptoms, which may occur in service members as a result of traumatic events in combat or prolonged exposure to the stresses of military operations.

Combat Stress: Includes "all the physiological and emotional stresses encountered as a direct result of the dangers and mission demands of combat"[20] and is defined as "the mental, emotional, or physical tension, strain, or distress resulting from exposure to combat and combat-related conditions."[21]

Operational Stress: Includes "stress resulting from instantaneous or cumulative exposure to military operations, training, or life"[22] and is defined as the "changes in physical or mental functioning or behavior resulting from the experience of military

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19 Definitions were derived from a review of the literature.

20 U.S. Marine Corps (USMC), *Combat Stress*, Field Manual (FM) 90-446/6-22.5/Naval Tactics, Techniques, and Procedures (NTTP) 1-15M/Marine Corps Reference Publication (MCRP) 6-11C (Washington, DC: Headquarters, USMC, 2000), Preface.

21 U.S. Department of Defense (DoD), "Stress Awareness," last accessed May 14, 2014, www.defense.gov/specials/stressawareness03/combat.html.

22 William P. Nash, "Consensus Recommendations for Common Data Elements for Operational Stress Research and Surveillance: Report of a Federal Interagency Working Group," *Archives of Physical Medicine and Rehabilitation*, 91 (2010): 1679.

operations other than combat, during peacetime, or war, and on land, at sea, or in the air."[23]

ASR: The typically transient reaction to stress, including physical, emotional, cognitive, and behavioral symptoms, which may occur in civilians and service members following trauma that is military or civilian in nature.[24]

ASD: A disorder that is diagnosed after experiencing symptoms of intrusion, negative mood, dissociation, avoidance, and arousal for at least three days and up to one month following a traumatic event which is experienced directly, indirectly, or witnessed and is civilian or military in nature.

PTSD: A disorder that is diagnosed after experiencing symptoms of intrusion, avoidance, arousal, and negative cognitions and mood for at least one month following a traumatic event which is experienced directly, indirectly, or witnessed and is civilian or military in nature.

TBI: A brain injury that can be categorized as mild, moderate, or severe and occurs as a result of military or non-military related trauma to the skull and causes physical, sensory, and cognitive symptoms which impair normal functioning.

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23 USMC, *Combat and Operational Stress Control*, 2010, 1-3.

24 VA and DOD, *PTSD Pocket Guide*, 13.

Appendix B
Sample Surveys

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Post-Military Operations on Urbanized Terrain (MOUT) Questionnaire 1

Demographic Information

Subject Code _____ _____ _____ **Date (MM/DD/YYYY)** _____

First 2 letters of your mother's maiden name (e.g., Smith: **SM**)
First 2 letters of the city in which you were born (e.g., Fairfax: **FA**)
First 2 numbers of your birth month (e.g., May: **05**)
Sample subject code: **SMFA05**

Gender (M/F) _____ **Age (Circle one)** 18–20 21–25 26–30 31–35 36–40 41+

Instructions: Below is a list of statements regarding the training exercise you have completed. Please read each statement carefully and rate your level of agreement by marking an X in the box that best describes your experience.

No.	Response	Strongly Agree	Agree	Neither Agree nor Disagree	Disagree	Strongly Disagree
1.	My heart was racing during the exercise.					
2.	I was breathing heavily during the exercise.					
3.	I felt tense and on edge during the exercise.					
4.	It was difficult to concentrate on my duties during the exercise.					
5.	My reactions were slower than usual during the exercise.					
6.	I felt weak or shaky after the exercise.					
7.	I felt jumpy or on edge after the exercise.					
8.	My heart was racing after the exercise.					
9.	I felt disoriented or dizzy after the exercise.					
10.	I felt fatigued after the exercise.					
11.	The exercise was not very stressful.					
12.	I was able to perform my duties effectively despite the stress of the exercise.					
13.	The stress of the exercise improved my ability to perform my duties.					
14.	It was difficult to remember my instructions during the exercise.					
15.	The stress of the exercise negatively impacted my ability to perform my duties.					

Figure B-1. Post-Military Operations on Urbanized Terrain (MOUT) Questionnaire 1

Post-Military Operations on Urbanized Terrain (MOUT) Questionnaire 2

Demographic Information

Subject Code _____ _____ _____ **Date (MM/DD/YYYY)** _____

First 2 letters of your mother's maiden name (e.g. Smith: SM)
First 2 letters of the city in which you were born (e.g. Fairfax: FA)
First 2 numbers of your birth month (e.g. May: 05)
Sample subject code: **SMFA05**

Gender (M/F) _____ **Age (Circle one)** 18–20 21–25 26–30 31–35 36–40 41+

Instructions: Below is a list of experiences people sometimes have after a stressful event. Please read each statement carefully and rate how often it occurred following the training exercise by marking an X in the box that best describes your experience.

No.	Response	Never	Rarely	Sometimes	Most of the time	Always
1.	I had difficulty falling or staying asleep.					
2.	I felt restless.					
3.	I tried to avoid remembering the exercise.					
4.	I felt jumpy or on edge.					
5.	I had repeated distressing dreams about the exercise.					
6.	I felt anxious.					
7.	I had difficulty remembering details of the exercise.					
8.	I felt listless or depressed.					
9.	I felt uncomfortable talking about the exercise.					
10.	I felt distant from my own emotions.					
11.	I felt fatigued or lethargic.					
12.	I felt irritable or had outbursts of anger.					
13.	I had physical reactions when I remembered the exercise.					
14.	I felt disoriented or dizzy.					
15.	I felt detached from other people.					

Figure B-2. Post-Military Operations on Urbanized Terrain (MOUT) Questionnaire 2

Appendix C
Illustrations

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Appendix E
Abbreviations

ASD	Acute Stress Disorder
ASR	Acute Stress Reaction
BICEPS	Brevity, Immediacy, Centrality/Contact, Expectancy, Proximity, Simplicity
Cas	casualties
CBRN	chemical, biological, radiological, and nuclear
COS	combat and operational stress
COSB	combat and operational stress behavior
COSR	combat and operational stress reaction
CPC	civilian psychological casualties
CSC	combat stress casualties
CSR	combat stress reaction
DOD	Department of Defense
DOW	died of wounds
DSM	Diagnostic and Statistical Manual of Mental Disorders
FM	Field Manual
HQDA	Headquarters, Department of the Army
HRIP	Human Response Injury Profile
IAVA	Iraq and Afghanistan Veterans of America
IDA	Institute for Defense Analyses
KIA	killed in action
MCRP	Marine Corps Reference Publication
MOUT	military operations on urbanized terrain
NATO	North American Treaty Organization
NFC	Non-fatal casualties
NSA	National Security Agency
NTTP	Naval Tactics, Techniques, and Procedures
OEA	Operational Effectiveness Analysis
OEF	Operation Enduring Freedom
OELM	Operational Effectiveness Loss Multiplier
OIF	Operation Iraqi Freedom

PC	psychological casualties
PIE	Proximity, Immediacy, and Expectancy
PILOTS	Published International Literature on Traumatic Stress
PTSD	Posttraumatic Stress Disorder
RTD	return to duty
TBI	traumatic brain injury
UCMJ	Uniform Code of Military Justice
USAF	U.S. Air Force
USMC	U.S. Marine Corps
USN	U.S. Navy
VA	U.S. Department of Veterans Affairs
WHO	World Health Organization
WIA	wounded in action
WWI	World War I
WWII	World War II

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