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Validation of the PCL-5, PHQ-9, and GAD-7 in a Sample of Veterans

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Validation of the PCL-5, PHQ-9, and GAD-7 in a Sample of Veterans

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Objective: Veterans can present at nongovernment (Department of Defense, Department of Veterans Affairs) mental health agencies with complex symptom constellations that frequently include posttraumatic stress disorder, depression, and generalized anxiety. To date, no veteran study has validated these measures on a treatment-seeking sample of veterans outside the DoD and VA. **Methods:** We used a treatment-seeking sample of veterans ($N = 493$) to validate measures that assess these constructs (PTSD Checklist 5, Patient Health Questionnaire-9, and Generalized Anxiety Disorder-7). **Results:** The seven-factor posttraumatic stress disorder hybrid configuration was the best fit. The best fitting model of the depression measure was a two-factor structure, cognitive-affective, and somatic depression. The measure of generalized anxiety was a unidimensional model. **Limitations:** Follow-up studies should validate these measures on nontreatment-seeking discharged veterans. **Conclusions:** We interpret these findings within the veteran scholarship and explore clinical implications for providers.

Keywords: veteran, PTSD, depression, generalized anxiety, assessment

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LEARNING OUTCOMES

- Incorporate the PTSD Checklist 5 (PCL-5), Patient Health Questionnaire-9 (PHQ-9), and Generalized Anxiety Disorder-7 (GAD-7) with veteran clients.
- Conceptualize veteran interrelatedness of PTSD, generalized anxiety, and depression via the seven-factor hybrid configuration of the PCL-5, two-factor structure of depression, and generalized anxiety as a unidimensional construct.
- Identify clinical implications of the factor structure of the assessments (PCL-5, PHQ-9, GAD-7) used in this study.

Validation of the PCL-5, PHQ-9, and GAD-7 in a Sample of Veterans

Posttraumatic stress disorder (PTSD) is a treatable mental health condition that arises from directly or indirectly experiencing traumatic events (eg, combat, car crash, rape), and exhibiting symptoms in the following four symptom clusters: intrusions, avoidance, negative alterations in cognitions and mood, and alterations in arousal and reactivity.[1] Not all trauma-exposed service members develop PTSD, and of those who do, most recover. According to the National Center for PTSD,[2] prevalence rates for PTSD in a given year are 11% to 20% for veterans of Operations Iraqi Freedom and Enduring Freedom, 12% for Gulf War veterans, and 15% for Vietnam veterans, with as many as 30% of veterans having a lifetime prevalence. Subthreshold PTSD is even more common than PTSD and occurs when veterans do not meet full diagnostic criteria yet still struggle with symptoms that may result in significant functional and social impairment.[3] In addition to combat, service members may develop PTSD from training or military sexual trauma during service.[4] In some cases, symptoms may not emerge for months or even years after trauma.[5]

A meta-analysis of risk factors for combat-related PTSD[6] identified pretrauma factors that predispose service members to the development of PTSD as female gender, ethnic minority membership, low education, enlisted ranks, Army service, combat occupational specialty, greater number of deployments, lengthier deployments, greater number of adverse life events, history of trauma exposure, and history of mental health problems. Peritrauma factors included combat exposure, firing a weapon, witnessing injuries and deaths, experiencing severe trauma, and dealing with deployment-related stressors. Lack of postdeployment support was a significant posttrauma factor in the development of PTSD.

Comorbidities

PTSD comorbidities increase risks for adverse health and mental health outcomes.[7,8] Of veterans with PTSD, approximately 30% have it with no comorbidities; almost 37% have one concurrent psychiatric diagnosis, just more than 21% have two, and a little more than 12% present with three or greater. Major depressive disorder (MDD) is the most common concurrent diagnosis.[9] PTSD and MDD are highly comorbid at the item-level and latent factor level.[10,11] Possible explanations for the high comorbidity rates for these two disorders (see the study by Moring et al[9]) include shared common risk factors, symptom overlap, and each may be a preexisting risk factor for the development of the other.

According to a nationally representative study by Nichter and colleagues,[7] using data from 2,732 veterans surveyed in the *National Health and Resilience in Veterans Study*, veterans with co-occurring MDD were more likely to report suicidal ideation, anxiety disorders, mental health service utilization, reduced mental health and cognitive functioning, and lower quality of life compared with veterans with only depression or PTSD. In addition, surveyed veterans had twice the likelihood of attempted suicide compared with veterans that have PTSD without MDD. PTSD and comorbid anxiety disorders are less examined than comorbid PTSD and depressive disorders. In veterans, comorbid PTSD and anxiety are linked to greater symptom severity than would be found in either diagnosis alone, as well as the presence of other co-occurring conditions (eg, substance misuse, depression[12]). For example, in a longitudinal study, almost half of veteran participants acknowledged having had a lifetime occurrence of PTSD, depression, and anxiety.[13]

Research has shown comorbidities between these disorders are negative attributions forming after trauma exposure.[14] As with MDD, PTSD and generalized anxiety disorder (GAD) share overlapping

symptoms, with concentration difficulties, sleep disturbances, and irritability common to both.[15] Among veterans with PTSD, excessive use of alcohol increases the likelihood of other comorbid mental health disorders and adverse outcomes.[8] In a study by Norman et al,[8] veterans with alcohol use disorder (AUD) and PTSD were more likely to experience major depression, anxiety, and suicidality with a three-fold increase in suicide attempts than veterans with AUD only.

Assessment

Combat Exposure

The Combat Exposure Scale (CES) specifically assesses traumatic exposure experienced in combat.[16] This seven-item CES seeks to gauge a combat veteran's subjective retrospective report of their wartime stressors. Veterans who noted higher amounts of combat exposure using the CES; those veterans consistently also have been diagnosed with PTSD.[16] More recently, Vogt et al[17] developed and validated the combat experiences assessment, which was specifically designed for post-9/11 veterans. The combat experience is a 17-question Likert scale 1 (never) to 6 (daily or almost daily) instrument that measures combat exposure. The 17 questions are summed to obtain an aggregated score ranging from 17 to 102, with higher scores representing greater combat exposure.

Posttraumatic Stress Disorder

Multiple reliable, valid, specific, and sensitive psychological tests and structured diagnostic interviews are used to assess PTSD. The Clinician-Administered PTSD Scale (CAPS-5) for *Diagnostic and Statistical Manual of Mental Disorders, Fifth Edition* (*DSM-5*) is generally referred to as the *criterion standard* for identifying and measuring PTSD symptoms. It is composed of a 30-item structured interview conducted by a clinician to make a current (past month) diagnosis of PTSD, a lifetime diagnosis of PTSD, and to assess symptoms over the past week.[18] The 30 manualized questions in the CAPS-5 for *DSM-5* are used to assess the onset, severity, level of distress, and impact of PTSD symptoms during an interview that regularly takes at least 40 minutes to conduct.[19] It has been used extensively with veterans and military members in the United States.[20,19] Cronbach α for this interview tool ranges from 0.82 to 0.88 indicating high internal consistency.[21,19] A recent study investigated the concordance between the CAPS-5 and PTSD Checklist for *DSM-5* (PCL-5) at the beginning of treatment, midpoint, and posttreatment.[22] Their analyses suggest that although the scores between the two approaches are closely approximated, the PCL-5 scores were higher at each longitudinal data point.[22]

The most broadly used tool for screening PTSD is the PCL-5,[23] which aids in detecting provisional PTSD diagnostic status, measuring the severity of symptoms, and assessing changes over time.[24] The PCL-5 is recommended in the VA Department of Defense Clinical Practice Guideline for Management of PTSD and Acute Stress Disorder for the assessment and management of PTSD.[24] It is a psychometrically sound self-report measure of *DSM-5* PTSD symptoms among military members and veterans.[23,11] This scale is composed of 20-Likert scale questions from 0 (not at all) to 4 (extremely) that are totaled to obtain an aggregated score ranging from 0 to 80. Higher scores signify greater levels of PTSD severity and symptoms. Cronbach α for the PCL-5 spans from 0.56 to 0.77, suggesting moderate to good internal consistency.[24]

Depression

The Beck Depression Inventory II (BDI-II[25]) and the Patient Health Questionnaire 9 (PHQ-9[26]) are two of the most widely used tools for assessing and monitoring depression in veterans. The PHQ-9 is a valid and reliable instrument for detecting the presence, severity, and changes in depression symptoms in the general US population[27,28] and particularly with military-connected populations.[29] Responses for the PHQ-9 range from 0 (not at all) to 3 (nearly every day), with total scores from 0 to 27 with higher summed scores indicating greater severity of depression. The 21-item BDI-II is a commonly used screening

tool for assessing depressive symptoms in clinical settings that may be especially helpful for detecting depression among veterans when other military-related comorbid conditions are present such as mild traumatic brain injury.[30] Lower scores on the BDI-II reflect fewer depression symptoms, whereas higher scores indicate more symptoms. Concurrent validity of the BDI-II to other depression scales is high, and the Cronbach α ranges from 0.73 to 0.96 for internal reliability.[31]

Generalized Anxiety

The Beck Anxiety Inventory (BAI[32]) and the Generalized Anxiety Disorder-7 (GAD-7[33]) are two frequently used reliable and valid instruments for assessing the presence and severity of anxiety in veterans. Scores for the 21-item BAI range from 0 to 63: minimal anxiety levels (0–7), mild anxiety,[8–15] moderate anxiety,[16–25] and severe anxiety.[26–63] This assessment tool is used extensively within the Veterans Health Administration and is a psychometrically sound tool to measure anxiety in veterans.[34,35] The BAI has excellent overall internal consistency. A meta-analysis of 192 studies using the BAI found an aggregated internal consistency (coefficient α) of 0.91.[36] The GAD-7 is a seven-item scale that performs well as a screening tool for the most common anxiety disorders in primary care.[37] It is used with a wide variety of populations including military members and veterans.[38] Responses on the GAD-7 range from 0 (not at all) to 3

