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# Prevalence and Risk Factors for Post-Traumatic Stress Disorder Symptoms Among National Guard/Reserve Component Service Members Deployed to Iraq and Afghanistan

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### Abstract

Over the past decade, the USA has relied on unprecedented deployments of National Guard and Reserve Component service members to support sustained military operations in Afghanistan and Iraq. In this chapter, we review the empirical literature on the prevalence of PTSD among service members following deployment to Iraq and Afghanistan. Methodological issues to be considered when evaluating prevalence estimates across studies are reviewed, and the results of meta-analyses comparing PTSD prevalence rates for reserve and active components are critically examined. Finally, we summarize findings from the literature on risk and protective factors associated with PTSD that might account for the heightened risk of PTSD among Reservists during the post-deployment reintegration period.

### List of Abbreviations

BCT	Brigade combat team
DOD	Department of Defense
DSM-IV	Diagnostic and Statistical Manual of Mental Disorders, 4th edition
NG/R	National Guard/Reserve
OEF	Operation Enduring Freedom
OIF	Operation Iraqi Freedom
OND	Operation New Dawn
PCL	PTSD Checklist
PC-PTSD	Primary Care PTSD Screen
PDHA	Post-Deployment Health Assessment
PDHRA	Post-Deployment Health Reassessment
PTSD	Post-traumatic stress disorder

## Introduction

Modern military operations have increasingly relied on unprecedented deployments of military reserve force to support peacekeeping and combat missions. Reserve Component service members, frequently referred to as “citizen soldiers,” generally

hold civilian jobs or attend school while maintaining their military skills, typically by training “1 weekend a month, 2 weeks a year.” In the USA, the term “Reserve Component” refers to the individual reserve components of each branch of the US Armed Forces and the National Guard. As a direct descendant of early colonial militias (Griffith 2010), the National Guard is a dual state-federal force. Each state’s National Guard may be called up for active duty by its respective state governor to assist in state emergencies such as natural disasters and civil disturbances. National Guard units may also be mobilized for active duty to supplement regular armed forces in times of war; however, this rarely occurred in the USA prior to the terrorist attacks of September 11, 2001. In the UK, the Reserve Component refers to an all-volunteer force originally established as the Territorial Army to provide home defense and act as an “auxiliary component” to the UK Army Regulars. With the increase in global terrorism in a post-Cold War world, UK reserve forces were reorganized at an internationally broader level which included being deployed beyond the UK and its corresponding territories. Today, UK’s Reserve Component includes the Ex-Regular Reserves, a group of former members of Regular Forces who remain on reserve liability and may be called back into active service after their discharge, and the Volunteer Reserves, a group of civilians who volunteer to serve in Reserve status (Ministry of Defence 2013). Similar to the US National Guard, the UK Volunteer Reserves maintain operational readiness through annual training and are usually the first Reservists mobilized to deploy on operations.

Over the past decade, sustained military operations in Afghanistan (Operation Enduring Freedom [OEF] in the USA; code name Operation HERRICK in the UK) and Iraq (Operation Iraqi Freedom [OIF] and Operation New Dawn [OND] in the USA; code name Operation TELIC in the UK) led to more frequent and lengthier deployments than any prior conflict in the past 40 years. Since 2001, nearly 800,000 US National Guard/Reserve (NG/R) component service members were deployed to Afghanistan or Iraq (VA Office of Public Health 2014). At the surge of operations in 2007, NG/R service members comprised 55 % of US combat troops in Afghanistan and 43 % of those in Iraq (Department of Defense 2008). Since the beginning of the conflicts in Afghanistan and Iraq, over 220,000 UK Armed Forces personnel, including over 26,000 Reservists, have been deployed worldwide (Defence Statistics 2014; Keene 2015). In 2004, Reservists comprised 20 % of UK troops deployed in Iraq and 12 % of those in Afghanistan.

As citizen soldiers, Reservists tend to be older, more likely to be married, parents of young children, and generally hold civilian lifestyles as they serve part-time in the National Guard (Griffith 2010). Compared to the active duty component, Reservists may experience less unit cohesion and less perceived support while deployed and are more likely to have left family and civilian work responsibilities outside of the military (Friedman 2005). NG/R service members face distinct challenges (e.g., family and occupational stressors) while being deployed and as they transition back to civilian family and work roles which may increase risk of post-deployment mental health concerns. Following the Persian Gulf War, several reports examined Reserve status as a risk factor for post-traumatic stress disorder (PTSD) (Kang et al. 2003; Wolfe et al. 1999). One study showed Reservists and active duty service

members had similar rates of PTSD within the first week of returning home, but Reservist status predicted PTSD symptoms 2 years later (Wolfe et al. 1999). Despite the expanded operational role of NG/R component troops, a relatively small body of research has focused on this group.

In this chapter, we review the empirical literature on the prevalence of probable PTSD among service members following deployment to Iraq and Afghanistan. Methodological issues to be considered when evaluating prevalence estimates across studies are summarized, and results of recent meta-analyses comparing PTSD prevalence rates for reserve and active components are discussed. Finally, we address the literature on risk and protective factors associated with PTSD that might account for the development of PTSD among Reservists during the post-deployment reintegration period.

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## **Prevalence of PTSD in Reserve Component and Active Component Service Members Deployed to Iraq and Afghanistan**

Extensive research has examined the prevalence of combat-related PTSD among service members deployed to Iraq and Afghanistan with rates ranging from 1.4 % to as high as 31 %. Several systematic reviews have highlighted the wide variation in PTSD prevalence estimates and examined methodological factors contributing these disparate findings (Griffith 2010; Kok et al. 2012; Ramchand et al. 2010). Three meta-analyses have examined differences in PTSD prevalence estimates between active duty and NG/R components (Cohen et al. 2015; Hines et al. 2014; Sundin et al. 2010). After stratifying studies by enlistment type, Sundin and colleagues found high heterogeneity remained within both groups and enlistment type did not explain variability in PTSD prevalence. Two other recent meta-analyses both found similar rates of PTSD among NG/R and active component service members; Hines et al. (2014) reported the prevalence of probable PTSD was 14.5 % and 11.4 % in the NG/R and active duty components, respectively, with high heterogeneity in both groups. Cohen et al. (2015) reported PTSD prevalence rates of 9.8 % and 8.9 % for the NG/R and active duty components, respectively.

