

Prevalence, Detection and Correlates of PTSD in the Primary Care Setting: A Systematic Review

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Abstract Research suggests that posttraumatic stress disorder (PTSD) is common, debilitating and frequently associated with comorbid health conditions, including poor functioning, and increased health care utilization. This article systematically reviewed the empirical literature on PTSD in primary care settings, focusing on prevalence, detection and correlates. Twenty-seven studies were identified for inclusion. Current PTSD prevalence in primary care patients ranged widely between 2 % to 39 %, with significant heterogeneity in estimates explained by samples with different levels of trauma exposure. Six studies found detection of PTSD by primary care physicians (PCPs) ranged from 0 % to 52 %. Studies examining associations between PTSD and sociodemographic variables yielded equivocal results. High comorbidity was reported between PTSD and other psychiatric disorders including depression and anxiety, and PTSD was associated with functional impairment or disability. Exposure to multiple types of trauma also raised the risk of PTSD. While some studies indicated that primary care patients with PTSD report higher levels of substance and alcohol abuse, somatic symptoms, pain, health complaints,

and healthcare utilization, other studies did not find these associations. This review proposes that primary care settings are important for the early detection of PTSD, which can be improved through indicated screening and PCP education.

Keywords PTSD · Family Practice · Prevalence · Detection · Comorbid Mental Health · Healthcare Utilization; Primary Care

Introduction

Most people are exposed to traumatic events at some point in their life. A minority of these will develop posttraumatic stress disorder (PTSD), and meta-analysis suggests the lifetime prevalence of PTSD is between 5 and 10 % in the general population (Ozer, Best, Lipsey, & Weiss, 2008). According to DSM-5, PTSD consists of symptoms of intrusion, avoidance, arousal and negative cognitions and mood (APA, 2013). PTSD is associated with impaired functioning, as well as high rates of comorbid psychiatric disorders and physical problems (Kessler, Sonnega, Bromet, Hughes, & Nelson, 2005). Despite this, research suggests that many cases of PTSD are not diagnosed (Liebschutz et al., 2007; Taubman-Ben-Ari, Rabinowitz, Feldman, & Vaturi, 2001) and that even among those who are diagnosed, many do not seek treatment, or only do so following significant delays (Sayer et al., 2009; Trusz, Wagner, Russo, Love, & Zatzick, 2011).

Trauma exposure has been found to be associated with health conditions, morbidity, mortality and health care utilization (Schnurr & Green, 2004; Felitti et al., 1998). A growing body of evidence similarly indicates that people with PTSD show higher levels of general medical complaints and health-service utilization, placing a

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considerable burden on the health care delivery system (Calhoun, Bosworth, Grambow, Dudley, & Beckham, 2002; Greenberg et al., 1999; Kimerling & Calhoun, 1994; Koss, Koss, & Woodruff, 1991; Schnurr, Friedman, Sengupta, Jankowski, & Holmes, 2000; Solomon & Davidson, 1997). People with PTSD may be twice as likely to have a non-psychiatric health condition compared to those without PTSD, even when controlling for age, socioeconomic status and major depression (Kimerling, 2004). Given this evidence, it is likely that individuals with PTSD will attend primary care clinics seeking treatment for a variety of physical and mental health complaints.

Indeed, research has shown that individuals with mental health problems frequently first present in primary care settings, often seeking help for seemingly unrelated general medical problems (Lecrubier, 2004; Norquist & Regier, 1996). In many cases, mental health patients are first diagnosed by a primary care physician (PCP), and over half of mental health patients are treated by their PCP (Kessler et al., 2005). As such, Norquist and Regier (1996) described primary care settings as the “de facto mental health care system” (p. 473).

Yet, PTSD is often not detected by PCPs in routine clinical settings (Graves et al., 2011; Maoz et al., 1991; Samson, Bensen, Beck, Price, & Nimmer, 1999; Zimmerman & Mattia, 1999). It seems that this lack of detection does not necessarily stem from a failure on the part of PCPs to correctly interpret psychiatric symptoms that have been reported by patients. Rather, research indicates that individuals with PTSD often present to PCPs for medical treatment for physical symptoms, without even mentioning their psychiatric symptoms or trauma histories (Graves et al., 2011; McFarlane, Atchison, Rafalowicz, & Papay, 1994; Katon & Walker, 1998; Stein, 2003).

PTSD can also be difficult to diagnose as it is highly comorbid with other mental disorders (Breslau et al., 1998; Keane & Kaloupek, 1997). Investigations based on data from the National Comorbidity Survey found that 88 % of men and 79 % women with chronic PTSD meet the criteria for at least one other psychiatric diagnosis (Kessler et al., 1995), e.g., depression, bipolar disorder, somatization disorder, anxiety disorders, psychological distress, phobias, substance abuse and sleep problems (Davidson, Hughes, Blazer, & George, 1991; Geisser, Roth, Bachman, & Eckert, 1996; Kessler et al., 1995; Olfson et al., 1997).

Systematic reviews have been conducted on PTSD in primary care settings with regards to interventions (Possemato, 2011) and guidelines for clinicians (Miller, 2000), however to date, no reviews have considered prevalence, detection and correlates of PTSD. The current study conducts a systematic literature review that seeks to answer three questions: i) what is the prevalence of PTSD in primary care

settings?; ii) is PTSD well-detected by PCPs?; and iii) what are the correlates of PTSD in primary care patients?

Methods

Selection Criteria

Studies were included if they met the following criteria: original research that assessed PTSD prevalence in primary care settings; had sufficiently detailed description of PTSD measures, study sample and outcome measures and were published in English. The time-frame for inclusion in the study was between 1980 (when PTSD was first introduced in DSM-III) and December 2014, when the literature search for this review was terminated. We included studies that used the following approaches to investigate the epidemiology of PTSD in primary care: a) self-report questionnaires; b) structured clinical interviews administered by PCPs based on DSM III, DSM-IV or DSM-5 PTSD criteria, ICD-9 or ICD-10 PTSD criteria; or c) clinician-administered scales.