TABLE 1. Demographics of Sample

Characteristic	Sample (N = 493)
Age, yr	
Mean	38.93
Median	36.00
SD	10.60
Range	45
Time as veteran, yr	
Mean	7.65
Median	6.00
SD	5.71
Range	29.42
Branch of service, *n* (%)	
Air force	65 (13.2%)
Army	220 (44.6%)
Navy	81 (16.4%)
Marine corps	127 (25.8)
Sex, *n* (%)	
Women	99 (20.1%)
Men	394 (79.9%)
Ethnicity, *n* (%)	
African American/Black	86 (17.4%)
Latino(a)/Hispanic	76 (15.4%)
Multiple ethnicities	17 (3.5%)
White	314 (63.7%)
Service status	
Active	17 (3.4%)
Discharged	370 (75.1%)
Reserve	22 (4.5%)
Retired	84 (17.0%)
Relationship status	
Single	82 (16.6%)
Committed relationship	86 (17.4%)
Married	222 (45.0%)
Separated	33 (6.7%)
Divorced	65 (13.3%)
Remarried	1 (0.2%)
Widowed	4 (0.8%)
Rank	
e1–e4	278 (56.4%)
e5–e6	172 (34.9%)
e7–e9	28 (5.7%)
Officer/warrant officer	15 (3.0%)

(nearly every day), with summed scores ranging from 0 to 21. Higher scores on the tool indicate greater severity of anxiety. The reliability of the GAD-7 has been reported with a Cronbach α of 0.89 and higher.[39]

Confirmatory Factor Analytic Studies

Previous confirmatory factor analytic (CFA) studies of the psychometric properties of the PCL-5 for the *DSM-5*[20] have demonstrated its reliability and validity with military samples.[40,41,11] The factor structure of the PCL-5 is highly relevant given that the relationship between PTSD and MDD depends on the factor structure of the data analyzed.[9] More recent CFA studies based on *DSM-5* diagnostic criteria support six- and seven-factor hybrid factor structures.[40,41,42]

Recent CFA studies based on *DSM-5* criteria for PTSD have investigated relationships between PTSD and comorbid depression using bifactor modeling.[10,9] In bifactor models, items load onto specific subscale factors as well as the general bifactor, termed the "general distress," or "transdiagnostic" factor. The general distress factor encompasses dysphoric elements present in mood and anxiety disorders that are also present in PTSD.[9] In a study that replicated and extended a previous CFA study by Byllesby and colleagues,[10] other scholars[9] found support for the bifactor model (ie, model including a general factor that all items load onto) using data from 268 treatment-seeking active-duty service members to investigate the relationship between the PCL-5 and BDI-II. After accounting for general distress, negative alterations in cognitions and mood, alterations in arousal and reactivity, and the bifactor were significantly correlated with MDD in their treatment-seeking sample. Findings supported the notion that general distress is a common factor to PTSD and MDD, underscoring the hypothesis that the high rates of comorbidity between these two disorders may be explained by transdiagnostic factors and disorder-specific symptoms.[9]

There is scant CFA research on underlying relationships between PTSD and anxiety disorders. In one longitudinal study using data based on *DSM-IV* criteria, Durham et al[43] investigated relationships between PTSD and GAD using PCL-5 and GAD-7 data from 1266 National Guard Soldiers to conduct CFAs using two four-factor

models of PTSD: the dysphoria[44] and the numbing configurations.[45] They found significantly higher correlations between the GAD factor and PTSD dysphoria factor than among PTSD re-experiencing, avoidance, and hyperarousal factors. Compared with distress, dysphoria involves more depression-related symptoms. The researchers noted that GAD was not more highly correlated with emotional numbing than other PTSD factors.

It is important to note that findings from CFA studies on PTSD; comorbid depression and anxiety disorders in active-duty and veteran samples differ somewhat because clinical epidemiological samples have higher levels severity on baseline PTSD measures.[10,9,11] For example, in a treatment-seeking active-duty military sample ($N = 142$), Wortmann et al[11] found that participants had a PCL-5 mean of 42.41 (SD = 15.06), whereas Byllesby et al,[10] analyzing data from a trauma-exposed nonclinical sample of National Guard members ($N = 972$), found a mean PCL-5 score of 28.60 (SD = 14.19).

This study aims to extend the current literature by replicating previous CFA findings of commonly used mental health measures for screening and assessing PTSD, depression, and generalized anxiety in treatment-seeking veterans. This study uses a moderate to a large sample size ($N = 493$) to investigate the following research question: What is the best fitting CFA of the PCL-5, PHQ-9, and GAD-7 assessments? The following hypotheses were formulated based on prior research into the use of these instruments:

H_1) Hybrid configuration of the PCL-5 (seven-factor) provides the best fitting model.
H_2) Two-factor PHQ-9 provides the best fitting model.
H_3) GAD-7 will be unidimensional.

METHOD

Participants

Veterans' mean age was 38.93 years (SD = 10.60). The participants identified as male (79.9%, $n = 394$) and 20.1% ($n = 99$) as

TABLE 2. Item mapping for all seven CFA models

	DSM-5	Dysphoria	Dysphoric Arousal	Externalizing Behaviors	Anhedonia	Hybrid	*DSM-4* (3 factor)
1. Intrusive thoughts	R	R	R	R	R	R	R
2. Nightmares	R	R	R	R	R	R	R
3. Flashbacks	R	R	R	R	R	R	R
4. Emotional cue reactivity	R	R	R	R	R	R	R
5. Physiological cue reactivity	R	R	R	R	R	R	R
6. Avoidance of thoughts	A	A	A	A	A	A	AEN
7. Avoidance of reminders	A	A	A	A	A	A	AEN
8. Trauma-related amnesia	NACM	D	NACM	NACM	NACM	NA	AEN
9. Negative beliefs	NACM	D	NACM	NACM	NACM	NA	——
10. Blame of self or others	NACM	D	NACM	NACM	NACM	NA	——
11. Negative trauma-related emotions	NACM	D	NACM	NACM	NACM	NA	——
12. Loss of interest	NACM	D	NACM	NACM	An	An	AEN
13. Detachment	NACM	D	NACM	NACM	An	An	AEN
14. Restricted affect	NACM	D	NACM	NACM	An	An	AEN
15. Irritability/anger	AR	D	DA	EB	DA	EB	A
16. Self-destructive/reckless behavior	AR	AR	DA	EB	DA	EB	AEN
17. Hypervigilance	AR	AR	AA	AA	AA	AA	A
18. Exaggerated startle response	AR	AR	AA	AA	AA	AA	A
19. Difficulty concentrating	AR	D	DA	DA	DA	DA	A
20. Sleep disturbance	AR	D	DA	DA	DA	DA	A

Adopted with permission from Armour et al.[40]

A, arousal (*DSM-IV-TR* cluster D); A, avoidance; AA, anxious arousal; AEN, avoidance and emotional numbing (*DSM-IV-TR* cluster C); An, anhedonia; AR, alterations in arousal and reactivity; DA, dysphoric arousal; EB, externalizing behaviors; AR = alterations in arousal and reactivity; D = dysphoria; NA, negative affect; NACM, negative alterations in cognitions and mood; R, re-experiencing.

TABLE 3. Descriptive Statistics

	Mean	SD	Variance	Skew	Kurtosis	Range
PCL-5 Q1 Intrusive thoughts	2.30	1.29	1.68	−0.30	−1.01	0–4
PCL-5 Q2 Nightmares	1.73	1.39	1.93	0.20	−1.25	0–4
PCL-5 Q3 Flashbacks	1.53	1.39	1.94	0.40	−1.18	0–4
PCL-5 Q4 Emotional cue reactivity	2.16	1.32	1.74	−0.15	−1.14	0–4
PCL-5 Q5 Physiological cue reactivity	2.00	1.42	2.03	−0.01	−1.34	0–4
PCL-5 Q6 Avoidance of thoughts	2.20	1.33	1.78	−0.20	−1.16	0–4
PCL-5 Q7 Avoidance of reminders	2.11	1.39	1.93	−0.13	−1.24	0–4
PCL-5 Q8 Trauma-related amnesia	1.40	1.39	1.93	0.51	−1.09	0–4
PCL-5 Q9 Negative beliefs	2.15	1.48	2.20	−0.15	−1.39	0–4
PCL-5 Q10 Blame of self or others	2.00	1.50	2.26	−0.02	−1.44	0–4
PCL-5 Q11 Negative trauma-related emotions	2.39	1.38	1.90	−0.39	−1.10	0–4
PCL-5 Q12 Loss of interest	2.14	1.42	2.04	−0.13	−1.33	0–4
PCL-5 Q13 Detachment	2.32	1.39	1.95	−0.36	−1.17	0–4
PCL-5 Q14 Restricted affect	1.98	1.37	1.89	−0.04	−1.23	0–4
PCL-5 Q15 Irritability/anger	2.03	1.37	1.88	−0.01	−1.25	0–4
PCL-5 Q16 Self-destructive/reckless behavior	1.01	1.20	1.43	0.98	−0.06	0–4
PCL-5 Q17 Hypervigilance	2.27	1.47	2.16	−0.29	−1.33	0–4
PCL-5 Q18 Exaggerated startle response	1.86	1.44	2.07	0.07	−1.38	0–4
PCL-5 Q19 Difficulty concentrating	2.29	1.35	1.82	−0.27	−1.15	0–4
PCL-5 Q20 Sleep disturbance	2.59	1.39	1.95	−0.59	−1.01	0–4
PHQ-9 Q1 Loss of interest	1.49	1.04	1.08	0.03	−1.17	0–3
PHQ-9 Q2 Down, depressed, hopeless	1.62	1.02	1.05	−0.05	−1.16	0–3
PHQ-9 Q3 Sleep disturbance	2.06	1.05	1.12	−0.73	−0.78	0–3
PHQ-9 Q4 Energy disturbance	1.90	1.04	1.09	−0.43	−1.08	0–3
PHQ-9 Q5 Poor appetite/overeating	1.62	1.16	1.34	−0.17	−1.42	0–3
PHQ-9 Q6 Thought avoidance	1.70	1.12	1.27	−0.22	−1.34	0–3
PHQ-9 Q7 Difficulty concentrating	1.51	1.14	1.30	0.01	−1.41	0–3
PHQ-9 Q8 Altered speech/movement	1.01	1.10	1.21	0.63	−1.01	0–3
PHQ-9 Q9 Self-harm/ideation	0.49	0.85	0.73	1.74	2.08	0–3
GAD-7 Q1 Feeling nervous	1.94	1.01	1.01	−0.41	−1.05	0–3
GAD-7 Q2 Can't stop or control worrying	1.76	1.06	1.12	−0.23	−1.22	0–3
GAD-7 Q3 Worry too much	1.93	1.01	1.01	−0.41	−1.05	0–3
GAD-7 Q4 Trouble relaxing	1.94	1.02	1.04	−0.49	−0.97	0–3
GAD-7 Q5 Restless	1.48	1.13	1.27	0.06	−1.38	0–3
GAD-7 Q6 Annoyed/irritable	1.90	1.05	1.10	−0.42	−1.11	0–3
GAD-7 Q7 Feeling afraid	1.45	1.16	1.34	0.05	−1.45	0–3