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## **Practice and Procedures**

Most studies estimating the prevalence of probable PTSD among military personnel have relied on standardized self-report instruments, such as the PTSD Checklist (PCL) (Weathers et al. 1993) and the Primary Care PTSD (PC-PTSD) Screen (Prins et al. 2003). The PCL is the most widely used screening instruments for the identification of potential PTSD (Elhai et al. 2005) and is the most frequently used measure of PTSD symptoms in studies of military personnel (Hines et al. 2014). The PCL consists of 17 self-report items corresponding to the Diagnostic and Statistical Manual of Mental Disorders, 4th edition (DSM-IV),

diagnostic criteria for PTSD (American Psychiatric Association 1994). Respondents rate the severity of each symptom during the past month on a scale from 1 (not at all) to 5 (extremely). Three versions of the PCL have been developed that differ based on the wording used to anchor the event to symptom. The PCL-military (PCL-M) asks respondents to rate each symptom in response to “stressful military experiences,” while the PCL-civilian (PCL-C) anchors items to “stressful life experiences.” The PCL-specific (PCL-S) requires respondents to identify and write down a specific stressor and then anchors items to that specific event. The PCL has excellent test–retest reliability and high overall convergent validity (Blanchard et al. 1996; Weathers et al. 1993).

The PC-PTSD Screen is another commonly used screening tool. This 4-item scale is included in DOD’s Post-Deployment Health Assessment (PDHA) completed by all service members immediately upon return from deployment as well as the Post-Deployment Health Reassessment (PDHRA) completed 3–6 months later (Bliese et al. 2007). The PC-PTSD cues respondents to a traumatic event and then asks if they have (1) had nightmares or intrusive thoughts about the event, (2) avoided reminders or thoughts about the event, (3) were hypervigilant or easily startled, and (4) felt numb or detached. The PC-PTSD uses a dichotomous response format (1 = yes or 0 = no) and is scored from 0 to 4. Validation studies have supported the PC-PTSD as an acceptable screen for PTSD among military personnel and veterans, but this instrument may also result in a large number of false-positives when the prevalence of PTSD is low (Bliese et al. 2008; Calhoun et al. 2010).

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## Methodological Considerations in Estimating the Prevalence of PTSD

Before reviewing the literature on the prevalence of PTSD among the NG/R and active duty components, we briefly summarize key methodological issues to be considered when evaluating prevalence estimates across studies.

### Differences in PTSD Case Definitions

Estimates of PTSD prevalence depend heavily on the methods or procedures used to measure PTSD symptoms and the definitions used to identify potential cases of PTSD. Although most studies have reported prevalence estimates based on either the PCL or PC-PTSD, studies have differed widely in how potential cases of PTSD are identified, with some studies using broad (liberal) definitions favoring sensitivity (Bliese et al. 2008; Terhakopian et al. 2008; Weathers et al. 1993) and others using stricter (conservative) definitions favoring specificity (Bliese et al. 2008; Terhakopian et al. 2008; Weathers et al. 1993). Table 1 provides a summary of the various criteria used by researchers to define a “case” of probable PTSD. The most widely used PCL case definition involves summing the scale’s 17 items to yield a

**Table 1** Screening instruments, definitions, and scoring criteria used to identify cases of probable PTSD

Measure	PTSD case definition	Scoring criteria
PTSD Checklist (PCL)	PCL DSM-IV (sensitive)	Requires respondent to meet the DSM-IV Criteria B, C, and D for PTSD by endorsing at least one reexperiencing symptom, at least three avoidance symptoms, and at least two hyperarousal symptoms at the moderate or higher level on the PCL
	PCL $\geq 50$ (specific)	Requires respondent to obtain a total score of 50 or higher on the PCL
	PCL strict (specific)	Requires the respondent to endorse the requisite DSM-IV symptom-cluster criteria (PCL DSM-IV) and total score 50 or greater (PCL $\geq 50$ )
Primary Care-PTSD (PC-PTSD) Screen	PC-PTSD sensitive	Requires the respondent to endorse 2 or more items on the 4-item PC-PTSD Screen
	PC-PTSD strict (specific)	Requires the respondent to endorse 3 or 4 items on the 4-item PC-PTSD Screen

Notes. *PCL* post-traumatic stress disorder checklist, *PC-PTSD* primary care PTSD screen

total score ranging from 17 to 85 and using a stringent cutoff of 50 or higher (PCL  $\geq 50$ ). Some studies have used more sensitive cutoffs of 30, 34, or 44 on the PCL; however, such liberal case definitions are likely to overestimate the true prevalence of PTSD (Arbisi et al. 2012; Terhakopian et al. 2008). Alternatively, a liberal (sensitive) definition based on the DSM-IV symptom-cluster scoring method requires the respondent to meet the B, C, and D criteria by endorsing at least one reexperiencing symptom, at least three avoidance symptoms, and at least two hyperarousal symptoms at the moderate or higher level on the PCL (PCL DSM-IV). The most conservative (strict) case definition of PTSD using the PCL requires the respondent to endorse the requisite DSM-IV symptom-cluster criteria and score 50 or greater (PCL DSM-IV and PCL  $\geq 50$ ). For the PC-PTSD Screen, a score of 2 or greater of the PC-PTSD is required to meet the broad (sensitive) case definition, while a score of 3 or greater (favoring specificity) is required to meet the more specific (strict) definition.

Differences in case definitions used across studies likely contribute to the large variability in prevalence estimates between studies. The impact of PTSD case definitions on prevalence estimates was demonstrated in a study of 18,305 US Army soldiers (active duty  $N = 8,957$ ; NG/R  $N = 4,269$ ) from infantry brigade combat teams (BCTs) deployed to Iraq (Thomas et al. 2010). Overall, prevalence estimates ranged from 20.7 % (active duty, 3 months) to 30.5 % (NG/R, 12 months) using the most sensitive definition (PCL DSM-IV), from 15.9 % (active duty and NG/R, 3 months) to 25.6 % (NG/R, 12 months) based on the stringent PCL  $\geq 50$  definition, and from 15.7 % (NG/R, 3 months) to 24.6 % (NG/R, 12 months) using the strictest case definition (PCL DSM-IV and PCL  $\geq 50$ ).