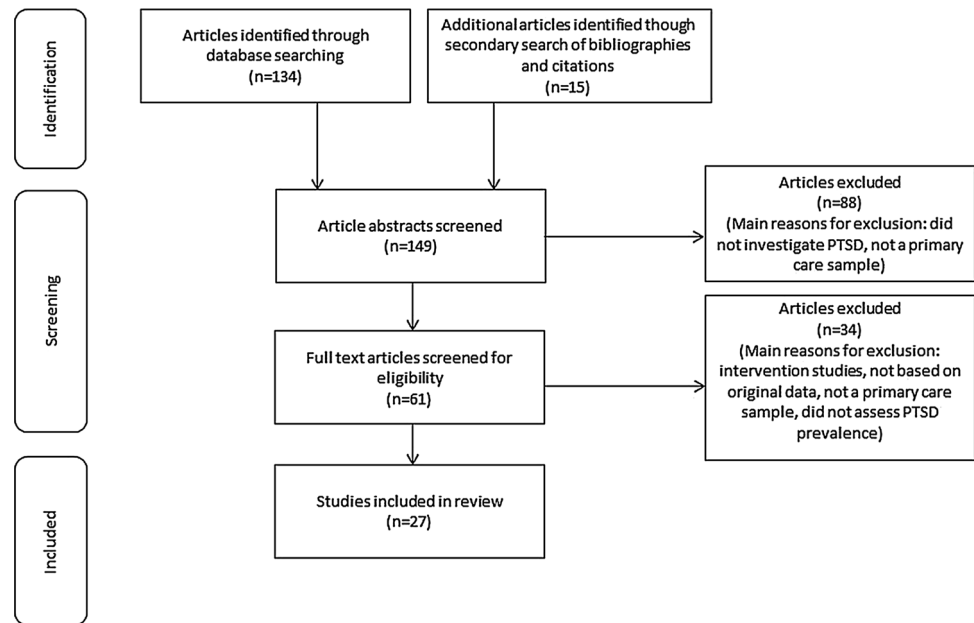
Search Strategy

We obtained studies for this review by a four-step procedure, as detailed in Fig. 1. First, an electronic search was conducted using MEDLINE (1980–December 2014) and PsycINFO (1 Jan 1980–31 December 2014) databases. Key search terms were: posttraumatic stress, PTSD, symptoms, detection, traumatic stress symptoms, trauma, mental health, primary care, general practice, family practice, HMO, prevalence. Second, we analyzed the abstracts for all studies returned by the electronic search and excluded those that did not meet the selection criteria. Third, we analyzed the full-text version of the remaining studies and excluded those that did not meet the selection criteria. Last, we conducted a secondary search through the bibliographies and citations of the studies returned from the electronic search to ensure that we had not missed any studies, and applied the selection criteria to these articles, and included any that were applicable. Altogether, 27 original articles were identified for inclusion.

Results

Sample Size

There was a large degree of variation in sample size, with studies ranging from $N = 134$ (Row 12 of Table 1, Kimerling et al., 2006) to $N = 4416$ (Row 2 of Table 1, Andersen et al., 2010). The populations from which these

Fig. 1 Flow diagram for identification, screening and inclusion of studies

studies drew their sample also differed; some samples were “high risk,” such as those with high rates of trauma exposure (e.g., Row 4 of Table 1, Carey, Stein, Zungu-Dirwayi, & Seedat, 2003) and veteran samples (e.g., Row 17 of Table 1, McDevitt-Murphy et al., 2010). The studies investigating high risk groups generally report higher prevalence rates, thus enabling a more thorough investigation of PTSD correlates, but simultaneously limiting our ability to make inferences about the rates of PTSD in the general primary care population.

Measures

The reviewed studies used a number of different measures to assess PTSD. These included three well-validated structured interview measures: the Clinician-Administered PTSD Scale of PTSD (CAPS; Blake et al., 1990), the Structured Clinical Interview for DSM-IV (SCID; First, Spitzer, Gibbon, & Williams, 1997), and the Composite International Diagnostic Interview (APA, 1994; WHO, 1997). The most common self-report measures used were the PTSD checklist –civilian (PCL-C; Weathers, Litz, & Keane, 1994) and military (PCL-M; Weathers, Kosinski, & Keller, 1996) versions. Other self-report measures used included the PTSD scale from the National Comorbidity survey (NCS; Kessler et al., 1995), the PTSD Inventory (Solomon, Weisenberg, Schwarzwald, & Mikulincer, 1987), and the Primary Care PTSD Screen (PC-PTSD; Prins et al. 2004).

The CAPS is considered the “gold standard” for PTSD diagnosis (Weathers et al., 2001), however the CAPS takes 30–60 min to administer, and is also time-consuming to score. The SCID PTSD module has adequate psychometric

properties, however it does not assess severity and it has been recommended that only experienced or well-trained practitioners administer it (Blake, et al. 1995). The Composite International Diagnostic Interview (CIDI; WHO, 1990) PTSD module also has adequate psychometric properties, but is not as sensitive as the CAPS (Kimerling, et al. 2014), which makes it less useful as a screening tool. The PCL-C and PCL-M are both 17-item checklists and are quick and easy to administer and score with excellent psychometric properties (Weathers et al., 1993). Scores for the PCL-C/M and CAPS have been found to be highly correlated (Blanchard, Jones-Alexander, Buckley, & Forneris, 1996). Prins et al. (2004; Row 22 of Table 1) compared the four-item PC-PTSD and the PCL-C against the CAPS and found the PC-PTSD to have higher sensitivity, i.e., be better able to correctly identify persons with PTSD, and higher specificity, i.e., be better able to correctly identify persons who do not have PTSD, than the PCL-C.

PTSD Prevalence

Seventeen studies reported current PTSD prevalence rates in primary care that ranged from 2 % to 15 %. The other ten studies found higher rates, and were mostly conducted among groups that could be considered high-risk, as described here. Following a screening phase, Alim et al. (2006; Row 1 of Table 1) investigated PTSD prevalence in a wholly trauma-exposed African-American sample, in which 20 % of males and 27 % of females met the criteria for current PTSD. An urban, low-income, primary care sample had a current PTSD rate of 19.1 % (Row 26 of Table 1, Westphal et al., 2013). A study utilizing a wholly

Table 1 Studies assessing PTSD prevalence, detection and correlates in primary care clinics

Authors	Country	Study design	Measures	Sample	PTSD prevalence	PTSD detection	PTSD correlates
1 Alim et al. (2006)	US	Cross-sectional	PTSD Clinician Administered PTSD Scale; Blake et al., 1990 Structured Clinical Interview for DSM-IV (SCID-IV; First, Spitzer, Gibbon, & Williams, 1997)	Phase 1: $N = 617$ Phase 2: (trauma-exposed) $n = 279$ Male and female	From the trauma-exposed sample - Current PTSD: 20 % males and 27 % females Lifetime prevalence: 51 %	Not assessed	Sociodemographic: Female gender Psychiatric: 46 % comorbid lifetime PTSD and depression Alcohol/Substance use: 52 % comorbid lifetime PTSD and alcohol/substance use disorder
2 Andersen et al. (2010)	US	Prospective	PTSD Medical records review for PCP-diagnosed PTSD using ICD-9 and DSM-IV criteria (APA, 1994) Other Medical records review for PCP-diagnosed depression and substance use disorder using ICD-9 and DSM-IV criteria (APA, 1994)	$N = 4416$ Male and female veterans	6 % PTSD at first point of testing 24.6 % over 6 years of study	Study only addressed cases where PTSD had been diagnosed by a PCP	Physical: PTSD associated with increased odds of ever developing many different physical diseases, and early onset physical disease
3 Bruce et al. (2001)	US	Cross-sectional	PTSD/Other SCID-IV (First, et al., 1997) Revised Version of Trauma Assessment for Adults (Resnick, Best, Kilpatrick, Freedy, & Falsetti, 1993)	$N = 3750$ Age ≥ 18 Male and female	4.93 % current PTSD	Not assessed	Sociodemographic: PTSD associated with divorce/separation Exposure characteristics: PTSD group associated with experiencing a higher number of trauma categories. Strongest predictors of PTSD were exposure to accident, unwanted sexual contact, rape, or seriously injured. Psychiatric: 43 % major depression, 34 % social phobia, 33 % lifetime history of suicide attempts Alcohol/substance use: 62 % lifetime history of alcohol/substance use problems