GAD-7, Generalized Anxiety Disorder-7; PCL-5, PTSD Checklist 5; PHQ-9, Patient Health Questionnaire-9.

female. Most of the participants identified as White (63.7%, *n* = 314), followed by African American or Black (17.4%, *n* = 86), Latino/a (15.4%, *n* = 76), and multiple ethnicities (3.5%, *n* = 17). Two-hundred twenty participants (44.6%) served in the army, 25.8% (*n* = 127) marine corps, 16.4% (*n* = 81) navy, and 13.2% (*n* = 65) in the air force. The average length of service was 7.65 years (SD = 5.71). The majority of the sample was married 45.0% (*n* = 222), deployed at least once 59.4% (*n* = 293), and were lower enlisted 56.4% (*n* = 278). See Table 1.

Procedure

Data for the current study were collected from 2015 to the last quarter of 2021 at a nonprofit mental health agency that provides services, to veterans, first responders, frontline healthcare workers, and their families. Data from the present study were collected at the veteran's intake appointment before they were assigned a mental health professional. For inclusion in this study, participants identified as veterans, were 18 years or older, and completed the clinical assessments with no missing data. The second author confirmed that there were

TABLE 4. Confirmatory Factor Analysis Fit Indices for the PCL-5

PCL-5 model	χ^2	df	P	CFI	TLI	RMSEA	SRMR	BIC	CMIN/DF
Three-factor (*DSM-4*)	644.186	116	<0.001	0.902	0.885	0.096	0.0522	873.605	5.553
DSM-5	713.437	164	<0.001	0.920	0.907	0.083	0.0441	998.661	4.350
Dysphoria	708.386	164	<0.001	0.921	0.908	0.082	0.0479	993.610	4.319
Dysphoric arousal	596.577	160	<0.001	0.936	0.925	0.074	0.0391	906.603	3.729
Externalizing behavior	579.285	155	<0.001	0.938	0.924	0.075	0.0387	920.313	3.737
Anhedonia	387.679	155	<0.001	0.966	0.958	0.055	0.0326	728.707	2.501
Hybrid	370.145	149	<0.001	0.968	0.959	0.055	0.0321	748.376	2.484

BIC, Bayesian information criterion; CFI, comparative fit index; CMIN/DF, minimum discrepancy per degree of freedom; *df*, degrees of freedom; *DSM-4*, *Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition; DSM-5, Diagnostic and Statistical Manual of Mental Disorders, Fifth Edition;* PCL-5, PTSD Checklist 5; RMSEA, root mean squared error of approximation; TLI, Tucker Lewis Index; SRMR, standardized root mean square residual.

TABLE 5. Confirmatory Factor Analysis Fit Indices for the PHQ-9

PHQ-9	χ^2	df	P	CFI	TLI	RMSEA	SRMR	BIC	CMIN/DF
One factor[a]	151.321	27	<0.001	0.945	0.927	0.097	0.0402	262.930	5.604
One factor[c]	83.673	24	<0.001	0.974	0.960	0.071	0.0301	213.884	3.486
Two factor[a]	105.619	26	<0.001	0.965	0.951	0.079	0.0349	223.429	4.062
Two factor[b]	61.151	24	<0.001	0.984	0.975	0.056	0.0278	191.362	2.548
Two factor[c]	60.307	23	<0.001	0.984	0.974	0.057	0.0274	196.718	2.622

[a]No correlated residuals.
[b]Correlated residuals items 3 and 4; items 7 and 8.
[c]Correlated residuals items 2 and 9; items 3 and 4; items 7 and 8.
BIC, Bayesian information criterion; CFI, comparative fit index; CMIN/DF, minimum discrepancy per degree of freedom; df, degrees of freedom; PHQ-9, Patient Health Questionnaire-9; RMSEA, root mean squared error of approximation; TLI, Tucker Lewis Index; SRMR, standardized root mean square residual.

no duplicate cases in this study that were used in a different validation manuscript of these same measures on a treatment-seeking sample of first responders.[46] This study was approved by an Institutional Review Board.

Measures

PTSD Checklist-5

The PCL-5 measures PTSD symptoms that correspond to the *DSM-5*.[23] Participants answer the 20-item self-report on a Likert scale with individual responses from 0 (not at all) to 4 (extremely). The range of summed scores is 0 to 80 and the higher the score indicates more severe symptoms. Bovin et al[41] recommend a cutoff score of 33 for probable PTSD. In this sample, Cronbach α of the total score was α = 0.954.

Patient Health Questionnaire-9

The PHQ-9 assesses depression.[26] Participants answer the nine-item self-report on a Likert scale with individual responses from 0 (not at all) to 3 (nearly every day). The range of summed scores is 0 to 27 and the higher the score indicates more severe symptoms. In this sample, Cronbach α of the total score was α = 0.905.

Generalized Anxiety Disorder-7

The GAD-7 to assess generalized anxiety.[33] Participants answer the seven-item self-report instrument on a Likert scale with individual responses from 0 (not at all) to 3 (nearly every day). The range of summed scores is 0 to 21, and the higher scores indicate more severe symptoms. In this sample, Cronbach's α of the total score was α = 0.923.

Data Analysis

Statistical analyses were conducted using SPSS version 27.0 (IBM Corp., Armonk, NY) and SPSS Analysis of Moment Structures (AMOS) version 27.0 (IBM SPSS, Chicago). There were no missing values on all three measures. First, we assessed and confirmed that the data was normally distributed.[47] Next, we evaluated the reliability of the three standardized assessments of the PCL-5, PHQ-9, and

GAD-7. We conducted seven CFAs for the PCL-5. The different models were hybrid, anhedonia, externalizing behavior, dysphoric arousal, dysphoria, *DSM-5*, and the three-factor DSM-IV-TR (Table 2). Next, we conducted five CFAs on the PHQ-9 and two on the GAD-7. We used several indices to conclude model fit; comparative fit index (CFI), Tucker-Lewis index (TLI), root mean square error of approximation (RMSEA), standardized root mean residual (SRMR), Bayesian information criterion (BIC), and the change to minimum discrepancy per degree of freedom (CMIN/DF) and P values. CFI and TLI of 0.90 or greater and an RMSEA less than 0.10 are indicative of strong model fit.[48] SRMR of 0.09 or lower demonstrates adequate model fit.[49] When evaluating models, if the difference in BIC values is between 6 and 9, this constitutes strong support in favor of the model with smaller BIC, and a 10-point difference or greater indicates very strong support for the model with the lowest BIC.[50] A value of 0.03 or lower for CMIN/DF is indicative of adequate fit.[51] Lastly, we established criterion and convergent validity between the PCL-5, PHQ-9, and the GAD-7 via correlation analyses.

RESULTS

Descriptive Analyses

The average PCL-5 score was 40.46 (SD = 20.33), PHQ-9 13.39 (SD = 7.24), and the average GAD-7 score was 12.40 (SD = 6.17). According to the recommended cutoff score by Bovin et al,[41] 64.3% (n = 317) have probable PTSD. Of the veterans in this sample, 14.6% (n = 72) have minimal, 18.7% (n = 92) have mild, 19.3% (n = 95) have moderate, 22.9% (n = 113) have moderately severe, and 24.5% (n = 121) have severe depression. In addition, 12.2% (n = 60) have minimal, 22.5% (n = 111) have mild, 22.3% (n = 110) have moderate, and 43.0% (n = 212) have severe generalized anxiety. To check the normality, we applied statistical methods of skewness and kurtosis.[47,51,52] The absolute value of skewness greater than 3 and kurtosis value greater than 10 indicate a problem and values greater than 20 indicate a more serious problem.[51] Others argued that data are normal if skewness is between −2 and +2 and kurtosis is between −7 and +7.[52,47] Based on this recommendation, the absolute values of the skewness and kurtosis of all the items in this study are

TABLE 6. Confirmatory Factor Analysis Fit Indices for the GAD-7

GAD-7	χ^2	df	P	CFI	TLI	RMSEA	SRMR	BIC	CMIN/DF
One factor[a]	147.939	14	<0.001	0.947	0.920	0.139	0.0362	234.746	10.567
One factor[b]	27.404	12	<0.01	0.994	0.989	0.051	0.0192	126.612	2.284