## Differences in Sampling Strategies

Given the robust dose–response relationship established between level of combat intensity and PTSD (Dohrenwend et al. 2006; Hoge et al. 2004), it is also important to distinguish between prevalence estimates based on studies using operational infantry units (e.g., brigade combat teams) engaged in direct combat operations and those based on population studies (Kok et al. 2012). Although substantial variability in prevalence of PTSD across population-based studies has been documented regardless of the measures used to assess PTSD (i.e., PCL or PC-PTSD) and the sampling strategy (random versus nonrandom versus population-based samples) used (Sundin et al. 2010), a subsequent meta-analysis of this same literature provided a more meaningful interpretation of seemingly disparate PTSD estimates after accounting for differences across studies in level of combat exposure (Kok et al. 2012). In this review, Kok and colleagues grouped studies into three broad categories: (1) studies involving operational units engaged in direct combat, (2) studies of the entire deployed population using data from Department of Defense (DoD) PDHA/PDHRA program, and (3) studies using random samples of the military population. Within these groupings, studies were further stratified based on whether a specific (strict) or a less specific (sensitive) case definition of PTSD was used as well as the timing of assessment (pre-deployment, during deployment, or post-deployment). Based on the strict definition of PTSD, the post-deployment PTSD prevalence estimate was 5.0 % using studies of the entire deployed population and 13.2 % in operational infantry units. When the more sensitive case definition was used, the post-deployment PTSD prevalence estimate for operational infantry units rose to 19.6 %. Although differences in PTSD prevalence estimates between NG/R and active components were not examined in the Kok et al. meta-analysis (Kok et al. 2012), this study provides compelling evidence for the importance of considering the impact of varying PTSD case definitions and differences in the timing of assessments across studies when comparing prevalence rates across military subgroups.

Thomas et al. (2010) compared prevalence estimates between active duty and National Guard soldiers using data from six infantry brigade combat teams collected 3 and 12 months following their return from deployment to Iraq. Both active duty and National Guard BCTs were engaged in direct combat operations during their deployment, reported similar levels of combat exposure, and reported similar prevalence rates at 3 months post-deployment. Prevalence estimates increased significantly from 3 to 12 months post-deployment for both groups; however, the magnitude of increase was greater for National Guard soldiers. For example, based on the strict definition, the 3-month post-deployment prevalence of PTSD was 14.8 % and 14.7 % for active duty and National Guard soldiers, respectively. At the 12-month post-deployment time period, the prevalence of PTSD increased by less than 2 % for the active duty service members (16.6 %), but nearly doubled for National Guard soldiers (24.6 %). It is important to note that the pronounced differences in post-deployment PTSD prevalence rates would be obscured if comparisons between groups were incorrectly made based on different PTSD case

definitions. For example, the prevalence of PTSD was 24.6 % for National Guard soldiers using the strict definition and 23.7 % for active duty service members using the most sensitive definition. Since prevalence estimates are greatly influenced by varying case definitions, comparisons of PTSD prevalence estimates across military subgroups (i.e., active duty versus NG/R components) should only be made between studies that have similar methodologies. Yet, studies examining the prevalence of PTSD in military personnel have differed widely in the use of methods to measure PTSD, timing of assessments, and sampling strategies. Such methodological differences across studies could also mask important differences between military subgroups.

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### **Reconsidering Findings from Meta-Analyses Comparing Active Component and Reserve Component Estimates of PTSD**

Next, we take a closer look at the three meta-analytic studies examining the prevalence of PTSD among NG/R and active duty component service members and reconsider their findings from the context of the methodological issues discussed above. Table 2 lists all 47 studies that were included in the meta-analyses. Studies are organized into three broad categories similar to those utilized by Kok et al. 2012. Study characteristics (population studied, PTSD case definition(s) used, timing of assessment relative to deployment) and prevalence estimates reported in the original papers are summarized. For studies that reported prevalence rates based on differing case definitions and assessment time points, Table 2 indicates (last column) which estimate was selected for inclusion in each meta-analysis.

Three out of four of the studies included in the meta-analysis conducted by Sundin et al. (2010) reported prevalence estimates based on a strict case definition, but the studies varied in the timing of assessments from during deployment to over 12 months post-deployment. Although two recent meta-analyses both focused on examining differences in the prevalence of PTSD between active component and reserve components (Cohen et al. 2015; Hines et al. 2014), the two studies shared only four studies in common (Kim et al. 2010; Martin 2007; Milliken et al. 2007; Thomas et al. 2010). Both meta-analyses included PTSD estimates based on a sensitive definition for the Martin study and a strict definition for the Thomas et al. study. However, Cohen and colleagues (2015) reported estimates for the Thomas et al. study from the 3-month post-deployment time point when no difference in the rates of PTSD was observed, while Hines and colleagues (2014) reported estimates from the 12 months post-deployment when large differences were observed. PTSD estimates included from the Milliken et al. study varied across meta-analyses in terms of case definitions and timing of assessment (Sundin et al., strict definition, 6 months; Hines et al., sensitive definition, 6 months; Cohen et al., sensitive definition, 2 months).

