A Systematic Review of Posttraumatic Stress and Resilience Trajectories: Identifying

Predictors for Future Treatment of Veterans and Service Members

Jeffrey M. Pavlacic1,2

Erin M. Buchanan3

Shannon E. McCaslin4

Stefan E. Schulenberg1,2

John N. Young1

*1Department of Psychology, University of Mississippi*

2 *Clinical-Disaster Research Center (CDRC), University of Mississippi*

*3Analytics, Harrisburg University of Science and Technology*

*4National Center for Posttraumatic Stress Disorder*

JEFFREY M. PAVLACIC received his MA in clinical psychology from the University of Mississippi (UM). He is a doctoral candidate in clinical psychology and a member of the UM CDRC. Areas of research interest include disaster mental health, resilience, and processes of change in Cognitive Behavioral Therapy.

ERIN M. BUCHANAN received her PhD in experimental psychology from Texas Tech University. She is currently a Professor of Cognitive Analytics at Harrisburg University. Her areas of research interest include psycholinguistics, memory, and applied statistics.

SHANNON E. MCCASLIN received her PhD in clinical psychology from the University of South Dakota. She is currently a Clinical Psychologist at the National Center for Posttraumatic Stress Disorder (NCPTSD), Dissemination & Training Division, VA Palo Alto HCS. Her areas of research interest include risk and resilience factors in PTSD, cross-cultural aspects of traumatic stress, and disaster mental health.

STEFAN E. SCHULENBERG received his PhD in clinical psychology from the University of South Dakota. He is a Professor of Psychology at UM, director of the UM CDRC, and director of the Interdisciplinary Minor in Disaster Sciences at UM. His areas of research interest include disaster mental health, meaning, resilience, and posttraumatic growth.

JOHN N. YOUNG received his PhD in clinical psychology from the University of Hawaii. He is an Associate Professor of psychology at the University of Mississippi. Research interests include evidence-based services, dissemination, and mental health care systems.

Correspondence should be addressed to Jeffrey M. Pavlacic, 205 Peabody Hall, University, MS 38677. Email: jpavlaci@go.olemiss.edu. Phone: 662-915-3518

Abstract

Posttraumatic stress disorder (PTSD) often presents with comorbidities and resulting functional impairment. Veterans and service members report PTSD at higher rates than civilians, which represents a public health concern among those who have served or are serving in the military. Prior reviews of evidence-based treatments for PTSD demonstrate smaller effect sizes for veterans and service members than for civilians. One line of investigation that may contribute to our understanding in this area is developmental trajectory research. Understanding predictors of different symptomatic trajectories compared to resilient trajectories and vice versa may help clinicians better tailor evidence-based conceptualizations, treatments, and change agents to the individual, facilitate prevention efforts, and embark on a process-based, flexible, cognitive-behavioral approach that is patient-centered. The current systematic review examined predictors of both resilient (i.e., compared to heterogeneous symptomatic trajectories) and variable symptomatic trajectories (i.e., compared to resilient and/or other symptomatic trajectories) in veterans and service members. Twenty-seven studies met inclusion criteria. Across all included studies reporting percentages (i.e., including some studies that used the same datasets and/or samples), most individuals (73.36%) reported a resilience trajectory, while the remaining 26.64% reported heterogeneous symptomatic trajectories. Predictors are presented and discussed, in addition to implications for research and treatment of veterans and service members.

*Keywords*: posttraumatic stress disorder; developmental trajectory; resilience

Public Significance Statement: This review suggests that most veterans and service members are resilient when averaging percentages across included studies (i.e., meaning that they do not develop posttraumatic stress symptoms). There are also factors in trajectory studies that predict resilient and symptomatic trajectories, which could have implications for the way clinicians conceptualize and treat psychological conditions in veterans and service members.

A Systematic Review of Posttraumatic Stress and Resilience Trajectories: Identifying

Predictors for Future Treatment of Veterans and Service Members

Most civilians experience at least one traumatic event throughout their lifetime (i.e., 89% of a community sample; Breslau et al., 2004). Exposure to traumatic events places individuals at risk for posttraumatic stress disorder (PTSD). PTSD disproportionately affects some populations, such as veterans and service members (Fulton et al., 2015; Hoge et al., 2006). For example, despite the frequent exposure of individuals to traumatic events, PTSD prevalence rates were relatively low in a World Mental Health Survey selecting random traumatic events (i.e., 2 to 8%; Atwoli et al., 2015). In veterans, however, approximately 23% of Operation Iraqi Freedom and Operation Enduring Freedom veterans meet diagnostic criteria for PTSD (Fulton et al., 2015). Further, 12% of Gulf War veterans and 15% of Vietnam veterans are diagnosed with PTSD, both of which represent a base rate higher than that of the general population (Department of Veterans Affairs, 2015).

In veterans and service members, PTSD is associated with substance use disorders (Najavits et al., 2018) and depression (Kimbrel et al., 2016), among other psychological and physical health problems. Subclinical and clinical levels of PTSD are also associated with poorer functional outcomes in veterans (Bergman et al., 2017; Bovin et al., 2018). Although veterans and service members represent a small percentage of the population (i.e., less than 10%; Bergman et al., 2017; Hoge et al., 2006), a relatively high number of veterans and service members develop PTSD, psychiatric comorbidities, and various forms of functional impairment. PTSD represents a prominent health concern during and following military service (Steenkamp et al., 2015), and developing and administering evidence-based treatments is essential to treating PTSD and co-occurring disorders in these populations.