[a]No correlated residuals.
[b]Correlated residuals items 2 and 3; items 4 and 5.
BIC, Bayesian information criterion; CFI, comparative fit index; CMIN/DF, minimum discrepancy per degree of freedom; df, degrees of freedom; GAD-7, Generalized Anxiety Disorder 7; RMSEA, root mean squared error of approximation; TLI, Tucker Lewis Index; SRMR, standardized root mean square residual.
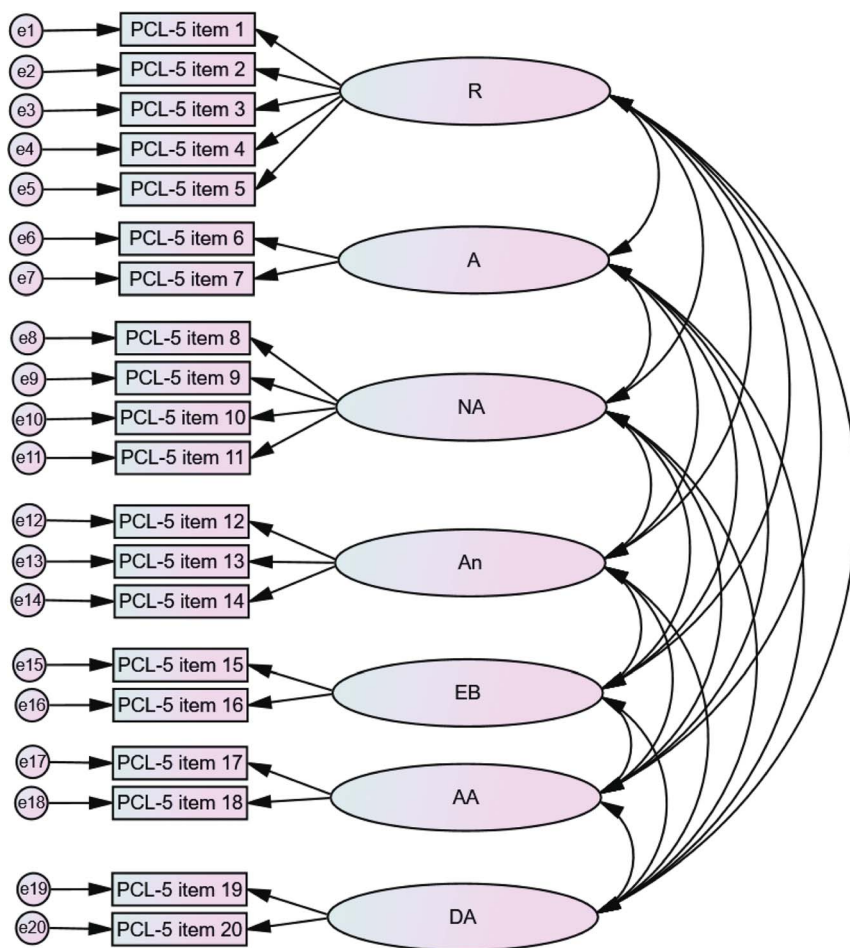
FIGURE 1. Confirmatory factor analysis model of the PCL-5 (hybrid). R, reexperiencing; A, avoidance; NA = negative affect; An, anhedonia; EB, externalizing behaviors; AA, anxious arousal; DA, dysphoric arousal.

within the acceptable range of less than 3 and less than 7, respectively. See Table 3 for item level descriptive statistics for the PCL-5, PHQ-9, and GAD-7.

Reliability Analyses

To assess the reliability of the PCL-5, PHQ-9, GAD-7 factor structure, we used Cronbach α. The internal consistency for hybrid configuration re-experiencing factor was (α = 0.900), avoidance (α = 0.826), negative affect (α = 0.846), anhedonia (α = 0.881), externalizing behaviors (α = 0.615), anxious arousal (α = 0.849), and dysphoric arousal (α = 0.747). The internal consistency for the anhedonia CFA model re-experiencing factor was (α = 0.900), avoidance (α = 0.826), negative alterations in cognitions and mood (α = 0.846), anhedonia (α = 0.881), anxious arousal (α = 0.849), and dysphoric arousal (α = 0.781). Cronbach α values greater than 0.6 are considered high reliability and acceptable index.[53,54] The overall Cronbach α for the PCL-5 was 0.954. No item indicated an increase in overall reliability if being deleted. Next, we assessed the corrected item-total correlation values, and all were greater than 0.3. Lastly, we calculated the mean inter-item correlation for the PCL-5, which was 0.421. The value falls between the acceptable range of 0.14 and 0.50.

The PHQ-9 cognitive affective factor was α = 0.825 and the somatic factor was α = 0.853, which are indicative of acceptable fit.[53,54] The overall Cronbach α for the PHQ-9 was α = 0.905, and the corrected item-total correlation values were greater than 0.3. We calculated the

mean inter-item correlation for the PHQ-9, which was 0.638. The GAD-7 unidimensional factor structure was α = 0.923.

Factorial Validity Analyses

Confirmatory Factor Analysis of PCL-5

First, we compared the different PTSD factor models: three-factor *DSM-4* configuration, *DSM-5*, dysphoria, dysphoric arousal, externalizing behavior, anhedonia, and seven-factor hybrid model. The hybrid χ^2 (149) = 370.145, $P < 0.001$, CFI = 0.968, TLI = 0.959, RMSEA = 0.055, SRMR = 0.0321, BIC = 748.376, CMIN/DF = 2.484 and anhedonia χ^2 (155) = 387.679, $P < 0.001$, CFI = 0.966, TLI = 0.958, RMSEA = 0.055, SRMR = 0.0326, BIC = 728.707, CMIN/DF = 2.501 were the best fitting models. Using the χ^2 difference test, we compared the anhedonia (nested) model with the hybrid (parent) model. Results showed that the hybrid had a better fit than the anhedonia model ($\Delta\chi^2$ (6) = 17.534, $P < 0.01$). In the hybrid configuration, item loadings ranged from 0.519 to 0.910 on each respective latent variable. In the anhedonia model, item loadings ranged from 0.519 to 0.910 on each respective latent variable. See Figure 1 for a visualization of the PCL-5 hybrid configuration and Figure 2 for the anhedonia model factor structure. See Table 4 for the PCL-5 CFA fit indices and Table 7 for item-level factor loadings.

Confirmatory Factor Analysis of PHQ-9

We conducted five CFA on the PHQ-9, two one-factor and three two-factor CFAs. The first one-factor CFA model fit was poor,
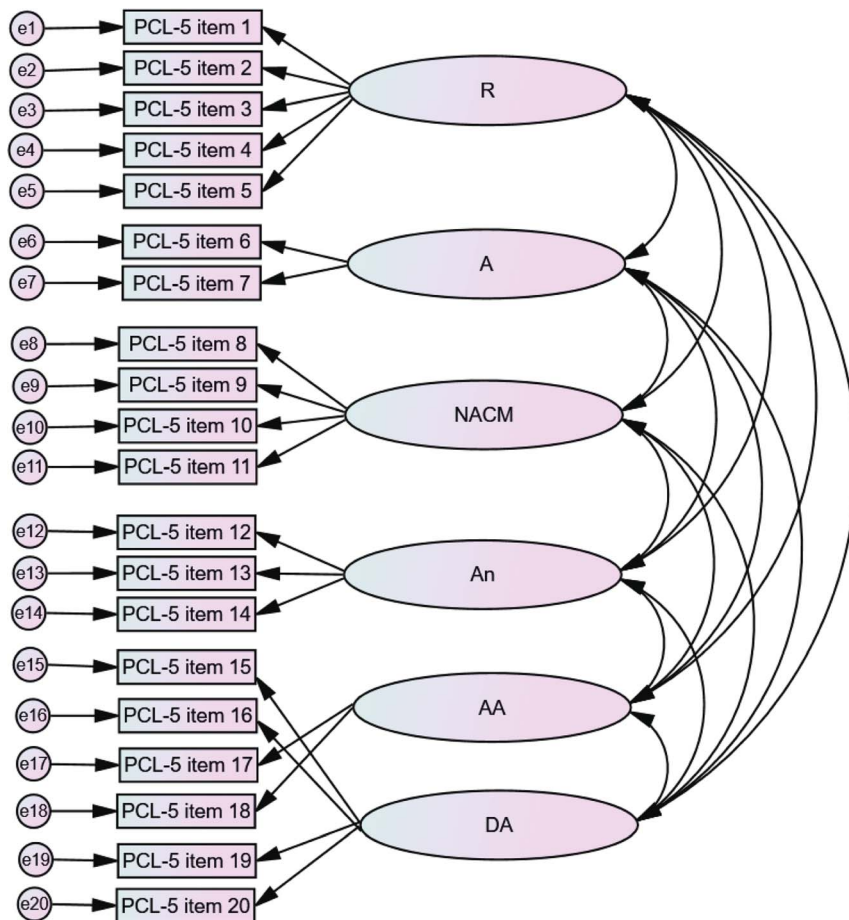
FIGURE 2. Confirmatory factor analysis model of the PCL-5 (anhedonia). R, reexperiencing; A, avoidance; NACM = negative alterations in cognitions and mood; An, anhedonia; AA, anxious arousal; DA, dysphoric arousal.

χ^2 (27) = 151.321, $P < 0.001$, CFI = 0.945, TLI = 0.927, RMSEA = 0.097, SRMR = 0.0402, BIC = 262.930, CMIN/DF = 5.604. Modification indices results suggested that correlating the residuals for items 3 to 4 and 7 to 8 improves the model as their values extremely exceeded the specified threshold. Moreover, the results for items 2 to 9 showed an above threshold value, which is expected as the items measure depression and suicidal ideation that are theoretically related. Hence, residuals for items 2 to 9 were also correlated. The CFA was specified again by freely estimating the error covariances of these items, which improved the model, χ^2 (24) = 83.673, $P < 0.001$, CFI = 0.974, TLI = 0.960, RMSEA = 0.071, SRMR = 0.0301, BIC = 213.884, CMIN/DF = 3.486.