Table 1 continued

Authors	Country	Study design	Measures	Sample	PTSD prevalence	PTSD detection	PTSD correlates
4 Carey et al. (2003)	South Africa	Cross-sectional	PTSD Composite International Diagnostic Interview (CIDI); adapted PTSD event module; World Health Organization (1990) Other Mini-International Neuropsychiatric Interview (MINI; Sheehan et al., 1992) Adapted Sheehan Disability Scale (Leon, Olfson, Portera, Farber, & Sheehan, 1997) National Comorbidity Survey (NCS; Kessler, Sonnega, Bromet, & Hughes, 1995)	N = 220 Age 15–65 Male and female	19.9 % current PTSD	0 % PCP detection	Exposure characteristics: Mean number of traumatic events was significantly higher for patients with PTSD (5) compared to patients without PTSD (3.5) Psychiatric: PTSD associated with higher rates of comorbid major depressive episode (current and past), panic disorder Physical: PTSD associated with higher rates of somatization Functioning: PTSD was associated with higher functional impairment
5 Cwikel, Zilber, Feinson Lerner, (2008)	Israel	Cross-sectional	PTSD PTSD scale from the NCS (Kessler et al., 1995) Other Composite International Diagnostic Interview –Short Form (CIDI-SF; Kessler, Andrews, Mroczek, Ustun, & Wittchen, 1998) Symptom Checklist-90 (SCL-90; somatization disorder questions; Derogatis, 1977) Disordered eating behaviors questionnaire (Spitzer, et al., 1993)	N = 976 Age 25–75 Male and female	2.8 % last year prevalence PTSD	Not assessed	Not assessed
6 Escalona et al. (2004)	US	Cross-sectional	PTSD/Other CIDI 2.1 (APA, 1994; WHO, 1997)	N = 264 Age 23–85 Females (Half veterans)	27.3 % lifetime prevalence	Not assessed	Physical: PTSD associated with somatization

Table 1 continued

Authors	Country	Study design	Measures	Sample	PTSD prevalence	PTSD detection	PTSD correlates
7 Gillock et al. (2005)	US	Cross-sectional	PTSD PCL-C (Weathers, Litz, & Keane, 1994) Life Events Checklist (LEC; part of the CAPS; Blake et al., 1990) Other Wahler Physical Symptom Inventory (WPSI; Wahler, 1983) Medical Outcomes Study 36-Item Short-Form Health Survey (SF-36; Ware & Sherbourne, 1992; Ware, Snow, Kosinski, & Gandek, 1993)	<i>N</i> = 232 Age 18–60 Male and female	9 % current full PTSD 25 % subclinical PTSD	Not assessed	Sociodemographic: Full or subclinical PTSD was associated with fewer years of education, more likely to live alone rather than be married/in a committed relationship, and less likely to be working outside the house Physical: PTSD associated with more physical symptoms Functioning: PTSD associated with worse health functioning Healthcare utilization: PTSD associated with higher outpatient visits
8 Glover et al. (2010)	US	Cross-sectional	PTSD PCL-C (Weathers et al., 1994) LEC (Kessler et al., 1995) Other The Patient Health Questionnaire depression, panic disorder, generalized anxiety disorder and past year alcohol use disorder (Spitzer, Kroenke, & Williams, 1999) Drug use assessed with adapted version of PHQ alcohol use disorder module Mood Disorder Questionnaire (Hirschfeld et al., 2000)	<i>N</i> = 977 Age 18–70 Male and female	12 % PTSD	Not assessed	Exposure characteristics: PTSD was associated with a history of assault
9 Graves et al. (2011)	US	Cross-sectional	PTSD CAPS (Blake et al., 1990) PTSD/Other SCID-IV (First et al., 1997) Questions regarding PCP awareness	<i>N</i> = 738 at initial screening <i>n</i> = 501 at second screening—all had endorsed one significant trauma Age ≥ 18	12.33 % of initial phase had current PTSD 24.3 % of trauma exposed (phase 2) had current PTSD	52.1 % of a subsample of those identified with PTSD reported that their PCP was aware of their trauma and psychiatric symptoms	Psychiatric: 23 % comorbid major depressive disorder, 5.5 % comorbid bipolar disorder Alcohol/substance use: 22 % comorbid alcohol or substance abuse

Table 1 continued

Authors	Country	Study design	Measures	Sample	PTSD prevalence	PTSD detection	PTSD correlates
10 Grubaugh et al. (2005)	US	Cross-sectional	PTSD CAPS (Blake et al., 1990) Trauma Assessment for Adults-Self Report Version (TAA; Resnick, 1996) Other SF-36 (Ware & Sherbourne, 1992) MINI (Sheehan et al., 1992) Medical chart review	N = 669 Male and female veterans	11.7 % current PTSD 4.6 % met criteria for subclinical PTSD	Not assessed	Sociodemographic: PTSD group was younger than group without PTSD Exposure characteristics: PTSD associated with combat exposure. Psychiatric: PTSD associated with major depression, dysthymia, panic disorder, agoraphobia, generalized anxiety disorder, suicidality risk PTSD and subclinical PTSD groups endorsed higher number of traumas than no PTSD group Functioning: PTSD associated with worse functioning Healthcare utilization: PTSD associated with higher general mental health visits
11 Kartha et al. (2008)	US	Cross-sectional	PTSD CIDI 2.1 PTSD module (APA, 1994; WHO, 1997) Other Chronic Pain Definitional Questionnaire (Purves et al., 1998) Patient Health Questionnaire (PHQ; depression and anxiety modules; Spitzer, Kroenke, & Williams, 1999) CIDI-SF substance use disorder modules (WHO, 1997)	N = 607 Age 18–65 Male and female	22 % current PTSD	Not assessed	Sociodemographic: PTSD associated with female gender and low income Psychiatric: PTSD associated with depression—71 % comorbidity Alcohol/Substance use: Patients with PTSD more likely to meet criteria for substance dependence—24 % comorbidity Healthcare utilization: PTSD associated with more hospitalizations and mental health visits in the prior 12 months. Not assessed
12 Kimerling et al. (2006)	US	Cross-sectional	PTSD Breslau Short Screening Scale for PTSD (Breslau, Peterson, Kessler, & Schultz, 1999)	N = 134 Age 22–85 Male and female	25 % PTSD (identified using the CAPS)	38 % had a PTSD diagnosis in medical chart	Not assessed