**Evidence-Based Treatments for PTSD**

Trauma-focused psychotherapies, such as Cognitive Processing Therapy (CPT; Monson et al., 2006) and Prolonged Exposure Therapy (PE; Foa et al., 2007) are gold-standard treatments for PTSD. Meta-analytic reviews of both CPT (Asmundson et al., 2019) and PE (Cusack et al., 2016) demonstrate clinically meaningful results in combined civilian and military samples. In addition, gold-standard treatments such as PE can be modified dependent upon the setting (i.e., *M* = 7.50 sessions in a combat setting which differs from the traditional nine to 12 sessions; Peterson et al., 2020). Written Exposure Therapy, a five-session protocol, is also gaining traction across diverse samples (Sloan & Marx, 2019). Other treatment modalities, such as present-centered therapy (Resick et al., 2015), have shown promise for reducing PTSD symptoms in service members.

Despite the dissemination efforts for CPT and PE, especially in the Veterans Affairs setting, these gold-standard treatments are less effective for veterans and service members (Kitchiner et al., 2019). In a systematic review and meta-analysis conducted by Steenkamp et al. (2015), CPT and PE led to clinically significant reductions in posttraumatic stress symptoms in veterans and service members (i.e., 10-12 point reductions in self-report measures and/or interviews) although, mean posttreatment scores were still above clinical cutoffs for PTSD. In a follow-up commentary to Steenkamp et al. (2015), Steenkamp et al. (2020a) reviewed three additional, recent trials evaluating the efficacy of CPT and PE for service members. Across these trials, 31% of service members improved or recovered, and among those who improved, 60% remained above the clinical threshold for PTSD symptoms in two trials. It is important to note that the Steenkamp et al. (2015) review only used comparison trials and did not consider dual-diagnostic samples despite the high frequency with which PTSD occurs with other psychological problems (Knowles et al., 2019). In a response to Steenkamp et al. (2020a), Schnurr et al. (2020) argued that smaller effect sizes from PTSD treatments are due to largely unknown reasons, which may not be directly attributable to PE and CPT. This result is likely the case, given the demonstrable evidence base for PE and CPT across heterogeneous contexts and populations. Regardless, competing perspectives converge on the fact that there is opportunity for improvement to psychotherapeutic intervention in veterans and service members (Schnurr et al., 2020; Steenkamp et al., 2020b). The current review argues that improvements in evidence-based intervention may be attainable through an examination of contextual factors that could impact symptom trajectories and therefore have implications for case conceptualization, treatment, and prevention.

There are many contextual variables that may adversely affect treatment outcomes in veterans and service members. Veterans with PTSD report high psychotherapy treatment drop-out rates (i.e., 24%; Hoge et al., 2014), and the stigmatization of mental health in the military may prevent individuals from seeking help (Coll et al., 2011). As service members transition from the military to civilian context, cultural factors may also not be adequately considered by providers (Meyer & Wynn, 2018; redacted for blind review). As an example, during military service, veterans learn values consistent with the warrior ethos, such as placing the welfare of the mission above themselves (Taylor et al., 2020). These values, while adaptive in a military environment, may contribute to limited treatment seeking for fear of behaving inconsistently with these values (Caddick et al., 2015). Further, intervention and dissemination efforts tailored to veterans do not always address cultural factors (Thompson et al., 2014) despite the relevance of these factors for treatment outcomes.

Despite decreased effectiveness and efficacy compared to other populations suffering from PTSD, trauma-focused cognitive-behavioral therapies remain the most evidence-supported options for service delivery (Schnurr et al., 2020). Given the available data, however, it may be beneficial to elucidate ways in which the effectiveness of cognitive-behavioral therapies might be enhanced for veterans and service members. VA/DoD Clinical Practice guidelines (Card, 2017) recommend a wide array of approaches that emphasize idiographic patient care. The current systematic review asserts that understanding predictors of symptomatic and resilient trajectories is one way to help clinicians better conceptualize the development and maintenance factors of posttraumatic stress in veterans and service members to achieve this goal. Delineating predictors may also be of utility to clinicians seeking to target specific behavioral processes or ‘ingredients’ of change and/or identify factors that might interfere with treatment.

**Developmental Trajectories in Veterans and Service Members**

Individuals are typically assessed cross-sectionally to diagnose PTSD (Galatzer-Levy & Bryant, 2013). Examining outcomes over time provides more information than cross-sectional assessment, such as predictors of symptomatic and resilient (i.e., a healthy psychological state following an adverse experience) trajectories. Humans have a remarkable capacity for resilience (McCutcheon et al., 2020), and most adults exposed to a wide array of stressful or traumatic events do not develop PTSD (Galatzer-Levy et al., 2018).

Bonanno (2004) delineates four common trajectories in adults following stressful or traumatic events. The first is the *resilience trajectory*, operationalized as the non-development of symptoms over time. Resilient adults frequently have access to various environmental and personal resources, which vary depending upon the context and situation (Southwick et al., 2014). The *chronic trajectory*, in contrast to the resilience trajectory, is characterized by consistently high levels of PTSD symptomatology (e.g., shown in a sample of first responders; Pietrzak et al., 2014). The *recovery trajectory* encompasses symptoms at a clinical level with decreasing levels of intensity over time. Finally, the *delayed onset trajectory* comprises symptoms at a subclinical level initially, with increasing intensity over time (Bonanno & Mancini, 2012). Others have identified somewhat different patterns of trajectories. Orcutt et al. (2004) described only two trajectories in Gulf War veterans, specifically resilience and symptoms that increased over time. While the literature most commonly identifies the four aforementioned trajectories, heterogeneity exists across different populations and contexts, supporting the need for evaluations of common trajectories across different contexts and populations.