Given that Beard et al[55] found a two-factor model to be a superior fit, we conducted three separate CFAs on the PHQ-9. The first two-factor indices were poor, χ^2 (26) = 105.619, $P < 0.001$, CFI = 0.965, TLI = 0.951, RMSEA = 0.079, SRMR = 0.0349, BIC = 223.429, CMIN/DF = 4.062. Next, using the modification indices results for the two-factor PHQ-9, we correlated the residuals to only items 3 to 4 and 7 to 8 as their values extremely exceeded the specified threshold. This resulted in model improvement, χ^2 (24) = 61.151, $P < 0.001$, CFI = 0.984, TLI = 0.975, RMSEA = 0.056, SRMR = 0.0278, BIC = 191.362, CMIN/DF = 2.548. Lastly, parallel to the one-factor PHQ-9 model, we correlated the residuals for items 2 to 9, 3 to 4, and 7 to 8, which also improved the model, χ^2 (23) = 60.307, $P < 0.001$, CFI = 0.984, TLI = 0.974, RMSEA = 0.057, SRMR = 0.0274, BIC = 196.718, CMIN/DF = 2.622. In a comparison of the nested, two-factor PHQ-9 CFA model without correlated residuals with the two parent, two-factor PHQ-9 CFA models with correlated residuals,

the χ^2 difference test indicated they significantly differed, $\Delta\chi^2$ (3) = 45.312, $P < 0.001$; $\Delta\chi^2$ (2) = 44.468, $P < 0.001$, suggesting that the parent models with correlated residuals have superior fit. Next, in a comparison of the two-factor PHQ-9 CFA models with correlated residuals, the χ^2 difference test indicated that they are not significantly different, $\Delta\chi^2$ (1) = 0.844, $P = 0.36$, suggesting the model with fewer parameters and more degrees of freedom has superior fit (two-factor PHQ-9 model with correlated residuals for items 3 to 4 and 7 to 8). Item loadings ranged from 0.528 to 0.860 on the cognitive affective factor of the PHQ-9 and ranged from 0.658 to 0.776 on the somatic factor of the PHQ-9. See Figure 3 for a visualization of the two-factor PHQ-9 structure, Table 5 for PHQ-9 CFA fit indices, and Table 7 for item-level factor loadings.

Confirmatory Factor Analysis of GAD-7

We conducted two CFAs on the GAD-7 assessment. The first CFA model with no correlated residuals yielded a poor model fit χ^2 (14) = 147.939, $P < 0.001$, CFI = 0.947, TLI = 0.920, RMSEA = 0.139, SRMR = 0.0362, BIC = 234.746, CMIN/DF = 10.567. Modification indices results suggested that correlating the residuals for items 2 to 3 and 4 to 5 improves the model as their values extremely exceeded the specified threshold. The correlated residuals between items 2 and 3 are expected because both measure excessive worrying. The correlated residuals between items 4 and 5 are also expected because the items measure bodily symptoms, similar to other studies.[56,57] Hence, the CFA was specified again by freely estimating the error covariances of these items, which improved the model fit, χ^2 (12) = 27.404,

TABLE 7. Factor Loadings for the PCL-5, PHQ-9, and GAD-7

	PCL-5[a, b]	PHQ-9 (2-Factor)[b, c]	GAD-7 (1-Factor)[a, b]
PCL-5 Q1 Intrusive thoughts	0.804; 0.804		
PCL-5 Q2 Nightmares	0.735; 0.735		
PCL-5 Q3 Flashbacks	0.758; 0.758		
PCL-5 Q4 Emotional cue reactivity	0.858; 0.858		
PCL-5 Q5 Physiological cue reactivity	0.850; 0.850		
PCL-5 Q6 Avoidance of thoughts	0.866; 0.866		
PCL-5 Q7 Avoidance of reminders	0.814; 0.814		
PCL-5 Q8 Trauma-related amnesia	0.519; 0.519		
PCL-5 Q9 Negative beliefs	0.858; 0.857		
PCL-5 Q10 Blame of self or others	0.796; 0.796		
PCL-5 Q11 Negative trauma-related emotions	0.897; 0.897		
PCL-5 Q12 Loss of interest	0.855; 0.854		
PCL-5 Q13 Detachment	0.851; 0.851		
PCL-5 Q14 Restricted affect	0.825; 0.825		
PCL-5 Q15 Irritability/anger	0.735; 0.705		
PCL-5 Q16 Self-destructive/reckless behavior	0.610; 0.576		
PCL-5 Q17 Hypervigilance	0.811; 0.811		
PCL-5 Q18 Exaggerated startle response	0.910; 0.910		
PCL-5 Q19 Difficulty concentrating	0.863; 0.815		
PCL-5 Q20 Sleep disturbance	0.691; 0.662		
PHQ-9 Q1 Loss of interest		0.774; 0.775	
PHQ-9 Q2 Down, depressed, hopeless		0.860; 0.857	
PHQ-9 Q3 Sleep disturbance		0.709; 0.710	
PHQ-9 Q4 Energy disturbance		0.776; 0.777	
PHQ-9 Q5 Poor appetite/overeating		0.764; 0.764	
PHQ-9 Q6 Thought avoidance		0.783; 0.783	
PHQ-9 Q7 Difficulty concentrating		0.701; 0.701	
PHQ-9 Q8 Altered speech/movement		0.658; 0.658	
PHQ-9 Q9 Self-harm/ideation		0.528; 0.518	
GAD-7 Q1 Feeling nervous			0.809; 0.831
GAD-7 Q2 Can't stop or control worrying			0.891; 0.846
GAD-7 Q3 Worry too much			0.905; 0.862
GAD-7 Q4 Trouble relaxing			0.834; 0.843
GAD-7 Q5 Restless			0.736; 0.730
GAD-7 Q6 Annoyed/irritable			0.689; 0.710
GAD-7 Q7 Feeling afraid			0.713; 0.720

GAD-7, Generalized Anxiety Disorder 7 ([a]No correlated residuals. [b]Correlated residuals items 2 and 3; items 4 and 5); PCL-5, PTSD Checklist 5 ([a]Hybrid. [b]Anhedonia); PHQ-9, Patient Health Questionnaire 9 ([b]Correlated residuals items 3 and 4; items 7 and 8. [c]Correlated residuals items 2 and 9; items 3 and 4; items 7 and 8).

$P = 0.007$, CFI = 0.994, TLI = 0.989, RMSEA = 0.051, SRMR = 0.0192, BIC = 126.612, CMIN/DF = 2.284. Comparing the two models, the χ^2 difference test indicated they significantly differed, $\Delta\chi^2 (2) = 120.535$, $P < 0.001$, suggesting the model with correlated residuals has superior fit. All of the seven-item level questions loaded significantly on the latent variable ranging from 0.710 to 0.862. See Figure 4 for a visualization of the GAD-7 factor structure, Table 6 for GAD-7 CFA fit indices, and Table 7 for item-level factor loadings.

Discriminant Validity Analyses

Because this study is the first to validate the PCL-5, PHQ-9, and GAD-7 in a sample of treatment-seeking veterans at a civilian outpatient mental health agency, we assessed the discriminant validity among factors on each measure. Re-experiencing symptoms were most highly correlated with avoidance $r(493) = 0.72$, $P < 0.01$ and negative affect $r(493) = 0.67$, $P < 0.01$. Avoidance was significantly correlated with negative affect $r(493) = 0.67$, $P < 0.01$. Negative affect was strongly correlated with anhedonia $r(493) = 0.71$, $P < 0.01$. Anhedonia was positively correlated with affective depression $r(493) = 0.70$, $P < 0.01$. Externalizing behaviors were moderately correlated with anxious arousal $r(493) = 0.61$, $P < 0.01$, affective depression $r(493) = 0.54$, $P < 0.001$, and somatic depression $r(493) = 0.55$, $P < 0.01$. Anxious arousal was positively correlated with dysphoric arousal $r(493) = 0.58$, $P < 0.01$. Dysphoric arousal was significantly correlated with affective depression $r(493) = 0.57$, $P < 0.01$. The GAD-7 was significantly correlated with affective depression $r(493) = 0.73$, $P < 0.01$, and somatic depression $r(493) = 0.80$, $P < 0.01$. A factor correlation that equals or exceeds 0.85 is often used as the cutoff criterion for multicollinearity and problematic discriminant validity.[58,59,52] There is no factor correlation greater than 0.85 and therefore discriminant validity was achieved. In addition, we examined convergent validity by correlating total scores on the three measures. Although no criterion exists to quantify the strength of this validity measure, the significant positive correlations indicated that they are interrelated as expected because of being overlapping constructs. See Table 8.

DISCUSSION

We sought to validate measures of PTSD, depression, and generalized anxiety in a sample of treatment-seeking veterans at a community nonprofit agency. We hypothesized the best fitting model for the PCL-5 would be the hybrid seven-factor configuration, a two-factor structure for the PHQ-9, and the GAD-7 would be unidimensional. Each of these hypotheses were confirmed. The hybrid model was a better fit compared with the anhedonia indices. The best fitting PHQ-9 model had a two-factor structure, with the residuals correlated on questions 3 to 4 and 7 to 8. The GAD-7 was found to be a
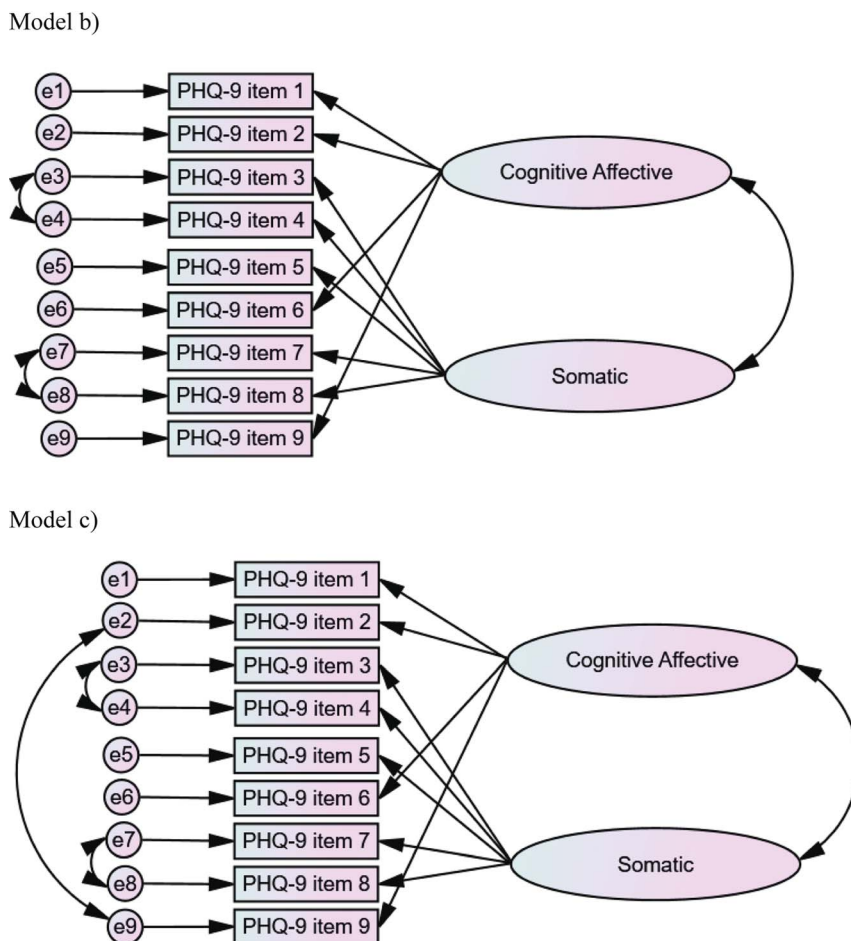
Model b)

Model c)

FIGURE 3. Confirmatory factor analysis model of the PHQ-9 (models B and C).

unidimensional construct that had the residuals correlated on questions 2 to 3 and 4 to 5. In the discussion, we will present the findings within the veteran scholarship, explore implications for clinical practice, describe limitations, and make recommendations for future research.