Table 1 continued

Authors	Country	Study design	Measures	Sample	PTSD prevalence	PTSD detection	PTSD correlates
13 Kroenke et al. (2007)	US	Cross-sectional	PTSD SCID-IV (First et al., 1997) Other PHQ Generalized Anxiety Disorder Scale (GAD-7; Spitzer, Kroenke, Williams & Löwe, 2006) Medical Outcomes Study Short Form General Health Survey (SF-20; Stewart, Hays, & Ware, 1988) Hopkins Symptom Checklist anxiety subscale (Derogatis, Lipman, Rickels, Uhlenhuth, & Covi, 1974) PHQ-depression, panic and somatic scales Mini-SPIN (Social Phobia Inventory; Connor, Kobak, Churchill, Katzelnick, & Davidson, 2001) Single item assessments of anxiety, depression and pain Reports of physician visits and disability dates in the last three months	N = 965 Age 18–87 Male and female	8.6 % PTSD	Not assessed	Psychiatric: PTSD associated with depression compared with no anxiety disorder Physical: PTSD associated with somatic symptoms compared with no anxiety disorder Functioning: PTSD associated with worse functioning compared with no anxiety disorder Healthcare utilization: PTSD associated with higher physician visit compared with no anxiety disorder
14 Liebschutz et al. (2007)	US	Cross-sectional	PTSD CIDI 2.1 PTSD module (APA, 1994; WHO, 1997) Electronic Medical Records Review Other Chronic Pain Definitional Questionnaire (Purves et al., 1998) Patient Health Questionnaire (PHQ; depression and anxiety modules; Spitzer et al., 1999) CIDI-SF substance use disorder modules (WHO, 1997) Self-administered screening tool containing questions about: demographics, symptoms of depression and anxiety, IBS, quantity and frequency of alcohol, heroin or cocaine use, and chronic pain.	N = 509 Age = 18–65 Male and female	23 % current (past 12 months) PTSD 34 % lifetime PTSD	11 % had PTSD diagnosis noted in medical records	Sociodemographic: Current PTSD associated with female gender, non-immigrants, low income, unemployed or disabled, separated/divorced, and never married. Physical: Current PTSD associated with chronic pain and irritable bowel syndrome Psychiatric: Current PTSD associated with anxiety disorders and depression Alcohol/substance use: Lifetime PTSD associated with alcohol abuse and substance dependency

Table 1 continued

Authors	Country	Study design	Measures	Sample	PTSD prevalence	PTSD detection	PTSD correlates
15 Löwe et al. (2011)	US	Cross-sectional	PTSD/Other SCID-IV (Löwe et al., 2011) Other Mini SPIN; Connor et al., 2001) SF-20; Stewart et al., 1988) PHQ; somatic symptoms and depression modules (Spitzer et al., 1999) GAD-7 (Spitzer et al., 2006)	N = 965 Age ≥ 18 Male and female	8.6 % current PTSD	Not assessed	Sociodemographic: PTSD associated with female gender, less likely to be white, and less likely to be married Psychiatric: PTSD associated with higher depression, panic disorder, social anxiety disorder and generalized anxiety disorder. Physical: PTSD associated with somatic symptoms and pain Functioning: PTSD associated with lower functioning and higher numbers of disability days Healthcare utilization: PTSD associated with more medical visits
16 Magruder et al. (2005)	US	Cross-sectional	PTSD PTSD Checklist—Military (PCL-M; Weathers, Huska, & Keane, 1991) CAPS (Blake et al., 1990) TAA (Resnick, 1996) Other SF-36 (Ware & Sherbourne, 1992) MINI (Sheehan et al., 1992) Medical record analysis	N = 746 Age 18–79 Male and female veterans 92.9 % male participants	11.5 % PTSD	46.5 % PCP detection	Sociodemographic: PTSD associated with no college degree, unemployment and younger age Exposure characteristics: Serving in a war zone increased likelihood of PTSD Physical: Medical records analysis suggested PTSD comorbid with musculoskeletal problems Psychiatric: PTSD associated with major depression, generalized anxiety disorder, panic disorder, agoraphobia suicidality risk In addition, medical record analysis suggested comorbid depression, panic, anxiety, bipolar/mania, psychosis, dysthymia Functioning: PTSD was associated with worse functioning Alcohol/substance use: PTSD associated with substance abuse In addition, medical record analysis suggested PTSD comorbid alcohol and drug use

Table 1 continued

Authors	Country	Study design	Measures	Sample	PTSD prevalence	PTSD detection	PTSD correlates
17 McDevitt-Murphy et al. (2010)	US	Cross-sectional	PTSD PCL-M (Weathers et al., 1991) Other Alcohol Use Disorder Identification Test (AUDIT; Babor, Higgins-Biddle, Saunders, & Monteiro, 2001) SF-36 (Ware & Sherbourne, 1994)	N = 151 Age 21–62 Male and female veterans 90.1 % male participants	39.1 % PTSD	Not assessed	Physical: PTSD associated with pain Functioning: PTSD associated with functional impairment Alcohol/substance use: PTSD associated with hazardous drinking
18 McQuaid et al. (2001)	US	Cross-sectional	PTSD PCL-C (Weathers et al., 1994) CIDI-SF/CIDI 2.1 PTSD module (Kessler et al., 1998; APA, 1994; WHO, 1997) Other Demographic and medical information Center for Epidemiological Studies Depression Scale (CES-D; Radloff, 1977)	N = 368 at phase 1 N = 132 at phase 2 after screening Age ≥ 18 Males and female NB: This study over-selected participants likely to meet criteria for PTSD and depression	11.4 % full current PTSD 22 % full lifetime PTSD	Not assessed	Sociodemographic: PTSD associated with female gender Exposure characteristics: Higher number of trauma categories experienced predicted PTSD Assaultive trauma associated with lifetime PTSD Psychiatric: PTSD associated with depression
19 Neria et al. (2006)	US	Cross-sectional	PTSD PCL-C (Weathers et al., 1994) Modified version of the LEC (Kessler et al., 1995) Other Primary Care Evaluation of Mental Disorder (PRIME-MD; Spitzer, Williams, Kroenke, & Linzer, 1994) PHQ depression, panic disorder, generalized anxiety disorder and alcohol abuse modules (Spitzer et al., 1994) SF-12 (Ware et al., 1996) SDS (Leon et al., 1992) Computerized database of healthcare utilization	N = 930 Age 18–70 Male and female	4.7 % strict criteria 10.2 % broad criteria	Not assessed	Sociodemographic: PTSD associated with female gender, being born outside of the United States, Hispanic ethnicity, not being married or cohabiting, having a family history of psychiatric disorder Exposure characteristics: PTSD associated with pre-9/11 trauma exposure, and knowing someone killed in the 9/11 attacks Psychiatric: PTSD associated with major depression and generalized anxiety disorder Functioning: PTSD associated with significant social and family life impairment, and work loss of more than one week in the past month