Galatzer-Levy et al. (2018) conducted a systematic review examining common predictors of PTSD trajectories following exposure to heterogeneous, potentially-traumatic events in the general population and specific populations. Predictors of the various trajectories (i.e., resilience, chronic, recovery, delayed onset) were categorized as psychological, environmental, individual, social, financial, substance-related, and physical. This information is incredibly useful, facilitating an understanding of the broad factors associated with the development of PTSD symptomatology across different populations. However, recognizing and discussing specific predictor variables for different PTSD trajectories exclusively with veterans and service members may help clinicians tailor treatment and conceptualization efforts with the ultimate goal of improving treatment outcomes for this population.

**Rationale for the Current Review**

Identifying common developmental PTSD trajectories offers more detailed information than cross-sectional methods used to diagnose and treat veteran and service member samples. Identification of predictors of distinct trajectories may provide insights into how best to modify evidence-based treatments for veterans and service members to enhance effectiveness and could provide a basis for case conceptualization by understanding different contextual and psychological factors that warrant consideration. To this end, the purpose of this systematic review was to examine common developmental trajectories of PTSD and resilience (i.e., absence of clinical PTSD symptoms) in veterans and service members, as well as predictors of identified trajectories compared to other trajectories (e.g., symptomatic vs. resilient, resilient vs. symptomatic).

**Method**

**Search Strategy and Inclusion Criteria**

Google Scholar and PsycINFO were utilized to select articles for inclusion. The following search terms and their combinations were used to screen and select published articles, using the first five pages of each database: *Trajectory, Veterans, Active Duty, Military, Developmental Trajectory, Posttraumatic Stress, Combat Trauma, Service Member.* We also screened the references of the final list of articles to ensure no prominent articles were missed during the search process. The search for this project was originally completed between 07/1/2019 and 8/12/2019 (i.e., studies meeting inclusion criteria but published after this date would *not* have been included). Two authors independently coded articles, and included articles were checked by a third author to ensure accuracy in data extraction and adherence to inclusion criteria. The inclusion criteria were informed by the systematic review and statistical evaluation conducted by Galatzer-Levy et al. (2018), as it is the only review (to the authors’ knowledge) that examines PTSD trajectories across potentially traumatic events. There were some exceptions, however, to include a broader range of studies. Studies included employed the following statistical methods that allow for trajectory estimation: Latent Class Growth Analysis/Modeling, Latent Growth Mixture Modeling, Latent Growth Modeling, Latent Trajectory Modeling, Growth Mixture Modeling, Second-Order Growth Mixture Modeling, and Latent Trajectory Analysis. At least three time points were required to ensure a measurable developmental trajectory, and a sample size of 100 was also required. Studies were also required to employ a trauma-related outcome assessment for trajectories (i.e., any self-report measure assessing PTSD symptomatology).

Given the breadth of treatment studies in the literature, trials and studies seeking to examine trajectories of treatment response across treatment were screened but *not* included in the final articles. One study using data from a trial was included, but the treatments did not impact recovery rates per the authors (i.e., and therefore would not have impacted trajectories). Some studies did not include predictors of trajectories, but they were retained to calculate an overall percentage of participants endorsing a resilience trajectory compared to a symptomatic trajectory assuming they met other inclusion criteria. Further, some studies did not delineate the number of individuals included in each trajectory.Articles published before 2000 were screened/reviewed to include a broader range of studies (i.e., although the final number of studies were published from 2004 to 2019), and articles measuring symptomatology greater than one year after exposure were also included (i.e., when applicable to specific studies measuring outcomes before and after deployment). Studies were either prospective or longitudinal. The final pool consisted of 1514 articles. After screening 1514 abstracts and excluding articles based on the criteria mentioned above, 73 full-text articles were assessed for eligibility, and 27 were retained for final examination. For Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines, see https://osf.io/2dnhe/?view\_only=1f59972f95944bde9ec54d821f72fe8b

**Study Coding**

The following data were extracted for the individual articles to be analyzed: title, authors, year published, type of analysis used, number of time points, sample size, post-deployment assessment time (i.e., when applicable as not all studies surveyed participants before and after deployment), year data collection began, trauma-related outcome assessment used, design, population, search engine, predictors of resilience trajectories compared to symptomatic trajectories, predictors of symptomatic trajectories compared to resilient trajectories, predictors of symptomatic trajectories compared to different symptomatic trajectories, deployment status, and the dataset for studies using the same dataset to answer different questions.

**Results**

**Posttraumatic Stress Trajectories**

Samples from the 27 retained studies were collapsed to determine the percentage of participants in a resilience or symptomatic trajectory. Most participants followed a resilience trajectory (73.36%), while symptomatic trajectories accounted for the remainder of study participants (26.64%). It is important to note that percentages were averaged across each study that reported a specific number of individuals in each trajectory (i.e., including different publications reporting data from the same dataset and studies reporting trajectory information for different cohorts).

**Trauma- and Stressor-Related Predictors**

A full list of predictors for resilient trajectories compared to symptomatic trajectories and vice versa for all results is presented at https://osf.io/2dnhe/?view\_only=1f59972f95944bde9ec54d821f72fe8b and the Supplemental Materials. Notably, stressful or traumatic experiences before, during, and after deployment were significant predictors of heterogeneous symptomatic trajectories (e.g., Delayed-Onset, Preexisting, Recovered) as compared to resilient trajectories across different studies. In contrast, a lack of stressful experiences as compared to higher levels of stressful experiences was associated with resilience compared to different symptomatic trajectories (e.g., Symptomatic, Elevated-Recovering).