Posttraumatic Stress Disorder

We found that the seven-factor hybrid configuration of the PCL-5 to be consistent with a nationally representative sample of US veterans,[40,60] and a sample of treatment-seeking veterans and first responders.[46,41,11] Using different factor structure of the PCL-5 can inform clinicians of each PTSD cluster in relation to suicide risk, which is a growing concern among veterans. In a large sample of treatment-seeking veterans ($N = 2570$) at the VA, Watkins et al,[61] compared the *DSM-5* and hybrid configuration and its relationship to suicide risk. They found that the five-factor model[62] had the best fit of the PCL-5. In multinomial logistical regression, the re-experiencing cluster had the highest odds ratios predicting suicide attempts whereas dysphoric arousal had the lowest odds ratios.[61] As a result, the differing number of factors on the PCL-5 to conceptualize PTSD can guide a collaborative treatment plan, and we recommend the hybrid configuration.

Depression

The PHQ-9 was initially developed and validated as a brief scale to measure depression severity,[26] yet the researchers only determined its reliability and not the factor structure of the scale. Since then, many researchers in various settings have sought to validate and determine

the structure of the scale for specific populations. Researchers[63,64,65] specified the factor structure to be unidimensional in general population studies, whereas our CFA analyses found the two-factor structure for veterans. This suggests that affective and somatic symptoms might need to be treated separately because affective depression mediates PTSD to suicide, whereas somatic depression does not.[66] Comparably, Beard et al[55] found a two-factor model in a psychiatric sample and asserted that two factors can help determine which symptoms to address first.

Generalized Anxiety

The GAD-7 factor structure findings of our study indicated the scale is unidimensional, which is similar to Ahmadi et al[46] and other researchers.[67,68,33] However, the GAD-7 was highly correlated with affective and somatic depressive symptoms, which should be included in case conceptualization. In a study on first responders, Ponder et al[69] found that generalized anxiety could be conceptualized as a general nervousness about seeking mental health treatment. However, generalized anxiety could be more pathological than interpreted as normal anticipatory anxiety because the correlations with affective and somatic depression symptoms are high. Therefore, a clinician needs to differentiate between generalized anxiety and pathological anxiety that contributes to the symptom constellation.

Clinical Implications

Researchers found that the common occurrence of generalized anxiety, depression, and PTSD is best conceptualized as the quadripartite model.[46,70,71,72] Watson[74] used a dimensional approach rather than
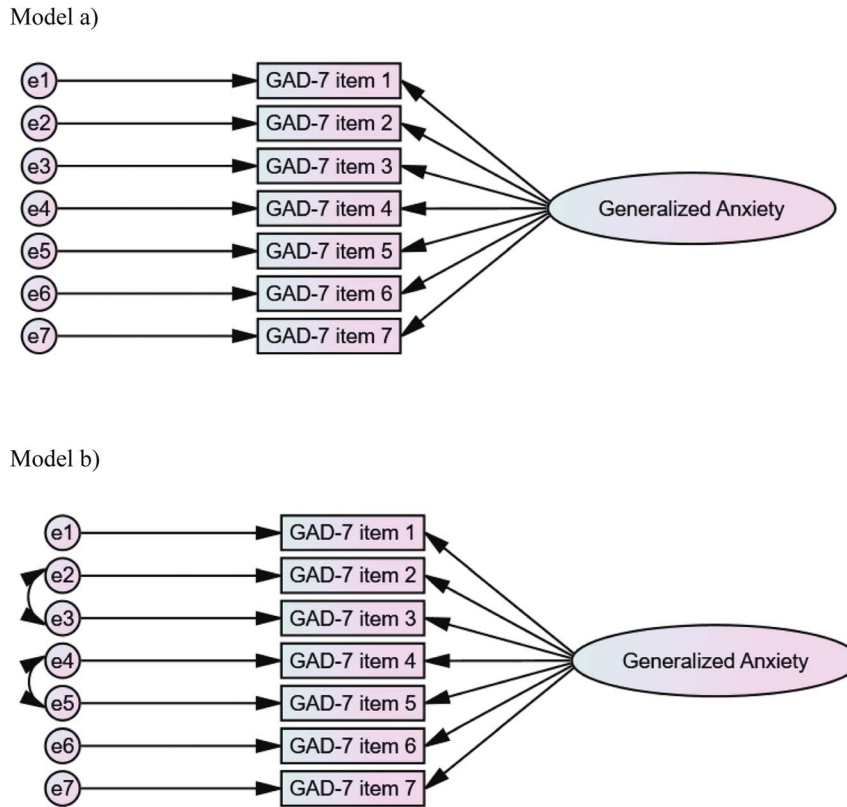
Model a)

Model b)

FIGURE 4. Confirmatory factor analysis model of the GAD-7 (models A and B).

a diagnostic classification to conceptualize the overlap between symptom presentation and the quadripartite model that is best characterized as combinations of distress and specificity. Other scholars have found that hyperarousal is consistent with high specificity and modest distress,[75] which is concerning because alternations in arousal and reactivity predicts temporal ordering of the symptoms.[76] Based on prior research, to prevent suicide, it is recommended clinicians target affective depression and not somatic depression rather than PTSD.[66]

Clinical researchers propounded that depression, PTSD, and generalized anxiety might be propelled by negative affect,[15,77,78,79,80,81,82] which indicates a transdiagnostic approach to address the interrelatedness

of these constructs would be appropriate. In a trauma exposed first responder network analysis, using the seven-factor hybrid configuration, the intrusions node had the highest predictability. Furthermore, the intrusions PTSD cluster started the cascade and anxious arousal was the endogenous endpoint in the DAG.[83]

There are efficacious modalities that can treat the interrelatedness of PTSD, depression, and generalized anxiety. The Unified Protocol is efficacious for transdiagnostic treatment for emotional disorders[84] and has recommendations for use during the COVID-19 pandemic.[85] In a veteran pilot randomized controlled trial on transcendental meditation and PTSD, Bellehsen et al[86] found that 50% of the treatment group did

TABLE 8. Criterion and Convergent Validity of the PCL-5, PHQ-9, and GAD-7

	R	A	NA	An	EB	AA	DA	PCL-5	GAD-7	Affective	Somatic	PHQ-9
R	1	0.72**	0.72**	0.63**	0.59**	0.66**	0.66**	0.89**	0.59**	0.55**	0.61**	0.63**
A		1	0.67**	0.58**	0.53**	0.55**	0.58**	0.80**	0.47**	0.47**	0.49**	0.41**
NA			1	0.71**	0.61**	0.58**	0.65**	0.89**	0.58**	0.61**	0.59**	0.64**
An				1	0.64**	0.57**	0.69**	0.84**	0.62**	0.70**	0.66**	0.72**
EB					1	0.61**	0.58**	0.76**	0.54**	0.54**	0.55**	0.58**
AA						1	0.65**	0.78**	0.56**	0.46**	0.54**	0.54**
DA							1	0.81**	0.65**	0.57**	0.72**	0.70**
PCL-5								1	0.69**	0.68**	0.72**	0.75**
GAD-7									1	0.73**	0.80**	0.82**
Affective										1	0.72**	0.92**
Somatic											1	0.95**
PHQ-9												1

*$P < 0.05$ (two tailed); **$P < 0.01$; ***$P < 0.001$.

A, avoidance; Affective, Patient Health Questionnaire 9 questions (1 [anhedonia], 2 [depressed mood], 6 [feelings of worthlessness], 9 [self-harm/ideation]); An, anhedonia; AA, anxious arousal; DA, dysphoric arousal; EB, externalizing behaviors; GAD-7, Generalized Anxiety Disorder-7; NA, negative affect; R, re-experiencing; PCL-5, PTSD Checklist 5; PHQ-9, Patient Health Questionnaire-9; Somatic, Patient Health Questionnaire-9 questions (3[sleep difficulties], 4 [fatigue], 5 [appetite changes], 7 [concentration difficulties], 8 [psychomotor agitation]).

not meet PTSD diagnostic criteria posttreatment. In addition, scholarship has shown that mindfulness has maintained its efficacy during the COVID-19 pandemic.[87,88]

Limitations and Future Research

This study does have limitations. First, this sample was treatment seeking, and it is unknown what the best fitting CFA models would be with nontreatment-seeking veterans. In addition, we did not include assessments that probe suicidality, resilience, or substance use to help establish criterion validity. We did not administer a trauma exposure measure, which may differentiate between frequency and intensity because 59% of this sample had been deployed at least once. The sample was also primarily White, male, served in the Army, discharged from the military, married, and enlisted. Lack of diversity among participants limited the generalizability of findings. We recommend that future studies examine the validity of these measurements across populations. In addition, regarding discriminant and convergent validity, though, we do not have multicollinearity (0.85 or greater factor correlations), we did not have clear criterion groups (eg, PTSD positive based on actual diagnosis, not symptom severity); thus, we should be cautious interpreting the discrimant and convergent validity. Given that negative affect is the connector of different syndromes,[72] it is recommended interventions directly and intentionally target negative affect when providing clinical services to this population.