The meta-analysis conducted by Hines et al. (2014) included 3 additional studies reporting PTSD estimates separately for active and reserve components, 7 estimates from studies of NG/R component service members only, and 24 estimates from



**Table 2** Description of studies used in three meta-analyses (Sundin et al. 2010; Hines et al. 2014; Cohen et al. 2015) comparing the prevalence of PTSD among National Guard/reserve and active duty components

Reference	Population studied/study design	Timing of assessment	PTSD case definition	Sample size		Prevalence of PTSD		Prevalence estimate included in previously published meta-analyses		
				Active N	NG/R N	Active%	NG/R%	Sundin et al. 2010	Hines et al. 2014	Cohen et al. 2015
<b>Operational sample studies</b>										
Ferrier-Auerbach et al. 2010	US Army National Guard soldiers from a single BCT deployed to Iraq and assessed while deployed	During deployment	PCL strict		2,677		7.0 %		X	
US Army Surgeon General 2003	Random sample of US Army soldiers who were deployed to Iraq and completed the Soldier Health and Well-Being Survey while on deployment in 2004	During deployment	PCL strict	544	212	16.0 %	12.0 %	X		
Hoge et al. 2004	Soldiers and marines from 4 US combat infantry units assessed either before deployment to Iraq in 2003 or 3-4 months after return from deployment in 2003	Prior to deployment 3-4 months (Iraq) 3-4 months (Iraq) 3-4 months (Afghanistan)	PCL DSM-IV PCL strict PCL DSM-IV PCL DSM-IV PCL DSM-IV	2,530 2,530 3,671 3,671		9.4 % 5.0 % Army 18.0 % Marines 19.9 % Army 11.5 %				X <sup>a</sup>
		3-4 months (Iraq)	PCL strict	2,530		Army 12.9 %				

(continued)

Table 2 (continued)

						Sample size		Prevalence of PTSD		Prevalence estimate included in previously published meta-analyses		
			3–4 months (Iraq)	PCL strict		3,671		Marines 12.2 %				
			3–4 months (Afghanistan)	PCL strict		3,671		Army 6.2 %				
Cabrera et al. 2007	US Army soldiers assessed following deployment to Iraq in 2004		3 months	PCL strict		2,392		13.5 %		X		
Duma et al. 2010	Data from US soldiers assessed following deployment to Iraq or Afghanistan through the Soldier Wellness Assessment Program		6 months	PC-PTSD 2 PC-PTSD3		433		7.0 % 5.0 %		X		
Kim et al. 2010	US Army soldiers from BCTs deployed to Iraq between December 2003 and October 2007 who completed surveys 3 months and 12 months following return from deployment		3 months 12 months	PCL strict PCL strict		4,502 3,616		14.5 % 16.0 %	13.0 % 17.0 %	X		X
Luxton et al. 2011	Sample of US Army soldiers from a single BCT deployed to Iraq in 2007		3–6 months	PC-PTSD 2 or 3		3,152		15.5 %			X	

Maguen et al. 2010	Sample of US Army soldiers deployed to Iraq who were assessed as part of a post-deployment screening program at a large Army medical facility	3 months	PC-PTSD 2 PC-PTSD 3	2,797		22.0 % 13.0 %			X
Maguen et al. 2012	Data from US Army soldiers who completed the PDHA prior to deployment and the PDHRA following deployment to Iraq or Afghanistan. Data collection occurred from March 2006 to July 2009	3 months	PC-PTSD 2	7,251		17.8 %			X
Riviere et al. 2011	US Army National Guard soldiers from two BCTs deployed to Iraq surveyed 3 and 12 months following deployment. Data collection occurred between 2005 and 2007. Response rate was 58 % and 71 % at Time 1 and Time 2, respectively	3 months 12 months	PCL strict PCL strict		2,539 1,495		14.7 % 24.6 %		X

(continued)

Table 2 (continued)

				Sample size	Prevalence of PTSD	Prevalence estimate included in previously published meta-analyses
Thomas et al. 2010	US Army soldiers from 4 active component brigade combat teams (BCTs) and 2 Reserve Component BCTs deployed to Iraq who were assessed 3 and 12 months post-deployment. Data collection occurred between 2004 and 2007. Response rate at Time 1 was 62 %	3-4 months 12 months	PCL DSM-IV PCL >50 PCL strict PCL DSM-IV PCL >50 PCL strict	4,933 4,024	20.7 % 21.5 % 15.9 % 14.8 % 23.7 % 17.5 % 16.6 %	X X
<b>Entire deployed population studies</b>						
Allison-Aipa et al. 2010	Data from US Army Reserve soldiers who completed the PDHRA following deployment to Iraq or Afghanistan		PC-PTSD 3	51,078	16.0 %	X
Highfill-McRoy et al. 2010	Data from entire population of US Marines who entered the military between October 2001 and September 2006 and completed combat deployment before September 2007		PTSD diagnosis in TRICARE Management Activity medical records from military treatment facilities and government-reimbursed private providers	77,998	3.0 %	X

Martin 2007	Entire population of US military service members who completed the PDHA after returning from Iraq in 2005	2 months	PC-PTSD 2	135,047	87,136	9.8 %	11.7 %	X	X	X
Milliken et al. 2007	Entire population of US Army soldiers returning from Iraq between June 2005 and December 2006 who completed both the Post-Deployment Health Assessment (PDHA) following deployment and the Post-Deployment Health Reassessment (PDHRA) 6 months later	2 months 6 months	PC-PTSD 2 PC-PTSD 3 PC-PTSD 2 PC-PTSD 3	56,350	31,885	11.8 % 6.2 % 16.7 % 9.1 %	12.7 % 6.6 % 24.5 % 14.3 %	X	X	X
Peterson et al. 2010	Data from population of US Air Force service members who completed the PDHA following return from deployment to Iraq. Data collection occurred between 2005 and 2007	3 months	PC-PTSD 2 PC-PTSD 3	4,408		4.1 % 2.1 %		X		
Shen et al. 2009	Data from population of US Air Navy deployed to Iraq or Afghanistan who completed the PDHA following return from deployment. Data collection occurred between 2002 and 2006	2 months (Iraq) 2 months (Afghanistan)	PC-PTSD 2 PC-PTSD	15,059 1,034		10.0 % 5.0 %		X X		

(continued)

**Table 2** (continued)

				Sample size	Prevalence of PTSD	Prevalence estimate included in previously published meta-analyses
Shen et al. 2010	Data from random sample of US service members active duty enlisted personnel serving between 2001 and 2006 from a TRICARE beneficiary database and link deployment characteristics from the contingency tracking system	PTSD diagnosis based on ICD-9 code from DOD medical records between 2001 and 2006	678,227	0.6–1.4 %	X <sup>b</sup>	
Vasterling et al. 2010	US Army soldiers to Iraq between April 2003 and September 2006	PCL strict	670	12.0 %	14.0 %	X
<b>Population-based studies</b>						
Bray et al. 2010	Stratified random sampling of DOD population – population-based DOD 2008 Health Related Behavior Surveys; Combat deployed since September 11, 2001, and served in OEF/OIF	PCL >50	28,546	12.4 %	X	