**Negative Affectivity and Behavioral Problem Predictors**

Predictors for trajectories related to negative affectivity and behavioral problems are presented at the aforementioned link. Increased psychological symptoms related to comorbid conditions (e.g., depression) prior to deployment predicted different symptomatic trajectories (e.g., Late-Onset, Chronic-Distress). Additionally, neuroticism, suicidality, childhood antisocial behavior, and peritraumatic dissociation predicted different symptomatic trajectories. Decreased depression predicted psychological resilience compared to delayed and recovery trajectories.

**Demographic Predictors**

Alldemographic predictors are presented at the OSF link. In general, individuals who were non-White, reported lower levels of education, younger, female, and less likely to be married were more likely to report variable symptomatic trajectories. Individuals who were older, male, more highly educated, and White were more likely to report resilience compared to symptomatic trajectories.

**Service/Occupation and Status Predictors**

Those enlisted, reporting combat jobs, in the Army, non-officers, leaving service a longer time ago, and engaging in previous deployments (i.e., in one study following participants before and after deployment and assessing deployment history) were more likely to report a symptomatic trajectory. In contrast, those with limited combat experiences, higher income, officer status, and lower peacekeeping hassles (e.g., difficult sleeping conditions) were more likely to report a resilience trajectory compared to symptomatic trajectories.

**Health Behavior/Physical Health Predictors**

Regarding health behaviors, those reporting alcohol problems, poorer physical health, smoking, and the presence of a sleep disorder were more likely to report a symptomatic trajectory compared to a resilient trajectory.

**Social/Cultural Factor Predictors**

Individuals who reported decreased societal exclusion at homecoming, increased social support, and increased family cohesiveness were more likely to report a resilience trajectory compared to different symptomatic trajectories. Individuals with increased concerns about the potential impact of deployment on family were more likely to report a Chronic-Distress trajectory compared to a resilient trajectory.

**Coping Predictors**

Individuals who reported increased locus of control were more likely to report resilience compared to symptomatic trajectories. In addition, those who indicated decreased emotion-focused coping and decreased problem-focused coping were more likely to report symptomatic trajectories as compared to resilient trajectories (i.e., with a similar pattern for increased avoidant coping). Individuals more reactive to stress were more likely to report a symptomatic trajectory compared to a resilient trajectory, while individuals who were less prepared for deployment were more likely to report a New-Onset trajectory compared to resilience.

**Discussion**

PTSD is a prominent public health concern in veterans and service members. An understanding of the development of posttraumatic stress and resilience trajectories over time may aid case conceptualization and help tailor intervention efforts, as well as associated research endeavors. In the current review, most participants reported a resilience trajectory, while approximately one-fourth of individuals reported a symptomatic trajectory. The review identified trauma- and stressor-related predictors, service occupation/status predictors, coping predictors, negative affectivity/behavioral problem predictors, health behavior predictors, and demographic/sociocultural predictors of symptomatic trajectories as compared to resilient trajectories and vice versa. These predictors show examples of factors that may warrant consideration in the provision of evidence-based services and have important implications for etiological and maintenance processes of psychopathology in veterans and service members.

**Trauma, Stressor-Related, Service/Occupation, and Coping Predictors**

As examples of etiological factors, stressful events before, during, and after deployment and/or service were significantly associated with different symptomatic trajectories compared to resilient trajectories, while decreased stressors were associated with resilience trajectories compared to symptomatic trajectories (i.e., with the caveat that these predictors occurred at different frequencies across included studies). Further, lower ranking personnel, in contrast to higher-ranking individuals, were more likely to report a symptomatic trajectory than a resilience trajectory. Trauma exposure and stressful experiences are well-known and accepted risk factors for PTSD, but adaptive coping strategies in the wake of traumatic and/or stressful events (e.g., meaning making, seeking social support) may prevent individuals from developing PTSD (Thompson et al., 2018) and help foster psychological growth (Boullion et al., 2020; see also coping predictors section below).Risk for developing posttraumatic stress is likely due to trauma exposure and other psychological factors (consistent with recent literature and with the caveat that few predictors of resilience emerged in the current review within the context of coping factors; Mattson et al., 2018). Building coping strategies enhances the likelihood of a resilience trajectory as opposed to a symptomatic trajectory, which were also borne out to some extent in the current review.

Individuals who were less able to engage in emotion- and problem-focused coping and more likely to engage in avoidant coping were more likely to report symptomatic trajectories compared to resilient trajectories, while individuals with a higher locus of control had a decreased likelihood of reporting symptomatic trajectories. Importantly, each of these aforementioned predictors emerged in only one of the studies reviewed, despite the importance of other coping factors (e.g., emotion regulation strategies) that explain the maintenance of trauma-related psychopathology in veterans (Sippel et al., 2016), as well as elevated treatment drop-out rates in PE for veterans (Gilmore et al., 2020).

Overall, findings for environmental predictors that implicate stressful life events and service rank as risk factors for symptomatology are well-understood with regard to the etiology of PTSD. The current review extends these findings to posttraumatic stress trajectories but also illustrates a dearth of studies that examine coping strategies or other factors that predict resilience trajectories, despite the importance of specific emotional coping strategies in the extant literature for maintaining PTSD symptoms.