Table 1 continued

Authors	Country	Study design	Measures	Sample	PTSD prevalence	PTSD detection	PTSD correlates
20 Neria et al. (2010)	US (NYC approx. 1 and 5 years post-9/11)	Prospective longitudinal cohort study	PTSD PCL-C (Weathers et al., 1994) Other SCID-IV (First et al., 1997) PRIME-MD (suicidal ideation; Spitzer et al., 1994) SF-12 (Ware et al., 1996) SDS (Leon et al., 1992) Computerized database of healthcare utilization	N = 455 Age -18–70 Male and female	At baseline: 9.6 % current PTSD Approx. 5 years after 9/11: 4.1 % current PTSD	Not assessed	Psychiatric: Remitted PTSD group had more suicidal ideation than no PTSD group Late (delayed) PTSD group had more depression and anxiety disorder than no PTSD group Late PTSD had more depression and anxiety compared with remitted PTSD group Individuals with pre-9/11 major depressive disorder were three times as likely to have remitted PTSD and ten times more likely to have late PTSD than no PTSD. Functioning: Remitted PTSD and late PTSD had worse mental health-related quality of life and more disability
21 Olsson et al. (1997)	US	Cross-sectional	PTSD/Other Structured Clinical Interview for DSM-III-R (SCID-III-R; Spitzer, Williams, & Gibbon, 1992) Other MINI (Sheehan et al., 1992) SDS (Leon et al., 1992) National Institute of Mental Health Epidemiological Catchment Area Program—disability items (Markowitz, Weissman, Ouellette, Lish, & Klerman, 1989)	N = 1001 Age 18–70 Male and female	2 % current PTSD	Not assessed	Sociodemographic: PTSD associated with marital distress Psychiatric: PTSD associated with phobia, major depressive disorder, bipolar disorder Healthcare utilization: PTSD associated with recent mental health service use compared to participants without a mental disorder
22 Prins et al. (2004)	US	Cross-sectional	PTSD CAPS (Blake et al., 1990) PLC-C (Weathers et al., 1994) Primary Care PTSD Screen (PC-PTSD; Prins et al., 2004)	N = 188 Male and female 99 % veterans (1 % relative of a veteran)	24.5 % PTSD	Not assessed	Not assessed

Table 1 continued

Authors	Country	Study design	Measures	Sample	PTSD prevalence	PTSD detection	PTSD correlates
23 Stein et al. (2000)	US	Cross-sectional	PTSD PLC-C (Weathers et al., 1994) CIDJ-2.1 PTSD module (WHO, 1997) Other CIDJ-SF (modules for MDD, panic disorder, social phobia, GAD, drug and alcohol abuse and impairment; Kessler et al., 1998) SDS (Leon et al., 1992) Questions about healthcare utilization	<i>N</i> = 368 for initial screen <i>n</i> = 122 for diagnostic interview Age ≥ 18 Male and female	11.8 % current (1 month) PTSD	Not assessed	Psychiatric: 61.1 % had comorbid major depression, 38.9 % had comorbid generalized anxiety disorder Healthcare utilization: PTSD associated with more medical problems, more emergency room visits, more healthcare utilization, and more visits to a mental health provider Functioning: PTSD associated with functional impairment and disability Alcohol/substance use: 22.2 % of PTSD patients also had comorbid substance use disorder
24 Taubman-Ben-Ari et al. (2001)	Israel	Cross-sectional	PTSD PTSD Inventory (DSM-III criteria; Solomon, Weisenberg, Schwarzwald, & Mikulincer, 1987) Other General Health Questionnaire (GHQ-28; Goldberg, 1972) Background Form Physician Encounter Form	<i>N</i> = 2975 Male and female	9 % current PTSD (7.4 % male, 10 % female)	2.4 % PCP detection	Sociodemographic: Women more likely to have PTSD
25 Weissman et al. (2005)	US	Cross-sectional	PTSD Questions about exposure to the World Trade Center PCL-C (Weathers et al., 1994) Life Events Checklist (Kessler et al., 1995) Other PRIME-MD (Spitzer, et al., 1994)	<i>N</i> = 982 Age 18–70 Male and female	13.2 % females 8.4 % males	Not assessed	Sociodemographic: Women more likely to have PTSD This gender difference in PTSD rates was lowered when marital status was controlled—being married has a protective effect for women.

Table 1 continued

Authors	Country	Study design	Measures	Sample	PTSD prevalence	PTSD detection	PTSD correlates
26 Westphal et al. (2013)	US	Cross-sectional	PTSD LEC (Kessler et al., 1995) CIDI (WHO, 1997) Other McLean Screening Instrument for Borderline Personality Disorder (MSI-BPD; Zanarini et al., 2003) SCID-IV (First et al., 1997) SDS (Leon et al., 1992) Social Adjustment Scale Self-Report (SAS; Weissman, Prusoff, Thompson, Harding, & Myers, 1978)	N = 474 Age 18–70 Male and female	Current PTSD 19.8 %	Not assessed	Psychiatric: PTSD associated with borderline personality disorder
27 Westphal et al. (2011)	US	Cross-sectional	PTSD CIDI (WHO, 1997) LEC (Kessler et al., 1995) Other SCID-IV (First et al., 1997) SF-12 (Ware et al., 1996) SDS (Leon et al., 1992) SAS (Weissman et al., 1978)	N = 321 Age 18–70 Male and female All trauma-exposed	Current PTSD 29.3 % Past PTSD 27.1 %	Not assessed	Sociodemographic: PTSD associated with female gender Exposure characteristics: Current and past PTSD more likely in survivors of interpersonal trauma vs noninterpersonal trauma Psychiatric: Current PTSD associated with depression, panic disorder, generalized anxiety disorder Past PTSD group had higher rates than the PTSD resistant group of depression and panic disorder Functioning: Current PTSD reported more disability, work days lost, functional impairment, child relational problems, and social adjustment problems

trauma-exposed subsample from this study found a current PTSD rate of 29.3 % and a past PTSD rate of 27.1 % (Row 27 of Table 1, Westphal et al., 2011). Carey et al. (2003; Row 4 of Table 1) investigated PTSD in an urban primary care clinic serving the Xhosa population in South Africa, in which the patients had high rates of trauma exposure (94 % had experienced at least one traumatic event), and 19.9 % of their participants met the criteria for PTSD. Liebschutz et al. (2007; Row 14 of Table 1) and Kartha et al. (2008; Row 11 of Table 1) carried out their studies in an urban primary care setting among a low socioeconomic population with high exposure to trauma and low levels of social support. Both these studies utilized the same sample of 509 patients, however the study by Kartha et al. (2008; Row 11 of Table 1) included an additional subsample of 98 patients who were oversampled for alcohol and drug use and irritable bowel symptoms. These two studies found prevalence rates of 23 % (Row 14 of Table 1, Liebschutz et al., 2007) and 22 % (Row 11 of Table 1, Kartha et al., 2008).

The four other studies reporting high rates of PTSD (in Table 1 see: Row 6, Escalona, Achilles, Waitzkin, & Yager, 2004: 27.3 %; Row 12, Kimerling et al., 2006: 25%; Row 17, McDevitt-Murphy et al., 2010: 39.1 %; Row 22, Prins et al., 2004: 24.5 %) were all conducted in Veterans Affairs (VA) clinics which provide services to military veterans and their families, and thus these samples included many combat-exposed veterans. The study reporting the highest prevalence rate of 39.1 % (Table 1, Row 17, McDevitt-Murphy et al., 2010), used a sample exclusively made up of veterans who had previously been deployed to a combat zone.