Fear et al. 2010	Population-based cohorts of UK regular and reserve component personnel who were deployed to Iraq (TELIC 1) between January 2003 and April 2003 or Afghanistan (Operation HERRICK) between April 2006 and April 2007	Unknown	PCL >50	5,743	972	3.8 %	4.5 %	X	
Hotopf et al. 2006	Random stratified cohort of UK active duty and reserve component personnel who were deployed to Iraq (Operation TELIC 1) between January and April 2003 and non-deployed comparison group. Response rate was 62.3 %	>12 months	PCL >50	3,936	786	4.0 %	6.0 %	X	
Iowa Persian Gulf Study Group 1997	Population-based sample of US military service members deployed to Persian Gulf War	Unknown Non-deployed	PCL >50 PCL >50	985 968	911 831	1.9 % 0.7 %	2.0 % 1.1 %	X X	
Kang et al. 2003	Population-based, stratified random sample of US troops deployed to the Persian Gulf War (National Health Survey of Gulf War Era Veterans and Their Families). Response rate was 70 %	>4 years	PCL >50	4,268	7,173	10.0 %	13.3 %	X	

(continued)

Table 2 (continued)

		Baseline	PCL strict	Sample size		Prevalence of PTSD		Prevalence estimate included in previously published meta-analyses	
				43,593	32,883	2.5 %	2.2 %		X
Riddle et al. 2007	Population-based cohort of US active duty and Reserve/National Guard personnel who enrolled in the Millennium Cohort (July 2001 to June 2003). Baseline data collected before OEF/OIF	Baseline	PCL strict	43,593	32,883	2.5 %	2.2 %		X
Stretch 1985	Stratified random sample of Vietnam and Vietnam-era veterans from the reserve component. Response rate was 73 % and 28 % for Vietnam and Vietnam-era veterans, respectively. Response rate not provided for active duty comparison group. Data collection occurred in 1982	Not reported	PTSD symptoms assessed using the Vietnam-Era Veterans Adjustment Survey (VEVAS); no case definition provided	908	925	5.1 %	10.9 %		X <sup>c</sup>
<b>Longitudinal cohort studies</b>									
Phillips et al. 2010	Cohort of US Marines who had been deployed at least 30 days to Iraq or Afghanistan between baseline (October 2001–October 2002) and follow-up (2004–2006). Response rate was 13.3 %	Not reported	PCL strict	706		10.8 %			X



Polusny et al. 2011a	US Army National Guard soldiers from a single BCT deployed to Iraq from March 2006 to July 2007; assessed prior to deployment and again following return from deployment. Response rate was 81 %	3-6 months	New-onset PTSD defined as PCL >34 prior to deployment and meets PCL strict criteria post-deployment		424		13.8 %	X	
Polusny et al. 2011b	Cohort of US Army National Guard from BCT deployed to Iraq from March 2006 to July 2006; assessed during deployment and again 1 year following return from deployment. Response rate was 50.4 %	12 months	PCL strict		953		13.7 %	X	
Rona et al. 2006	Randomly sampled cohort of UK service members deployed to Iraq assessed at baseline in 2002 and follow-up between June 2004 and March 2006. Response rate was 67 %	>12 months	PCL >50	669		1.9 %		X	

(continued)

Table 2 (continued)

				Sample size	Prevalence of PTSD	Prevalence estimate included in previously published meta-analyses
<b>Convenience sample studies</b>						
Adler et al. 2008	US soldiers from a BCT deployed to Iraq who were interviewed as part of a mandatory psychological assessment program. Participants were selected for interview if they reported exposure to a criterion A event during deployment. All soldiers scoring above established cutoff criteria on any of the clinical screening measures (PTSD, depression, alcohol problems, marital problems, anger problems) and 29.7% of soldiers scoring below cutoff criteria were included	3 months	Mini International Neuropsychiatric Interview (MINI) – PTSD Module: Report of criterion A event and met MINI criteria for the three symptom clusters of PTSD	202	17.7%	X
Kline et al. 2010	US Army National Guard soldiers preparing for deployment to Iraq in 2008. Compared soldiers who had been previously deployed to Iraq or Afghanistan to first time deployers		PCL DSM-IV PCL >50	2,543	21.1 % 14.0 %	X

Marshall et al. 2012	Nonrandom sample of previously deployed US Army National Guard soldiers with no history of alcohol abuse prior to deployment who were assessed for current PTSD			963		8.0 %		X	
Mulligan et al. 2010	Convenience sample of deployed UK personnel assessed while deployed. Data collection occurred between January and February 2009	0 month	PCL >50	611		3.3 %		X	
Pietrzak et al. 2009	Convenience sample of OEF/OIF veterans from a single geographical area who completed a needs assessment about 2 years following deployment. Response rate was 27.1 %	Not reported	PCL DSM-IV PCL strict	156	394	32.9 % 23.7 %	17.9 % 20.6 %		X
van Zuiden et al. 2012	Dutch military personnel deployed to Afghanistan from 2005 to 2009; assessed prior to deployment and again after returning from deployment. Response rate was 76.6 % at follow-up	6 months	Self-Report Inventory for PTSD (SRIP); SRIP cut score >38	546		8.0 %		X	

(continued)

**Table 2** (continued)

				Sample size	Prevalence of PTSD	Prevalence estimate included in previously published meta-analyses
Warner et al. 2011a	US Army soldiers from a single infantry BCT deployed to Iraq (2007–2008) who completed PDHA and were invited to complete an anonymous survey. Response rate was 68.5 %	6 months	PC-PTSD 3	1,712	7.7 %	X
Warner et al. 2011b	Random sample of US Army soldiers from a single infantry BCT deployed to Iraq (2007–2008) who were assessed prior to participating in a battlefield ethics training program. Response rate was 84 %	0 month	PCL >50	421	17.8 %	X