Conclusions

We established that the PCL-5, PHQ-9, and GAD-7 are valid and reliable assessments to use with treatment-seeking veterans. By conceptualizing treatment using the PCL-5 hybrid configuration and two-factor PHQ-9, practitioners can laser in on problematic areas of concern that are predictors of suicide. The literature suggests that affective depression should be targeted when providing clinical services.[66] When treating veterans, it is recommended that providers be mindful of the intrusions PTSD cluster. Based on a network analysis study using the *DSM-5* four-factor model, it is recommended that providers also focus on negative alternations in cognitions and mood and affective depression because they were highest in predictability, although the nodes did not significantly differ.[80]

REFERENCES

1. American Psychiatric Association. (2022). *Diagnostic and Statistical Manual of Mental Disorders, Fifth Edition, Text Revisions*. doi: 10.1176/appi.books. 9780890425787

2. US Department of Veterans Affairs (VA). 2022. *How common is PTSD in veterans?* PTSD-National Center for PTSD. Available at: https://www.ptsd.va.gov/understand/common/common_veterans.asp. Accessed January 8, 2023.

3. Pietrzak R, Javier F, Krystal J, Southwick S. Subthreshold post-traumatic stress disorder as a risk factor for post-traumatic stress disorder: results from a sample of USA veterans. *Br J Psychiatry*. 2021;219:456–459.

4. Forbes D, Pedlar D, Adler AB, et al. Treatment of military-related post-traumatic stress disorder: challenges, innovations, and the way forward. *Int Rev Psychiatry*. 2019;31:95–110.

5. Bonanno GA, Romero SA, Klein SI. The temporal elements of psychological resilience: an integrative framework for the study of individuals, families, and communities. *Psychol Inq*. 2015;26:139–169.

6. Xue C, Ge Y, Tang B, et al. A meta-analysis of risk factors for combat-related PTSD among military personnel and veterans. *PLoS One*. 2015;10:e0120270.

7. Nichter B, Norman S, Haller M, Pietrzak RH. Psychological burden of PTSD, depression, and their comorbidity in the US veteran population: suicidality, functioning, and service utilization. *J Affect Dis*. 2019;256:633–640.

8. Norman SB, Haller M, Hamblen JL, Southwick SM, Pietrzak RH. The burden of co-occurring alcohol use disorder and PTSD in U.S. military veterans: comorbidities, functioning, and suicidality. *Psychol Addict Behav*. 2018;32: 224–229.

9. Moring JC, Nason E, Hale WJ, et al. Conceptualizing comorbid PTSD and depression among treatment-seeking, active duty military service members. *J Affect Dis*. 2019;256:541–549.

10. Byllesby BM, Elhai JD, Tamburrino M, et al. General distress is more important than PTSD's cognition and mood alterations factor in accounting for PTSD and depression's comorbidity. *J Affect Dis*. 2017;211:118–123.

11. Wortmann JH, Jordan AH, Weathers FW, et al. Psychometric analysis of the PTSD Checklist-5 (PCL-5) among treatment-seeking military service members. *Psychol Assess*. 2016;28:1392–1403.

12. Milanak ME, Gros DF, Magruder KM, Brawman-Mintzer O, Frueh CB. Prevalence and features of generalized anxiety disorder in Department of Veteran Affairs primary care settings. *Psychiatry Res*. 2013;209:173–179.

13. Ginzburg K, Ein-Dor T, Solomon Z. Comorbidity of posttraumatic stress disorder, anxiety and depression: a 20-year longitudinal study of war veterans. *J Affect Dis*. 2010;123(1–3):249–257.

14. Beck JG, Jones JM, Reich CM, Woodward MJ, Cody MW. Understanding the role of dysfunctional post-trauma cognitions in the co-occurrence of posttraumatic stress disorder and generalized anxiety disorder: two trauma samples. *Behav Res Ther*. 2015;70:23–31.

15. Byllesby BM, Charak R, Durham TA, Wang X, Elhai JD. The underlying role of negative affect in the association between PTSD, major depressive disorder, and generalized anxiety disorder. *J Psychopathol Behav Assess*. 2016;38:655–665.

16. Keane TM, Fairbank JA, Cadell JM, Zimering RT. Implosive (flooding) therapy reduces symptoms of PTSD in Vietnam combat veterans. *Behav Ther*. 1989;20: 245–260.

17. Vogt D, Smith BN, King DW, King LA. *Manual for the Deployment Risk and Resilience Inventory-2 (DDRI-2): A collection of measures for studying deployment-related experiences of military veterans*. Boston, MA: National Center for PTSD; 2012.

18. US Department of Veterans Affairs, National Center for PTSD. (2022b). Clinician-Administered PTSD Scale for *DSM-5* (CAPS-5). Available at: https://www.ptsd.va.gov/professional/assessment/adult-int/caps.asp. Accessed January 10, 2023.

19. Weathers FW, Bovin MJ, Lee DJ, et al. The Clinician-Administered PTSD Scale for *DSM-5* (CAPS-5): development and initial psychometric evaluation in military veterans. *Psychol Assess*. 2018;30:383–395.

20. Weathers FW, Blake DD, Schnurr PP, Kaloupek DG, Marx BP, Keane TM. (2013). *The Clinician-Administered PTSD Scale for DSM-5 (CAPS-5)* [Assessment]. Available at: https://www.ptsd.va.gov. Accessed January 8, 2023.

21. Oliveira-Watanabe TT, Ramos-Lima LF, Santos RC, Mello MF, Mello AF. The Clinician-Administered PTSD Scale (CAPS-5): adaptation to Brazilian Portuguese. *Braz J Psychiatry*. 2019;41:92–93.

22. Lee DJ, Weathers FW, Thompson-Hollands J, Sloan DM, Marx BP. Concordance in PTSD symptom change between *DSM-5* versions of the Clinician-Administered PTSD scale (CAPS-5) and PTSD Checklist (PCL-5). *Psychol Assess*. 2022;34:604–609.

23. Blevins CA, Weathers FW, Davis MT, Witte TK, Domino JL. The Posttraumatic Stress Disorder Checklist for *DSM-5* (PCL-5): development and initial psychometric evaluation. *J Traumat Stress*. 2015;28:489–498.

24. US Department of Veterans Affairs, National Center for PTSD. 2022c. PTSD Checklist for *DSM-5* (PCL-5). Available at: https://www.ptsd.va.gov/professional/assessment/adult-sr/ptsd-checklist.asp. Accessed January 10, 2023.

25. Beck, A. T., Steer, R. A., & Brown, G. (1996). *Beck Depression Inventory–II (BDI-II)* [Database record]. APA PsycTests. doi: 10.1037/t00742-000

26. Kroenke K, Spitzer RL, Williams JB. The PHQ-9: validity of a brief depression severity measure. *J Gen Inter Med*. 2001;16:606–613.

27. Gelenberg A J. Using assessment tools to screen for, diagnose, and treat major depressive disorder in clinical practice. *J Clin Psychiatry*. 2010;71(Suppl E1):e01.

28. Lewis CC, Boyd M, Puspitasari A, et al. Implementing measurement-based care in behavioral health: a review. *JAMA Psychiatry*. 2019;76:324–335.

29. Katz IR, Liebmann EP, Resnick SG, Hoff RA. Performance of the PHQ-9 across conditions and comorbidities: findings from the Veterans Outcome Assessment survey. *J Affect Dis*. 2021;294:864–867.

30. Palmer GA, Happe MC, Paxson JM, Jurek BK, Graca JJ, Olson SA. Psychometric properties of the Beck Depression Inventory-II for OEF/OIF Veterans in a polytrauma sample. *Mil Med*. 2014;179:879–884.

31. Beck AT, Steer RA, Garbin GM. Psychometric properties of the Beck Depression Inventory: twenty-five years of evaluation. *Clin Psychol Rev*. 1988a;8:77–100.

32. Beck AT, Epstein N, Brown G, Steer RA. An inventory for measuring clinical anxiety: psychometric properties. *J Consult Clin Psychol*. 1988b;56:893–897.

33. Spitzer RL, Kroenke K, Williams JB, Löwe B. A brief measure for assessing generalized anxiety disorder: the GAD-7. *Arch Intern Med*. 2006;166:1092–1097.

34. Steer RA, Ranieri WF, Beck AT, Clark DA. Further evidence for the validity of the Beck Anxiety Inventory with psychiatric outpatients. *J Anxiety Dis*. 1993;7: 195–205.

35. Oehlert ME, Nelson KG, King N, et al. Measurement-based care: Use of the Beck Anxiety Inventory (BAI) in a veteran population. *Psychol Serv*. 2020;17: 372–379.

36. Bardhoshi G, Duncan K, Erford BT. Psychometric meta-analysis of the English version of the Beck Anxiety Inventory. *J Counsel Dev.* 2016;94:356–373.

37. Shepardson RL, Tapio J, Funderburk JS. Self-management strategies for stress and anxiety used by nontreatment seeking veteran primary care patients. *Mil Med.* 2017;182:1747–1754.

38. Plummer F, Manea L, Trepel D, McMillan D. Screening for anxiety disorders with the GAD-7 and GAD-2: A systematic review and diagnostic metaanalysis. *Gen Hospit Psychiatry.* 2016;39:24–31.

39. Zhong QY, Gelaye B, Zaslavsky AM, et al. Diagnostic validity of the Generalized Anxiety Disorder - 7 (GAD-7) among pregnant women. *PLoS One.* 2015;10: e0125096.

40. Armour C, Tsai J, Durham TA, et al. Dimensional structure of *DSM-5* posttraumatic stress symptoms: support for a hybrid Anhedonia and Externalizing Behaviors model. *J Psychiatr Res.* 2015;61:106–113.

41. Bovin MJ, Marx BP, Weathers FW, et al. Psychometric properties of the PTSD Checklist for Diagnostic and Statistical Manual of Mental Disorders–Fifth Edition (PCL-5) in veterans. *Psychol Assess.* 2016;28:1379–1391.