PTSD Detection

Six studies indicated that PTSD is often undetected in primary care settings, although there was a considerable range between studies. Four studies compared the prevalence rates that were obtained using standardized measures with these same patients' medical records to check whether they included a diagnosis of PTSD. These studies reported detection rates of 46.5 % (Row 16 of Table 1, Magruder et al., 2005), 38 % (Row 12 of Table 1, Kimerling et al., 2006), 11 % (Row 14 of Table 1, Liebschutz et al., 2007), and 0 % (Row 4 of Table 1, Carey et al., 2003). The study by Taubman-Ben-Ari et al., (2001; Row 24 of Table 1) utilized a physician encounter form to query PCPs' detection of PTSD. They reported that only 2.4 % of those meeting PTSD criteria on the PTSD inventory (Solomon et al., 1987) were diagnosed as having PTSD by PCPs. In the study carried out by Graves et al. (2011; Row 9 of Table 1), a subsample of the patients meeting PTSD criteria using standardized measures were asked whether they

had made their PCP aware of their trauma or their psychiatric symptoms, of which 52.1 % indicated that their PCPs were aware.

PTSD Correlates

Sociodemographic Characteristics

Many of the studies tested for differences between PTSD groups and non-PTSD groups regarding sociodemographic characteristics as follows:

Gender There were nine studies that found gender differences, eight studies that included both males and females but reported that no gender differences were found, and ten studies focused on only one gender, or included both males and females but either did not separate data by gender, or did not test for gender differences. All nine studies that reported gender differences found that female gender was significantly associated with a higher likelihood of PTSD (in Table 1 see: Row 1, Alim et al., 2006; Row 11, Kartha et al. 2008; Row 14, Liebschutz et al., 2007; Row 15, Löwe et al., 2011; Row 18, McQuaid, Pedrelli, McCahill, & Stein, 2001; Row 19, Neria et al., 2006; Row 24, Taubman-Ben-Ari et al., 2001; Row 25, Weissman et al., 2005; Row 27, Westphal et al., 2011).

Age Two studies found age differences, nine studies included age as a variable but reported that no age differences were found, and 16 studies either did not report age, or did not test for differences associated with age. Two studies reported that PTSD was significantly less prevalent in older populations (in Table 1 see: Row 10, Grubaugh et al., 2005; Row 16, Magruder et al., 2005). The Magruder et al. study (2005) used the same sample used by Grubaugh et al., 2005, together with an additional sample of 77 individuals who had some missing data and had been excluded by Grubaugh et al. (2005).

Education Two studies found differences associated with education level, nine studies included education as a variable but reported that no differences associated with education level were found, and 16 studies either did not report education level, or did not test for differences associated with education. Holding an undergraduate degree or higher (Row 16 of Table 1, Magruder et al., 2005), and having more years of education (Row 7 of Table 1, Gillock, Zayfert, Hegel, & Ferguson, 2005) was associated with fewer diagnoses of PTSD.

Employment Three studies found differences associated with employment status, four studies included employment

status as a variable but reported that no differences associated with employment status were found, and 20 studies either did not report employment status, or did not test for differences associated with employment status. In the three studies reporting differences, unemployment was associated with more PTSD (in Table 1 see: Row 7, Gillock et al., 2005; Row 14, Liebschutz et al., 2007; Row 16, Magruder et al., 2005).

Relationship Status Six studies found differences associated with relationship status, six studies included relationship status as a variable but reported that no differences associated with relationship status were found, and 15 studies either did not report relationship status, or did not test for differences associated with relationship status. PTSD was significantly less likely in married individuals (in Table 1 see: Row 14, Liebschutz et al., 2007; Row 15, Löwe et al., 2011) or married/cohabiting individuals (in Table 1 see: Row 7, Gillock et al., 2005; Row 19, Neria et al. 2006), and significantly more likely in those that were divorced or separated (Row 3 of Table 1, Bruce et al., 2001). Weissman et al. (2005; Row 25 of Table 1) found that the gender differences in PTSD were largely accounted for by differences in marital status; being married or cohabiting had a significant protective effect.

Ethnicity Three studies found differences associated with ethnicity, nine studies included ethnicity as a variable but reported that no differences associated with ethnicity were found, and 15 studies either did not report ethnicity, or did not test for differences associated with ethnicity. Löwe et al. (2011; Row 15 of Table 1) reported that the patients that met the criteria for PTSD were less likely to be white. Neria et al. (2006; Row 19 of Table 1) found a significant association between PTSD and ethnicity of Hispanic origin. While Liebschutz et al. (2007; Row 14 of Table 1) reported that PTSD was more common among non-immigrants, Neria et al. (2006, Row 19 of Table 1) conversely indicated that PTSD was more common among immigrants.

Trauma Exposure Measures and Characteristics

Studies that investigated trauma exposure characteristics used the Trauma Assessment for Adults (TAA; Resnick 1996), the CIDI PTSD module (WHO, 1990) or the Life Events Checklist (LEC) from the CAPS (Blake, et al., 1990). The LEC and CIDI ask about the exposure to various traumatic events, without differentiating whether traumas took place in childhood or adulthood, unlike the TAA which includes specific items for childhood sexual assault and physical abuse, and adolescent sexual assault. These assessment tools do not

investigate multiple exposures to the same kind of traumatic event, so we were not able to investigate this issue.

Eight studies found differences associated with exposure characteristics, two studies included exposure characteristics as a variable but reported that no differences associated with exposure characteristics were found, and 17 studies either did not report exposure characteristics, or did not test for differences associated with exposure characteristics.

According to Bruce et al. (2001; Row 3 of Table 1), the strongest predictors of a PTSD diagnosis were rape and unwanted sexual contact. This study also found that, in women, PTSD was significantly associated with being attacked with a weapon or by someone with intent to kill, or witnessing someone else being seriously injured, and in men that only rape and military combat were significantly associated with PTSD. In both men and women, a history of assault raised the risk of a PTSD diagnosis (Row 8 of Table 1, Glover, Olfson, Gameroff, & Neria, 2010). McQuaid et al. (2001; Row 18 of Table 1) found that assaultive trauma was reported as the most distressing experience more frequently than non-assaultive trauma by participants with PTSD. PTSD in veterans was significantly associated with having served in a war zone (Row 16 of Table 1, Magruder et al., 2005) or having combat exposure (Row 10 of Table 1, Grubaugh et al., 2005). In a study conducted in New York, PTSD was more common among patients who knew someone who had been killed due to the 9/11 attacks (Row 19 of Table 1, Neria et al., 2006). In this study, PTSD was also significantly related to pre-9/11 trauma exposure. A study utilizing a subset of this data sample found that interpersonal trauma exposure was associated with PTSD, compared with non-interpersonal trauma exposure (Row 27 of Table 1, Westphal et al., 2011). Some of the studies reviewed indicated that experiencing multiple types of traumas raised the risk of PTSD (in Table 1 see: Row 3, Bruce et al., 2001; Row 4, Carey et al., 2003; Row 10, Grubaugh et al., 2005; Row 18, McQuaid et al., 2001).