**Negative Affectivity and Behavioral Problem Predictors**

Aside from environmental and coping-related predictors that pertain to the etiology and maintenance of PTSD symptomatology, low and clinical levels of depression emerged as frequent predictors of resilient and symptomatic posttraumatic stress trajectories, respectively. PTSD frequently co-occurs with depression (Kimbrel et al., 2016), anxiety disorders, as well as other psychological problems, which suggests that psychological problems perhaps share certain components. In large veteran samples, individuals diagnosed with PTSD have shown comorbidity rates of 64% with either an additional depression or anxiety disorder diagnosis (Knowles et al., 2019). Barlow et al. (2014) discussed how psychological disorders share an underlying negative affectivity, or neuroticism, and experiential avoidance has also been posited as another nearly ubiquitous transdiagnostic vulnerability factor (Hayes et al., 1996). Therefore, this comorbidity between PTSD and depression is not entirely surprising.

However, given the high prevalence rates of co-occurring disorders and elucidation of specific factors responsible for maintaining psychological problems, cognitive-behavioral conceptualizations and evidence-based treatments have started focusing on transdiagnostic vulnerabilities that underpin psychological disorders and contribute to their exacerbation and maintenance. This movement towards process-based therapy challenges the emphasis of traditional evidence-based practices, which match singular diagnostic categories to specific manuals despite difficulties associated with this intervention approach (e.g., understanding how to apply manuals to transdiagnostic vulnerabilities and processes as opposed to the diagnosis; Kazdin & Blase, 2011). Environmental factors, coping strategies, and negative affectivity ultimately all contribute to the etiology and maintenance of psychopathology.

**Health Behavior Predictors**

In addition to the factors explained above and their relevance for psychopathology, individuals who endorsed smoking and alcohol use were more likely to report a symptomatic trajectory compared to a resilient trajectory, and this result was the case with three studies for smoking and five studies for alcohol use. This finding contrasts other meta-analytic reviews examining risk factors for PTSD, which suggest that smoking does *not* relate to PTSD symptoms (Xue et al., 2015). Smoking may be relevant to consider within a PTSD context, as it emerged as a common predictor of symptomatic trajectories and occurs more frequently in service members compared to the general population (Boyko et al., 2015). PTSD and co-occurring disorders are characterized by underlying vulnerabilities (mentioned above) and maintained by avoidance behaviors or coping strategies that negatively reinforce psychological symptoms (e.g., such as smoking and alcohol use; Barlow et al., 2014), which is perhaps not entirely surprising given that avoidance is a symptom cluster for a PTSD diagnosis (American Psychiatric Association, 2013). Of course, this finding may be only true for trajectory studies, which was the focus of the current review. The current review extends these vulnerabilities to posttraumatic stress trajectories and also supports a transdiagnostic case conceptualization that accounts for co-occurring disorders, underlying psychological processes (e.g., avoidance), and avoidance behaviors (e.g., smoking and alcohol use), consistent with the proliferation of process-based CBT and network models in clinical psychology that considers biological, psychological, and maintenance factors (Hayes & Hofmann, 2019).

**Demographic/Sociocultural Predictors**

In addition to stressor-related, psychological, service-related, and health behavior predictors, White males and individuals with higher levels of education were more likely to be classified in the resilience trajectory, while non-White individuals and individuals with lower levels of education were more likely to report symptomatic trajectories compared to resilient trajectories. These findings necessitate an awareness of cultural factors and how these factors may influence treatment outcomes (Koo et al., 2016). However, higher education was only examined in two studies, while ‘White’ and ‘male’ were examined in one study each. While it is much too early to make definitive conclusions based on the low frequency at which these variables emerged in terms of resilience and symptomatic trajectories (i.e., perhaps attributed to predominantly White male samples included in some studies), the relationship between gender and education level as predictors of resilience could be explained by increased social and economic resources for these subgroups. Social supports are a strong predictor of resilience across different populations and contexts (Southwick et al., 2016). Moore et al. (2016) showed that White veterans with Individualized Plans for Employment were more likely to return to work and discussed the need for policy developments favoring minority groups. Additionally, Mustillo and Kysar-Moon (2016) found that increased trauma exposure was associated with higher PTSD rates for women compared to men, which is corroborated by the results from the current review and other studies (Xue et al., 2015).

Additionally, younger individuals compared to older individuals were more likely to embark on a symptomatic trajectory. This variable emerged in three of the studies, and one study suggested that older age predicted a resilience trajectory. The effect of age on mental health has not been well-researched in military settings (Bayer et al., 2007), and the results of the current review may not generalize to each subgroup within the military setting. However, younger individuals are at higher risk for developing PTSD symptoms in the military (Riddle et al., 2007), which may be attributed to a combination of factors such as 1) PTSD criteria not adequately assessing experiences in older adults, 2) recall biases, 3) decreased negative affectivity in older veterans and service members, and 4) differences in negative attentional biases (see Konnert & Wong, 2015 for a review). It does appear that older, White, and highly educated individuals are at an advantage with respect to developing symptoms of posttraumatic stress (or rather the lack of symptom development in this case), with the caveat that education and race were low-frequency predictors of resilience trajectories compared to predictors of symptomatic trajectories. The topic of minority military members developing posttraumatic stress at differential rates is much debated within the context of military members (e.g., Dardis et al., 2018). The current review provides additional evidence suggesting that minority social groups are at a heightened risk for experiencing posttraumatic stress, which is perhaps due to discrimination, isolation, as well as sociocultural influences (Ruef et al., 2000) and consistent with recent research on this topic (Livingston et al., 2019).