Wright et al. 2012	Sample of US Army soldiers assessed 2 months prior to deployment to Iraq and again 3 months post-deployment as part of army screening program. Data collection occurred in 2004 and 2005	Pre-deployment 3 months	PCL >30 PCL >30	522	16.1 % 12.2 %			X	
Lapierre et al. 2007	US Army soldiers deployed to Iraq or Afghanistan assessed during reintegration training	1-2 months (Iraq) 1-2 months (Afghanistan)	SPTSS SPTSS	2,275 1,814	31.0 % 30.0 %			X X	

Notes. Active active duty component, NG/R National Guard/Reserve Component

<sup>a</sup>Meta-analysis reported prevalence estimate as 12.6 %

<sup>b</sup>Meta-analysis reported prevalence estimate as 0.8 %

<sup>c</sup>Meta-analysis reported prevalence estimate as 5.1 % and 8.3 % for active duty and reserve component, respectively

studies of active component service members only. Despite important methodological differences across studies, analyses were not stratified on these study characteristics. Among those studies that included NG/R component samples only, most estimates were based on strict definitions. There was much more variability in the methods used to ascertain PTSD prevalence among the active component only studies. Of the 24 active component estimates, 8 prevalence estimates were based on sensitive definitions using the PCL or PC-PTSD and 3 prevalence estimates were obtained using measures with unknown psychometric properties – of which two produced rates as high as 31 %. Hines and colleagues (2014) also included two studies that used clinical interviews to determine PTSD diagnosis and two other studies that reported prevalence rates based on data from medical records.

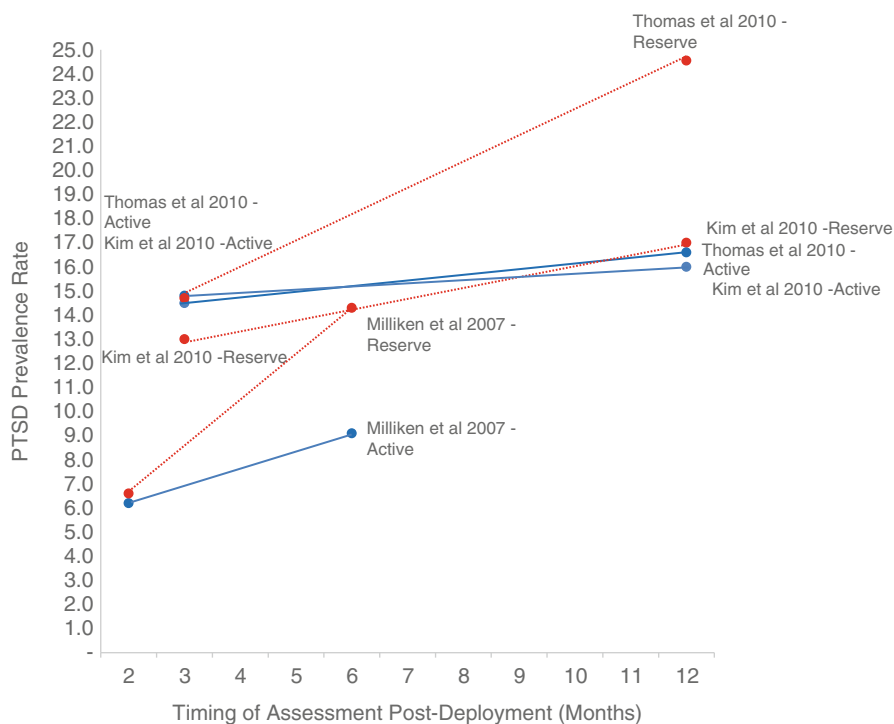
Although Cohen and colleagues (2015) limited their investigation to studies reporting the prevalence of PTSD separately for both the NG/R and active components ( $n = 10$ ), the authors did not consider the influence of deployment status, PTSD case definitions, or the time interval between deployment and assessment on results. Their meta-analysis included estimates of PTSD for Reservists who served during the Persian Gulf War and Vietnam War eras (Iowa Persian Gulf Study Group 1997; Kang et al. 2003; Stretch 1985), including some who were not deployed. Inclusion of PTSD prevalence estimates from previous conflicts, non-deployed service members and selecting initial post-deployment PTSD estimates over those from later in the reintegration period may mask potential differences.

The meta-analytic studies reviewed above examining the prevalence of PTSD among service members from NG/R and active duty components have differed widely in how PTSD caseness is defined and the time interval between deployment and assessment. Given these methodological differences between studies, it is difficult to form definitive conclusions about differences (or lack of differences) in rates of PTSD between NG/R and active duty component units and, if those differences occur, the source of those differences. Despite these limitations, one pattern of findings emerged from our review of this literature which we discuss below.

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## **Elevated Rates of PTSD Among Reserve Component Service Members During the Reintegration Period**

The prevalence of PTSD among NG/R and active duty components reported in studies assessing service members at two time points following deployment is presented in Fig. 1. All prevalence estimates were based on strict criteria. As illustrated in Fig. 1, the prevalence of post-deployment PTSD remained fairly stable for active duty service members over the post-deployment reintegration period (shown in solid line), but prevalence rates continued to rise over time for NG/R component service members (shown in dotted line). Using data from the PDHA and PDHRA, Milliken and colleagues found similar rates of probable PTSD among reserve and active components initially following deployment (11.8 % versus 12.7 %), but rates more than doubled among the reserve component when they were



**Fig. 1** Rates of probable PTSD based on strict criterion across the post-deployment reintegration period are shown for three studies comparing PTSD rates among National Guard/Reserve (*dotted lined*) and Active Duty (*solid line*) Components over time

reevaluated 6 months later (24.5 %). In contrast, the rate of probable PTSD increased by only 4.9 % (11.8 % to 16.7 %) in regular active duty component during the same time frame (Milliken et al. 2007). In another study of US soldiers from multiple BCTs deployed to Iraq, Kim et al. compared PTSD prevalence estimates at 3 months and 12 months after deployment. Rates of probable PTSD increased from 3 months to 12 months post-deployment in both the active and reserve component, but the increase was higher among National Guard soldiers (Kim et al. 2010). Similarly, Thomas et al. found rates of probable PTSD remained stable over time for active component soldiers, but increased across all case definitions from 3 to 12 months post-deployment for National Guard soldiers (Thomas et al. 2010). Although lower rates of PTSD have been consistently reported for UK service members compared to US service members, UK studies have also shown a pattern of higher rates of probable PTSD among Reservists (6 %) compared to Regulars (4 %) deployed to Iraq (Hotopf et al. 2006), with deployed Reservists continuing to have over twice the odds of PTSD (OR = 2.42) compared to their nondeployed counterparts 5 years after returning from deployment (Harvey et al. 2012).