Comorbid Mental Disorder

Seventeen studies found differences or high rates of comorbidity associated with psychiatric disorder or symptoms for those with and without PTSD (in Table 1 see: Row 3, Bruce et al., 2001; Row 4, Carey et al., 2003; Row 9, Graves et al., 2011; Row 10, Grubaugh et al., 2005; Row 14, Liebschutz et al., 2007; Row 15, Löwe et al., 2011; Row 16, Magruder et al., 2005; Row 18, McQuaid et al., 2001; Row 19, Neria et al., 2006; Row 20, Neria et al., 2010; Row 21, Olfson et al., 1997; Row 23, Stein, McQuaid, Pedrelli, Lenox, & McCahill, 2000; Row 26, Westphal et al., 2013; Row 27, Westphal et al., 2011), there were no studies which tested for such differences but did not find any, and 10 studies that either did not report on

comorbid mental disorders, or did not test for differences associated with such variables.

PTSD was found to be highly comorbid with other psychiatric disorders. For example, Neria et al. (2006; Row 19 of Table 1) found that 68.4 % of patients with PTSD met criteria for one or more comorbid mental disorders, and Olfson et al. (1997; Row 21 of Table 1) found that 65 % of patients with PTSD also met the criteria for another mental disorder. Notably, sixteen of the studies investigating psychiatric comorbidity reported either significant associations between PTSD and depression, or if they did not test for group differences between those with and without PTSD, found high rates of comorbidity ranging from 23 % (Row 9 of Table 1, Graves et al., 2011) to 71 % (Row 11 of Table 1, Kartha et al., 2008). The other study investigating comorbidity only assessed borderline personality disorder and did not assess comorbid depression (Row 26 of Table 1, Westphal et al., 2013). Anxiety disorders were also found to be associated with PTSD in ten studies (in Table 1 see: Row 3, Bruce et al. 2001; Row 4, Carey et al., 2003; Row 10, Grubaugh et al., 2005; Row 14, Liebschutz et al., 2007; Row 15, Löwe et al. 2009; Row 16, Magruder et al., 2005; Row 19, Neria et al., 2006; Row 21, Olfson et al., 1997; Row 23, Stein et al., 2000; Row 27, Westphal et al., 2011).

Comorbid Substance/Alcohol Abuse

Seven studies found differences associated with substance/alcohol abuse, four studies tested for such differences but found no such differences, and 16 studies either did not report on alcohol or substance abuse disorders, or did not test for differences associated with such variables.

Patients with PTSD had higher rates of alcohol or substance use than those without PTSD (in Table 1 see: Row 3, Bruce et al., 2001; Row 11, Kartha et al., 2008; Row 14, Liebschutz et al., 2007; Row 16, Magruder et al., 2005). Comorbidity rates were reported as 22 % (Row 9 of Table 1, Graves et al. 2011), 24 % (Row 11 of Table 1, Kartha et al., 2008) and 46 % (Row 1 of Table 1, Alim et al. 2006). McDevitt-Murphy (2010; Row 17 of Table 1) found that PTSD was associated with hazardous drinking.

Association with Physical and Somatic Complaints

Nine studies found differences associated with physical symptoms or illness, somatic complaints, or pain, there were no studies which tested for such differences but did not find any, and 19 studies either did not report on physical illness, somatic complaints, or pain, or did not test for differences associated with such variables.

PTSD was found to be associated with increased odds of developing a physical disease (Row 2 of Table 1, Andersen

et al., 2010), with early onset of physical disease (in Table 1 see: Row 2, Andersen et al., 2010; Row 16, Magruder et al., 2005), and with musculoskeletal problems (Row 16 of Table 1, Magruder et al., 2005). Gillock et al. (2005; Row 7 of Table 1) found that patients with PTSD endorsed a higher number of physical symptoms. Studies also indicated an association between PTSD and somatization (in Table 1 see: Row 4, Carey et al. 2003; Row, 6, Escalona et al. 2004; Row 13, Kroenke, Spitzer, Williams, Mohahan, & Löwe, 2007; Row 15, Löwe et al. 2009), as well as between PTSD and pain (in Table 1 see: Row 17, McDevitt-Murphy et al., 2010; Row 14, Liebschutz et al., 2007; Row 15, Löwe et al. 2009).

Functioning

There were 11 studies that found PTSD was associated with impaired functioning or disability (in Table 1 see: Row 7, Gillock et al., 2005; Row 10, Grubaugh et al., 2005; Row 13, Kroenke, et al., 2007; Row 15, Löwe et al., 2011; Row 16, Magruder et al., 2005; Row 17, McDevitt-Murphy et al., 2010; Row 19, Neria et al., 2006; Row 20, Neria et al., 2010; Row 21, Olfson et al., 1997; Row 23, Stein et al., 2000; Row 27, Westphal et al., 2011), one study which tested whether PTSD was associated with more disability as compared with current major depressive episode and somatization disorder and found no such difference (Row 4 of Table 1, Carey et al., 2003) and 15 studies either did not report on impaired functioning, or did not test for differences associated with this variable.

Health Care Utilization

There were nine studies that found differences associated with health care utilization, no studies which tested for such differences but found none, and 18 studies that either did not report on health care utilization, or did not test for differences associated with this variable.

The differences associated with health care utilization were mixed. While five studies found that people with PTSD showed significantly higher healthcare utilization (in Table 1 see: Row 7, Gillock et al., 2005; Row 11, Kartha et al., 2008; Row 13, Kroenke et al., 2007; Row 15, Löwe et al., 2011; Row 23, Stein et al., 2000), two other studies reported that while they were more likely to have made a recent mental health visit, they were not more likely to have utilized other medical services including primary care (in Table 1 see: Row 10, Grubaugh et al., 2005; Row 16, Magruder et al., 2005). It was also noted that people with PTSD were more likely to have received recent mental health treatment (in Table 1 see: Row 19, Neria et al. 2006; Row 20, Olfson et al., 1997).

Discussion

The studies reviewed reported a range of current PTSD prevalence in primary care, ranging from 2.0 %-39.1 %. Detection of PTSD ranged from 0 %-61.5 %. In addition, the studies reported a wide range of correlates and predictors of PTSD, including socio-demographic factors, comorbid mental and physical health problems, substance and alcohol abuse, somatic symptoms, functional impairment and pain. Notably, depression was found to have a significant association with PTSD in every study examining comorbidity between these two diagnoses.

The prevalence rates reported by seven of the studies were in the range found by Ozer et al. (2008), which was 5 %-10 % in a meta-analytic study. Three studies reported rates lower than 5 %, while 14 studies reported PTSD rates above 10 %. However these primary care clinics mostly served high-risk populations such as veterans, or highly trauma-exposed groups. Many of the samples were relatively small, a few used convenience samples, and aside from the study conducted by Taubman-Ben-Ari et al., (2001; Row 24 of Table 1) in Israel, none of the studies attempted to collect a representative primary care sample. Therefore these prevalence rates found in this review cannot be generalized to the primary care population as a whole.