The current review identified relatively few sociocultural factors that predicted resilient and symptomatic trajectories. Individuals reporting decreased homecoming exclusion were less likely to be included in symptomatic trajectories, while increased social support and increased family cohesiveness were related to a lower probability of being classified in a symptomatic trajectory. Individuals who reported increased concerns about deployment impact on family were more likely to embark on a symptomatic trajectory as compared to a resilient trajectory. Unfortunately, each of these factors was only examined in one of the included studies, despite the importance of acculturation and cultural factors in conceptualizing psychopathology (redacted for blind review) in treating veterans and service members (Hall-Clark et al., 2019).

**Implications for Treatment**

Emotional disorders are characterized by transdiagnostic psychological processes and avoidance behaviors that maintain psychological symptoms. This review supports a comprehensive conceptual framework that encourages clinicians and researchers to better understand and appreciate the importance of taking into consideration different psychological, demographic, and environmental characteristics that should be integrated into case conceptualizations and used to guide treatment (Hayes & Hofmann, 2018). This approach is consistent with the projected decline in basing manualized treatment recommendations on diagnosis, facilitating attention to behavioral processes underpinning psychological disorders and increased flexibility in the use of manualized treatments (Hayes & Hofmann, 2018).

Process-Based Cognitive Behavioral Therapy, one outgrowth of this transition in clinical psychology, involves the integration of biological, psychological, and social factors into network models to understand individual clinical presentations and select evidence-based procedures for clinical intervention (Hayes & Hofmann, 2018). This model of evidentiary therapy is best accomplished through network modeling of specific etiological (i.e., biological, psychological, social) and maintenance factors (e.g., avoidance, emotion dysregulation) that can explain other topographies of symptoms and be targeted with clinical interventions to increase psychological well-being and decrease psychological symptoms (Hofmann et al., 2020).Utilizing process-based approaches with a consideration of the commonalities underlying emotional disorders may enhance the effectiveness of CPT and PE in a military or VA/DoD setting, and the current review provides some factors that clinicians may want to contemplate if utilizing a cohesive approach that considers different factors and their relevance to intervention.

This is not to say, however, that process-based approaches should replace manualized treatments (or that manualized treatments are never individualized). Rather, process-oriented approaches overlap with contemporary, transdiagnostic treatment packages and can be integrated concurrently. As examples, the Unified Protocol for Transdiagnostic Treatment of Emotional Disorders (Barlow et al., 2017) emphasizes evidence-based techniques or practice elements that can be applied flexibly dependent upon the individual patient’s needs and provider’s conceptualization of a patient’s problems. However, this approach could technically still be considered a manualized treatment even though it is applied based on individual presentations. Acceptance and Commitment Therapy (Hayes et al., 2011), a third-wave behavioral approach, targets core processes (e.g., valued living) in psychotherapy. Hayes and Hofmann (2019) suggested that future advancements in clinical psychology will be guided by complex network approaches that can help apply case conceptualization to the individual’s unique cognitive, affective, and behavioral presentation.

These transdiagnostic and process-oriented models, taken in conjunction with Hayes and Hofmann’s (2018) model that discusses evidence-based practice elements applicable across contexts and heterogeneous forms of psychopathology, demonstrate how psychotherapy and evidence-based treatment can be adapted to treat complex and heterogeneous clinical presentations using specific practice elements incorporated in effective treatments. By understanding protective and risk factors that predict trajectories of psychological functioning, clinicians can integrate these factors into case conceptualization efforts and treatment to the individual (i.e., consistent with biological, psychological, and social domains of PB-CBT and discussed in the current review; Hayes & Hofmann, 2019), which may impact treatment outcomes (Galatzer-Levy et al., 2018) if these factors are addressed. At the least, these factors could be assessed at the outset of treatment or deployment to facilitate prevention efforts and determine which individuals may be more likely to develop psychological symptoms. As is evident in the current review, there are various psychological, behavioral, and environmental factors that increase the likelihood veterans and service members will embark on a symptomatic or a resilience trajectory. This is preliminary evidence that consideration of some constructs may promote context-specific adaption if incorporated into existing treatment and/or preventive approaches.

This process-based model integrating biological, psychological, and environmental factors may also be beneficial for some of the difficulties service members face that could be neglected when receiving manualized treatments (i.e., that were also not borne out in the current review except in a small number of studies), such as aspects of military culture (Meyer & Wynn, 2018), moral obligations (see Hall-Clark et al., 2019), and stigma (Coll et al., 2011). Focusing on “what core biopsychosocial processes should be targeted with this client given this goal in this situation, and how can they most efficiently and effectively be changed?” (Hayes & Hofmann, 2019, p. 4) is a reasonable next step to improving existing treatments for veterans and service members, and the current review offers an understanding of some of the processes and factors that are involved in the psychological functioning of veterans and service members. Considering the high dropout and nonresponse rates for veterans and service members in rigorous meta-analytic and systematic reviews of gold-standard treatments for PTSD (Steenkamp et al., 2015, 2020a), as well as the centrality of specific procedures in treating veterans (e.g., exposure; Norman et al., 2019), it is important to consider the way in which psychopathology and problems are conceptualized in these populations. This revitalized, updated approach may lower treatment dropout rates for veterans and service members, as well as improve treatment adherence and the therapeutic relationship. However, as is also evident given that some predictors (i.e., especially predictors of resilience trajectories) occurred at a low frequency, additional research is necessary and solidified conclusions to recommend specific, global changes are not possible at the present time.