42. Liu P, Wang L, Cao C, et al. The underlying dimensions of *DSM-5* posttraumatic stress disorder symptoms in an epidemiological sample of Chinese earthquake survivors. *J Anxiety Dis.* 2014;28:345–351.

43. Durham TA, Elhai JD, Fine TH, et al. Posttraumatic stress disorder′s dysphoria dimension and relations with generalized anxiety disorder symptoms. *Psychiatry Res.* 2015;228:150–155.

44. Simms LJ, Watson D, Doebbelling BN. Confirmatory factor analyses of posttraumatic stress symptoms in deployed and nondeployed veterans of the Gulf War. *J Abnorm Psychol.* 2002;111:637–647.

45. King DW, Leskin GA, King LA, Weathers FW. Confirmatory factor analysis of the clinician-administered PTSD Scale: evidence for the dimensionality of posttraumatic stress disorder. *Psychol Assess.* 1998;10:90–96.

46. Ahmadi A, Galusha JM, Ponder WN, et al. Confirmatory factor analysis of the PCL-5, PHQ-9, and GAD-7 in a treatment seeking sample of first responders. *J Occup Environ Med.* 2023. doi:10.1097/JOM.0000000000002823.

47. Hair J, Black WC, Babin BJ, Anderson RE. *Multivariate Data Analysis.* 7th ed. Upper Saddle River, NJ: Pearson Education International; 2010.

48. Dimitrov DM. *Statistical Methods for Validation of Assessment Scale Data in Counseling and Related Fields.* Washington, DC: American Counseling Association; 2012.

49. Hu L, Bentler PM. Cutoff criteria for fit indexes in covariance structure analysis: Conventional criteria versus new alternatives. *Struct Equation Model.* 1999;6:1–55.

50. Kass RE, Raftery AE. Bayes factors. *J Am Stat Assoc.* 1995;90:773–795.

51. Kline RB. *Principles and Practice of Structural Equation Modeling.* New York, NY: Guilford Press; 1998.

52. Byrne BM. Structural equation Modeling With AMOS: *Basic concepts, applications, and programming.* New York, NY: Routledge; 2016. 10.4324/9781315757421.

53. Nunnally JC, Bernstein IR. *Psychometric Theory.* New York, NY: McGRAW-HILL, INC. 1994.

54. Pallant J. *SPSS Survival Manual: A Step by Step Guide to Data Analysis Using IBM SPSS.* London: Routledge; 2020. https://doi.org/10.4324/9781003117452

55. Beard C, Hsu KJ, Rifkin LS, Busch AB, Björgvinsson T. Validation of the PHQ-9 in a psychiatric sample. *J Affect Dis.* 2016;183:267–273.

56. Johnson SU, Ulvenes PG, Oktedalen T, Hoffart A. Psychometric properties of the general anxiety disorder 7-item (GAD-7) scale in a heterogeneous psychiatric sample. *Front Psychol.* 2019;10:1–8.

57. Rutter LA, Brown TA. Psychometric properties of the generalized anxiety disorder scale-7 (GAD-7) in outpatients with anxiety and mood disorders. *J Psychopathol Behav Assess.* 2017;39:140–146.

58. Brown TA. *Confirmatory Factor Analysis for Applied Research.* New York, NY: Guilford Press; 2015.

59. Cohen J, Cohen P, West SG, Aiken LS. *Applied Multiple Regression/Correlation Analysis for the Behavioral Sciences.* 3rd ed. Hillsdale, NJ: Erlbaum; 2003.

60. Pietrzak RH, Tsai J, Armour C, Mota N, Harpaz-Rotem I, Southwick SM. Functional significance of a novel 7-factor model of *DSM-5* PTSD symptoms: results from the National Health and Resilience in Veterans Study. *J Affect Dis.* 2015;174:522–526.

61. Watkins LE, Sippel LM, Pietrzak RH, Hoff R, Harpaz-Rotem I. Co-occurring aggression and suicide attempt among veterans entering residential treatment for PTSD: The role of PTSD symptom clusters and alcohol misuse. *J Psychiatric Res.* 2017;87:8–14.

62. Elhai JD, Biehn TL, Armour C, Klopper JJ, Frueh BC, Palmieri PA. Evidence for a unique PTSD construct represented by PTSD's D1-D3 symptoms. *J Anxiety Disord.* 2011;25:340–345.

63. Kocalevent RD, Hinz A, Brähler E. Standardization of the depression screener Patient Health Questionnaire (PHQ-9) in the general population. *Gen Hospit Psychiatry.* 2013;35:551–555.

64. Maroufizadeh S, Omani-Samani R, Almasi-Hashiani A, Amini P, Sepidarkish M. The reliability and validity of the Patient Health Questionnaire-9 (PHQ-9) and PHQ-2 in patients with infertility. *Reprod Health.* 2019;16:1–8.

65. Teymoori A, Gorbunova A, Haghish FE, et al. Factorial structure and validity of depression (PHQ-9) and anxiety (GAD-7) scales after traumatic brain injury. *J Clin Med.* 2020;9:873.

66. Whitworth J, Galusha JM, Carbajal J, Ponder WN, Schuman DL. Affective depression mediates PTSD to suicide in a sample of treatment-seeking first responders. *J Occup Environ Med.* 2023;65:249–254.

67. Beard C, Björgvinsson T. Beyond generalized anxiety disorder: psychometric properties of the GAD-7 in a heterogeneous psychiatric sample. *J Anxiety Dis.* 2014;28:547–552.

68. Löwe B, Decker O, Müller S, et al. Validation and standardization of the Generalized Anxiety Disorder screener (GAD-7) in the general population. *Med Care.* 2008;266–274.

69. Ponder WN, Beauchamp A, Schuman DL, Carbajal J, Jetelina KK, Galusha JM. Differences in suicidality in non-treatment and treatment-seeking law enforcement officers: a cross-sectional study. *J Occup Environ Med.* 2022;64:797–801.

70. Contractor AA, Elhai JD, Fine TH, et al. Latent profile analyses of posttraumatic stress disorder, depression and generalized anxiety disorder symptoms in trauma-exposed soldiers. *J Psychiatr Res.* 2015;68:19–26.

71. Mallory JB, Ponder WN, Sherrill T, et al. The impact of COVID-19 on veterans' resilience, attachment, and negative affect. *J Veterans Stud.* 2022;8:194–207.

72. Price M, Legrand AC, Brier ZMF, Hebert-Dufresne L. The symptoms at the center: examining the comorbidity of posttraumatic stress disorder, generalized anxiety disorder, and depression with network analysis. *J Psychiatric Res.* 2019;109:52–58.

73. Schuman, D. L., Yockey, R. A., Ponder, W. N., & Carbajal, J. (2022). Latent profile analysis of transdiagnostic emotional distress and resilience to suicide in first responders.

74. Watson D. Differentiating the mood and anxiety disorders: a quadripartite model. *Ann Rev Clin Psychol.* 2009;5:221–247.

75. Clapp JD, Kemp JJ, Woodward MJ, Beck JG. Distress variance and specificity of symptom dimensions in posttraumatic stress disorder: a quadripartite perspective. *J Psychopathol Behav Assess.* 2020;42:328–339.

76. Doron-LaMarca SD, Niles BL, King DW, King LA, Kaiser AP, Lyons MJ. Temporal associations among chronic PTSD symptoms in US combat veterans. *J Trauma Stress.* 2015;28:410–417.

77. Carbajal J, Ponder WN, Whitwoth J, Schuman DL, Galusha JM. The impact of COVID-19 on first responders' resilience and attachment. *J Hum Behav Soc Environ.* 2022;32:781–799.

78. Dornbach-Bender A, Ruggero CJ, Schulder K, et al. Positive and negative affect in the daily life of World Trade Center responders with PTSD: an ecological momentary assessment study. *Psychol Trauma.* 2020;12:75–83.

79. Greene T, Gelkopf M, Fried EI, Robinaugh DJ, Pickman LL. Dynamic network analysis of negative emotions and *DSM-5* posttraumatic stress disorder symptom clusters during conflict. *J Trauma Stress.* 2020;33:72–83.

80. Ponder WN, Walters K, Simsons J, Simons R, Jetelina KK, Carbajal J. Network analysis of distress, suicidality, and resilience in a treatment-seeking sample of first responders. *J Affect Dis.* 2023;320:742–750.

81. Price M, van Stolk-Cooke K. Examination of the interrelations between the factors of PTSD, major depression, and generalized anxiety disorder in a heterogeneous trauma-exposed sample using DSM 5 criteria. *J Affect Dis.* 2015;186:149–155.

82. Seligowski AV, Rogers AP, Orcutt HK. Relations among emotion regulation and *DSM-5* symptom clusters of PTSD. *Pers Individual Diff.* 2016;92:104–108.

83. Beattie, E. H., Thomas, K., Ponder, W. N., et al. (2022). Network analysis of posttraumatic stress disorder symptoms in a treatment-seeking sample of US firefighters and emergency medical technicians

84. O'Donnell ML, Lau W, Chisholm K, et al. A pilot study of the efficacy of the unified protocol for transdiagnostic treatment of emotional disorders in treating posttraumatic psychopathology: a randomized controlled trial. *J Trauma Stress.* 2021;34:563–574.

85. Cassiello-Robbins C, Rosenthal MZ, Ammirati RJ. Delivering transdiagnostic treatment over telehealth during the COVID-19 pandemic: application of the Unified Protocol. *Cognit Behav Pract.* 2021;28:555–572.

86. Bellehsen M, Stoycheva V, Cohen BH, Nidich S. A pilot randomized controlled trial of transcendental meditation as treatment for posttraumatic stress disorder in veterans. *J Trauma Stress.* 2022;35:22–31.

87. Godara M, Silveira S, Matthaus H, et al. Investigating differential effects of socio-emotional and mindfulness-based online interventions on mental health, resilience and social capacities during the COVID-19 pandemic: the study protocol. *PLoS One.* 2021;16:e0256323.

88. Vos LWM, Habibovic M, Nyklícek I, Smeets T, Mertens G. Optimism, mindfulness, and resilience as potential protective factors for the mental health consequences of fear of the coronavirus. *Psychiatry Res.* 2021;300:113927.