This review highlights the issue of the high rates of undetected PTSD cases in primary care. While detection rates ranged from 0 %-52.1 %, even the best case left nearly half the sample with undiagnosed PTSD (Row 9 of Table 1, Graves et al., 2011). There are many possible reasons for the poor rates of detection. Primary care patients may not seek to be diagnosed with PTSD due to a lack of understanding regarding the relationship between trauma exposure and their own symptoms, or because of stigma (Samson et al., 1999; Yehuda, 2002; Lefevre et al., 1999). This appears to be particularly relevant for combat veterans who are especially sensitive to issues of stigma (Seal, 2013). PCPs may lack confidence or knowledge regarding PTSD symptoms (Meredith et al., 2009). Furthermore, it can be difficult to detect PTSD in patients whose presenting complaints are not classic PTSD symptoms. PCPs may focus on diagnosing and treating comorbid physical and mental conditions, without realizing that an additional PTSD diagnosis has been missed. Framing such symptom presentations as a mental or physical disorder with comorbid PTSD may help PCPs in having a broader perspective about treatment. There may also be systemic reasons PTSD is not well detected in primary care, such as a lack of integration between primary care and mental health services (Meredith et al., 2009).

The key to improving physician detection may be to build a model of the high-risk patient based on the correlates of PTSD identified in this review. These include comorbid

mental health disorders, in particular major depressive disorder, but also anxiety disorder and panic disorder. Substance and alcohol abuse was also found to be associated with PTSD in a number of studies. Additionally, physical health problems, somatic symptoms, pain, and functional impairment were more common among patients with PTSD. Particularly when these symptoms are not explained by any underlying physical disorder, it may be worth screening for PTSD (Hoge, Terhakopian, Castro, Messer, & Engel, 2007).

The reviewed studies were mixed in their implication of sociodemographic correlates. For example, nine studies found that female gender was associated with an increased likelihood of PTSD in line with previous studies (Kessler et al., 1995), while eight studies tested for gender differences and did not find any effect for gender. Some studies indicated that younger age, lower education, not being married, and being unemployed all raised the risk of PTSD, whereas other studies did not find any effect for these variables. In addition, studies that investigate the effect of ethnicity and immigrant status did not yield clear conclusions. Therefore PCPs should not make assumptions on PTSD likelihood based on socio-demographics.

This review indicates that patients with PTSD show higher levels of health care utilization. This contact with healthcare providers ought to be seen as an opportunity for detection and intervention (Olson et al., 1997; Stein et al., 2000). Sonis (2013) argued that there is insufficient evidence to recommend universal screening for all primary care patients. However, as suggested by the studies reviewed here, there are cases in which targeted screening could be useful, such as with patients who are known to have been in military service, have experienced violence or abuse, have unexplained somatic symptoms, and in patients with a diagnosis of depression or other mental health problems. Screening has also been recommended for primary care patients who do not respond to typical treatment for complaints such as pain and insomnia (Spoont, Williams, Kehle-Forbes, Nieuwsma, Mann-Wrobel, & Gross, 2015). Brief screening tools for use in primary care settings such as the 4-item PC-PTSD (Row 22 of Table 1, Prins et al., 2003) currently used by the VA, and the 17-item PCL-C show particular promise for use in primary care clinics (Spoont et al., 2015). Obtaining a trauma history in primary care settings may also improve detection of PTSD (Lecrubier, 2004; National Collaborating Centre for Mental Health UK, 2005).

It is important to note that this review did not address the question of treatment. While there is a substantial body of literature that suggests that primary care has an important role to play in the effective treatment of depression (Bower, Gilbody, Richards, Fletcher, & Sutton, 2006; Williams et al., 2007), there have been far fewer studies investigating

primary care-based treatment for PTSD (Possemato, 2011). Some studies have recommended that PCP involvement in treatment as part of a collaborative care model can reduce patients' PTSD symptoms as well as addressing some of the typical barriers to PTSD treatment, including stigma and access to services (e.g., Engel et al., 2008; Spont et al., 2013) in both military (Schnurr et al., 2013) and civilian populations (Graves et al., 2011; Stein et al., 2000). Primary care-based management of PTSD by either a PCP or a primary care nurse include patient education, enrollment of the patient into a local PTSD group, prescription of medications, and provision of cognitive behavioral therapy (Lange, Lange, & Cabaltica, 2000; Sullivan et al. 2007). There are promising pilot study findings from research conducted with military personnel that PTSD can be well-managed by an integrated Behavioral Health Consultant in military primary care clinics (Cigrang et al., 2011; Corso, Bryan, Morrow, Appolonio, Dodendorf & Baker, 2009). Further research is needed to assess this model, including in civilian settings. In addition PCPs have a crucial role in referring patients for specialist mental health treatments when on-site (collaborative or integrated) care is not available.

There are some limitations to this review. It is important to note that the studies reviewed differed in sample selection methods and screening instruments, which limits our ability to adequately compare prevalence rates of PTSD between these studies. Furthermore the populations assessed were not intended to be representative of the wider primary care population, so no conclusions can be reached about the prevalence of PTSD in general. In particular some of the populations were deemed high risk or were known to have a high level of trauma exposure, which would be expected to cause higher PTSD rates. Finally, these studies all assessed PTSD according to DSM-III/IV criteria. It is possible that screening instruments based on DSM-5 criteria for PTSD, such as the PCL-5 would have yielded different prevalence rates and correlates.

There are a number of clinical implications that arise from this review. It is clear that primary care clinics are important locations for the detection of undiagnosed PTSD. The finding that PCPs were not successful at detecting PTSD suggests that there should be a more active and consistent screening process in primary care. Administering brief and sensitive screening tools with trauma-exposed patients, and to patients with other psychiatric diagnoses, is likely to identify individuals with undiagnosed PTSD. Raising PCPs' awareness of common correlates of PTSD, such as comorbid mental health problems, somatic complaints and functional impairment may also improve PTSD detection.

Disclosure of Interest I, the undersigned author, certify that I have no commercial associations (e.g., consultancies, stock ownership, equity interests, patent-licensing arrangements, etc.) that might pose a

conflict of interest in connection with the submitted article, except as disclosed on a separate attachment. All funding sources supporting the work and all institutional or corporate affiliations are stated in the acknowledgment section. I also certify that the submitted article contains no descriptions of individuals, family history, and/or photographs in which a person's identity can be recognized, except as disclosed on an attached signed release.

Compliance with Ethical Standards

Conflict of Interest Talya Greene, Yuval Neria, and Raz Gross declare that they have no conflicts of interest.

Human and Animal Rights and Informed Consent All procedures followed were in accordance with ethical standards of the responsible committee on human experimentation (institutional and national) and with the Helsinki Declaration of 1975, as revised in 2000. Informed consent was obtained from all patients for being included in the study. No animal or human studies were carried out by the authors for this article.

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