**Limitations**

Several limitations of the current effort also warrant consideration. First, the small number of studies included in the systematic review and the low frequency at which some constructs predicted trajectories (i.e., particularly resilience trajectories) limits the ability to draw firm conclusions regarding salient predictors of symptomatology or lack thereof. These results could be at least in part attributed to selection factors related to the constructs that researchers chose to examine in reviewed studies. Constructs of interest to researchers would have shown up more frequently across studies, which warrants caution in interpreting studies with high-frequency predictors. Heterogeneity estimates were not conducted, which could limit the validity and generalizability of the frequency statistics provided. For example, some samples were comprised of individuals who served in different eras (e.g., Vietnam and Iraq), thus potentially diminishing the ability to learn about a specific military cohort and/or generalize overall results to the currently active armed forces. We also aggregated all studies across active-duty service members. This decision was made to avoid complexity in interpreting the findings across different subpopulations, although important differences among those groups may exist.

Another prominent limitation is the lack of examination of specific trauma type in terms of relevance to military combat (i.e., combat-related or not combat-related). However, most included studies individuals from both groups represented in their samples, and only a few of the included studies selected on the basis of combat-related trauma being the sole type of trauma experienced. As was also mentioned, the current systematic review was based off of the review conducted by Galatzer-Levy et al. (2018), with a few exceptions to include a broader range of studies. Additionally, given that avoidance is a symptom cluster for a PTSD diagnosis, this finding is perhaps not entirely surprising given the overlap between self-report measures of PTSD and other avoidance measures. As a final limitation, although it is useful to identify predictors of resilience and symptomatic trajectories, it is not possible to derive causal interpretations from the current review. Together, these limitations shed light on the heterogeneity in the trajectory literature but also offer insights into future areas of study.

**Future Research**

Future research should seek to identify additional predictors of different trajectories in veterans and service members, specifically with a focus on factors that increase the probability of a resilience trajectory. The results of the current review did not show a high frequency of predictors or coping strategies that may contribute to a resilience trajectory, owing at least in part to a lack of examination of a diversity of variables. Studies that identify protective factors or coping strategies for resilience trajectories (e.g., meaning, purpose in life; emotion regulation strategies; McCaslin et al., 2020) may provide researchers and clinicians with a more thorough understanding of coping skills that could help prevent the onset of posttraumatic stress symptoms in veterans and service members. Similarly, other contextual factors not elucidated in the current review (e.g., difficulties related to acculturation), may also be relevant in future posttraumatic stress trajectory research. Veterans and service members commonly report difficulties transitioning from military to civilian cultures, which contributes to psychological dysfunction in individuals transitioning back to civilian life (Koenig et al., 2014; redacted for blind review), yet these factors were rarely represented in the longitudinal studies review.

It is also recommended that future research continue to focus on the relationship between smoking and posttraumatic stress symptoms. The current review showed a relationship between smoking and symptomatic trajectories, but other studies have *not* found smoking to be a significant predictor (Xue et al., 2015). Additionally, more research on the relationship between LGBTQ identification, stigma, acculturation, and trajectory type is a reasonable next step in this domain, particularly given the lack of research in this domain and the importance of multiple identifiers and intersectionality in providing evidence-based treatments to veterans and service members (Hall-Clark et al., 2019; Simpson et al., 2013). This area of focus is also important for minority groups more generally (both in the military setting and otherwise), as well as younger military personnel.

Future insights may also be imparted through advances in machine-learning, which could allow researchers to determine complex interactions between different variables that defy the ability of the human brain to immediately identify in a theoretical sense.Machine learning approaches are becoming increasingly common in stress research (Schultebraucks & Galatzer-Levy, 2019), and continued expansion of this work may allow synthesizing the risk factors for symptomatic versus resilient trajectories. In turn, a more thorough approach for understanding of these factors may also include insights into the relative strength of individual predictors in comparison to one another. The current review provides a broad spectrum of predictors but is limited without advanced statistical methods that can effectively consolidate large bodies of literature and differentiate membership classes across different variables. On the contrary, we used a coarse frequency method of aggregating common predictors across studies. Identifying prominent risk factors can provide useful clinical information in that it will allow clinicians to intervene prior to the development of clinical PTSD symptoms and enhance other factors that can facilitate resilience trajectories (i.e., what *do* people have in terms of psychological resources instead of what they *do not* have?). Iterating and modeling these developmental pathways subsequent to traumatic experiences may be greatly advanced through the application of artificial intelligence to the extent future studies incorporate these analytic methods.

**Conclusions**

Understanding predictors of trajectories of symptomatology and resilience in specific populations and subgroups may facilitate conceptualization and treatment efforts (i.e., especially important considering heterogeneity in treatment outcomes and the unique cultural and contextual factors in veterans and service members; Hall, 2011; Steenkamp et al., 2015, 2020a).Certain groups within the military possess multiple risk factors and few protective factors associated with the development of posttraumatic stress symptoms. Moving towards a process-focused, evidence-based CBT model may help clinicians target the transdiagnostic factors across psychological problems (e.g., posttraumatic stress) in veterans and service members, consequently improving evidence-based treatments for these populations. Future trajectory research may also consider specific factors that could impact symptom presentations (e.g., loss of unit members, moral injury).

**References**

American Psychiatric Association. (2013). *Diagnostic and statistical manual of mental*

*disorders* (5th ed.). American Psychiatric Publishing.