## **Factors Influencing Post-deployment PTSD Among Reserve Component Service Members**

We conclude this chapter by summarizing the empirical literature examining risk and protective factors that may contribute to the development of PTSD among combat-deployed service members. We focus on factors that may be particularly relevant to explaining the development of post-deployment mental health problems among Reservists.

### **Military Service Expectations, Perceptions of Preparedness, and Combat Exposure**

Active duty and NG/R component populations differ in ways that may influence service members' expectations and experiences of combat deployment. One foundational difference between these two populations relates to their military service requirements and expectations. Military service is the primary responsibility of active duty personnel (Griffith 2010) and often includes the expectation of deployment overseas with increased opportunities for life-threatening combat. In contrast, NG/R component service members in the USA are required to attend, on average, 1-weekend drill per month and 15 days of annual training (Griffith 2010). Prior to September 11, 2001, few NG/R component service members likely held expectations of being called up for prolonged deployment, especially to a combat zone.

Although NG/R component troops have held a variety of operational roles while deployed to Iraq and Afghanistan, combat exposure is clearly an occupational hazard that may be inevitable for deployed military personnel. Extensive research has established a dose–response relationship between combat intensity and PTSD (Xue et al. 2015), and recent evidence suggests specific aspects of combat experiences (e.g., discharging a weapon and witnessing someone being wounded or killed) are particularly robust predictors of PTSD (Polusny et al. 2011a; Xue et al. 2015). Among UK service members deployed to Iraq, Reservists reported greater exposure to potentially traumatic experiences and higher levels of perceived life threat during deployment compared to their Regular counterparts (Browne et al. 2007) and greater perceived life threat significantly predicted post-deployment PTSD symptoms (Mulligan et al. 2010). Other studies have documented similar levels of combat exposure between National Guard soldiers and active duty personnel from brigade combat teams deployed to Iraq (Thomas et al. 2010). Yet, rates of PTSD nearly doubled for National Guard compared to active duty BCTs during the year following deployment pointing to the importance of factors beyond combat exposure in explaining elevated rates of PTSD.

Another important difference between soldiers deployed from National Guard units and those from active duty units relates to perceptions of preparedness for deployment. Studies have shown that National Guard soldiers report lower perceived preparedness for deployment than soldiers from active duty units (Vogt et al. 2008).



Using data from one of the first surveys to examine the mental health status of deployed service members (US Army Surgeon General 2003), the Military Health Advisory Team showed National Guard soldiers deployed to Iraq in transportation and nonmedical combat support services units had significantly higher rates of PTSD (19 %) compared with soldiers from combat units (11 %). In addition, those National Guard soldiers reported lower perceptions of combat readiness and training than those from active duty units. Similarly, a cross-sectional study of UK Regulars found that soldiers' appraisals of deployment experiences involving duties above their training were associated with post-deployment PTSD (Iversen et al. 2008). Finally, in a prospective, longitudinal study of 522 National Guard soldiers from a brigade combat team (BCT) deployed to Iraq, Polusny and colleagues demonstrated a nearly fourfold increase in new-onset PTSD 3 months after soldiers returned from Iraq compared to their pre-deployment base rates (Polusny et al. 2011). Not surprisingly, exposure to combat and exposure to the aftermath of battle both independently predicted PTSD. However, even after controlling for soldiers' baseline PTSD and exposure to traumatic experiences during deployment, soldiers' perceptions of military preparedness prior to their deployment predicted the development of new-onset PTSD 3–6 months following deployment.

## **Military Unit Support**

Poor social support in the aftermath of trauma is a well-established risk factor for PTSD (Wright et al. 2013). Within the military context, research has focused on the protective role of military unit support or cohesion while deployed as well as broader social support from family, friends, coworkers, and the community following deployment. Results of a recent meta-analysis indicated that poor unit cohesion is associated with greater risk of developing PTSD following combat exposure (Wright et al. 2013), and there is some evidence that Reservists experience lower levels of unit cohesion while deployed than their active duty counterparts (Browne et al. 2007). In a study of UK service members deployed to Iraq, Harvey and colleagues found Reservists were more likely than Regulars to perceive a lack of support from the military, and perceived lack of military support was associated with greater PTSD symptoms following deployment (Harvey et al. 2011). Two prospective, longitudinal studies have shown that unit support assessed prior to deployment was not predictive of post-deployment PTSD among US service members (Han et al. 2014; Polusny et al. 2011). Higher levels of unit support during deployment were associated with lower PTSD among active duty service members, but this relationship did not hold for deployed National Guard soldiers (Han et al. 2014). It is possible that active duty soldiers may perceive greater support during deployment because of their full-time status within their units compared to Reservists (Browne et al. 2007; Han et al. 2014; Harvey et al. 2011; Thomas et al. 2010). NG/R component service members who usually train with their units only 1 weekend a month and 2 weeks per year may have lower expectations of support from their units during deployment. Instead, NG/R component service members may have greater

expectations of support from family and friends during and especially after deployment.

## **Family Support and Home-Front Stressors During Deployment**

Families represent a critical source of support for deployed service members. However, families face significant stressors themselves during their loved one's combat deployment and subsequent reintegration. Not only might these deployment-related family stressors erode the support families can offer service members both during and after deployment, highly distressed families may also further add to the challenges faced by service members during deployment. In a retrospective, cross-sectional study of veterans who had served in the first Gulf War, Vogt and colleagues (2008) found that those who had served in the NG/R component were more likely to report family/relationship disruptions during the deployment than those who had served as active duty service members (Vogt et al. 2008). Family disruptions during deployment were also more strongly related to post-deployment PTSD symptoms for NG/R component service members than for those from the active duty component. Mulligan and colleagues examined the perceived impact of home-front stressors and the military's support for their family during deployment on the mental health of UK service members. After controlling for combat exposure and unit support, soldiers' perceptions of difficulties at home, such as relationship problems, marital separation, problems with children, and financial problems, were associated with greater severity of PTSD symptoms during their deployment (Mulligan et al. 2010). Conversely, family support during deployment has been associated with better mental health outcomes among deployed National Guard soldiers (Ferrier-Auerbach et al. 2010).

## **Challenges in Transitioning to Civilian Life and Post-deployment Social Support**

While combat deployment is one of the most stressful aspects of military life, it may be especially stressful for NG/R component service members because of the effects of prolonged deployment on civilian life domains. As NG/R component service members transition from the combat zone to their civilian lives, recent findings indicate that lack of post-deployment social support and additional life stressors are two important factors that appear to increase vulnerability for developing PTSD. Data from longitudinal studies has provided compelling support for the importance of post-deployment social support as a buffer for PTSD development following combat deployment (Han et al. 2014; Polusny et al. 2011). After accounting for National Guard soldiers' pre-deployment PTSD symptoms, other pre-deployment risk and resilience factors, and exposure to combat during deployment, Polusny and colleagues (2011) found the development of new-onset PTSD following deployment was associated with lower perceived social support. Similarly, Han et al. (2014)

found post-deployment social support was inversely related to PTSD symptom severity among both National Guard soldiers and active duty service members.

Supportive environments appear to promote mental health resilience by facilitating veterans' emotional expression (Bolton et al. 2002; Dirkzwager et al. 2003; Fontana and Rosenheck 1994; Green et al. 1990; Koenen et al. 2003) and promoting approach-based coping, which has been associated with lower levels of psychological symptoms and better adjusted functioning (Sharkansky et al. 2000; Wolfe et al. 1993). Social support may also help combat veterans create meaning around their experiences and sacrifices, which has been shown to lower risk for subsequent PTSD (Gray et al. 2004).

Evidence suggests that NG/R component service members deployed to Iraq and Afghanistan experience greater problems adjusting to homecoming than active duty personnel. In a study of UK Reservists, Browne et al. found Reservists reported more negative homecoming experiences and poorer marital satisfaction following deployment than Regulars (Browne et al. 2007). There is also ample data documenting that post-deployment stressful life events (e.g., occupational or legal difficulties, death of a loved one, and marital disruptions) are independently associated with higher rates of PTSD (King et al. 1998, 1999). After controlling for pre-deployment PTSD symptoms and exposure to combat and other deployment stressors, as well as post-deployment social support, Polusny and colleagues (2011) found that subsequent life stressors were also associated with the development of new-onset PTSD following deployment. In another longitudinal study of National Guard soldiers, Interian and colleagues examined whether home-front stressors from a previous OEF/OIF deployment increased the risk of PTSD symptoms after a subsequent deployment (Interian et al. 2014). These investigators found that home-front stressors prospectively assessed from a previous deployment and home-front stressors from a recent deployment were predictive of post-deployment PTSD symptom severity even after accounting for combat exposure and other risk factors.

Unlike the active duty force, reserve component service members generally hold civilian occupations and tend to rely primarily on civilian employment for their livelihood with military service supplementing their income (Griffith 2010). Therefore, deployment may also bring financial concerns and stressors for NG/R component service members and their families and loved ones. Using survey data from a sample of 4,034 deployed National Guard soldiers, Riviere et al. (2011) found financial hardship and job loss were independently related to post-deployment PTSD symptoms even after controlling for level of combat exposure, gender, age, and rank. These findings suggest that post-deployment interventions aimed at enhancing soldiers' interpersonal resources at home, work, and in the community and alleviating subsequent stressors (e.g., unemployment, family distress) might enhance recovery and resiliency.

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## Key Facts About Reservists

- A reservist is a member of a military reserve force.

- Reserve component service members, frequently referred to as “citizen soldiers,” generally hold civilian jobs or attend school while maintaining their military skill to augment the regular or active duty component as needed.
- In the USA, the “Reserve Component” includes the individual reserve components of each branch of the US Armed Forces and the National Guard.
- In the UK, the Reserve Component includes the Ex-Regular Reserves (former members of Regular Forces who remain on reserve liability and may be called back into active service after their discharge) and the Volunteer Reserves (civilians who volunteer to serve in Reserve status).
- The US National Guard and UK Volunteer Reserves maintain operational readiness through annual training and are usually the first reservists mobilized to deploy on operations.
- The slogan “1 weekend a month, 2 weeks a year” was commonly used in recruiting advertisements for the US National Guard prior to the conflicts in Afghanistan and Iraq.
- Since the beginning of these conflicts, the USA and UK have relied on unprecedented deployments of reserve component service members to support military operations.

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## Summary Points

- This chapter focuses on post-traumatic stress disorder (PTSD) among reservists deployed to Afghanistan and Iraq.
- Estimates of the prevalence of PTSD among service members deployed to Afghanistan and Iraq vary widely.
- Methodological differences across studies, such as differences in screening instruments and definitions used to identify potential cases of PTSD, contribute to variability in PTSD prevalence estimates.
- While recent meta-analyses have found similar rates of PTSD among NG/R and active duty component service members, methodological differences across studies preclude definitive conclusions regarding differences (or lack of differences) in the prevalence of PTSD by component.
- However, several longitudinal studies indicate that NG/R component service members show a pattern of increasing risk for post-deployment PTSD over time following deployment compared to their active duty counterparts.
- Differences between reservists and active duty service members in their military service expectations, military unit support, perceptions of preparedness, and combat exposure may contribute to increased risk of PTSD among reservists.
- We argue that reservists face unique challenges during deployment as well as in the post-deployment reintegration period. While family and home-front stressors appear to increase risk for the development of post-deployment PTSD among reservists, community social support following return from deployment serves an important protective role.

- Post-deployment interventions aimed at enhancing soldiers' interpersonal resources at home, work, and in the community and alleviating subsequent stressors (e.g., unemployment, family distress) might enhance recovery and resiliency among reservists.

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