\*Andersen, S. B., Karstoft, K. I., Bertelsen, M., & Madsen, T. (2014). Latent trajectories of

trauma symptoms and resilience: The 3-year longitudinal prospective USPER study of

Danish veterans deployed in Afghanistan. *The Journal of Clinical Psychiatry*, *75*(9),

1001-1008. https://doi.org/10.4088/JCP.13m08914

Asmundson, G. J., Thorisdottir, A. S., Roden-Foreman, J. W., Baird, S. O., Witcraft, S. M.,

Stein, A. T., Smits, J. A. J., & Powers, M. B. (2019). A meta-analytic review of cognitive

processing therapy for adults with posttraumatic stress disorder. *Cognitive Behaviour*

*Therapy*, *48*(1), 1-14. https://doi.org/10.1080/16506073.2018.1522371

Atwoli, L., Stein, D. J., Koenen, K. C., & McLaughlin, K. A. (2015). Epidemiology of

posttraumatic stress disorder: Prevalence, correlates and consequences. *Current Opinion*

*in Psychiatry*, *28*(4), 307-311. https://doi.org/10.1097/YCO.0000000000000167

Barlow, D. H., Farchione, T. J., Sauer-Zavala, S., Latin, H. M., Ellard, K. K., Bullis, J. R.,

Bentley, K. H., Boettcher, H. T., & Cassiello-Robbins, C. (2017). *Unified protocol for*

*transdiagnostic treatment of emotional disorders: Therapist guide*. Oxford University

Press.

Barlow, D. H., Sauer-Zavala, S., Carl, J. R., Bullis, J. R., & Ellard, K. K. (2014). The nature,

diagnosis, and treatment of neuroticism: Back to the future. *Clinical Psychological*

*Science*, *2*(3), 344-365. https://doi.org/10.1177/2167702613505532

Bayer, C. P., Klasen, F., & Adam, H. (2007). Association of trauma and PTSD symptoms with

openness to reconciliation and feelings of revenge among former Ugandan and

Congolese child soldiers. *JAMA*, *298*(5), 555-559. https://doi.org/10.1001/jama.298.5.555

Bergman, H. E., Przeworski, A., & Feeny, N. C. (2017). Rates of subthreshold PTSD among US

military veterans and service members: A literature review. *Military Psychology*, *29*(2),

117-127. https://doi.org/10.1037/mil0000154

\*Bernsten, D., Johannessen, K. B., Thomsen, Y. D., Bertelsen, M., Hoyle, R. H., & Rubin, D. C.

(2012). Peace and war: Trajectories of posttraumatic stress disorder symptoms before,

during, and after military deployment in Afghanistan. *Psychological Science*, *23*(12),

1557-1565. https://doi.org/10.1177/0956797612457389

\*Boasso, A. M., Steenkamp, M. M., Nash, W. P., Larson, J. L., & Litz, B. T. (2015). The

relationship between course of PTSD symptoms in deployed U.S. marines and degree of

combat exposure. *Journal of Traumatic Stress*, *28*(1), 73-78.

https://doi.org/10.1002/jts.21988.

Bonanno, G. A. (2004). Loss, trauma, and human resilience: Have we underestimated the human

capacity to thrive after extremely aversive events? *American Psychologist*, *59*(1), 20-28.

Bonanno, G. A., & Mancini, A. D. (2012). Beyond resilience and PTSD: Mapping the

heterogeneity of responses to potential trauma. *Psychological Trauma: Theory, Research,*

*Practice, and Policy*, *4*(1), 74-83. https://doi.org/10.1192/bjp.bp.111.096552

\*Bonanno, G. A., Mancini, A. D., Horton, J. L., Powell, T. M., LeardMann, C. A., Boyko, E. J.,

Wells, T. S., Hooper, T. I., Gackstetter, G. D., & Smith, T. C. (2012). Trajectories of

trauma symptoms and resilience in deployed US military service members: Prospective

cohort study. *The British Journal of Psychiatry*, *200*(4), 317-323.

https://doi.org/10.1192/bjp.bp.111.096552

Boullion, G. Q., Pavlacic, J. M., Schulenberg, S. E., Buchanan, E. M., & Steger, M. F.

(2020). Meaning, social support, and resilience as predictors of posttraumatic

growth: A study of the Louisiana flooding of August 2016. American Journal of

Orthopsychiatry, 90(5), 578-585. https://doi.org/10.1037/ort0000464

Bovin, M. J., Black, S. K., Rodriguez, P., Lunney, C. A., Kleiman, S. E., Weathers, F. W.,

Schnurr, P. P., Spira, J., Keane, T. M., & Marx, B. P. (2018). Development and validation

of a measure of PTSD-related psychosocial functional impairment: The Inventory of

Psychosocial Functioning. Psychological Services, 15(2), 216–229.

https://doi.org/10.1037/ser0000220

Boyko, E. J., Trone, D. W., Peterson, A. V., Jacobson, I. G., Littman, A. J., Maynard, C.,

Seeling, A. D., Crum-Cianflone, N. F., & Bricker, J. B. (2015). Longitudinal

investigation of smoking initiation and relapse among younger and older US military

personnel. *American Journal of Public Health*, *105*(6), 1220-1229.

https://doi.org/10.2105/AJPH.2014.302538

Breslau, N., Peterson, E. L., Poisson, L. M., Schultz, L. R., & Lucia, V. C. (2004). Estimating

post-traumatic stress disorder in the community: Lifetime perspective and the impact of

typical traumatic events. *Psychological Medicine, 34*(5), 889-898.

https://doi.org/10.1017/S0033291703001612

Caddick, N., Smith, B., & Phoenix, C. (2015). Male combat veterans’ narratives of PTSD,

masculinity, and health. *Sociology of Health & Illness*, *37*(1), 97-111.

https://doi.org/10.1111/1467-9566.12183

Card, P. (2017). VA/DoD clinical practice guideline for the management of posttraumatic stress

disorder and acute stress disorder. Retrieved from

https://preprod.tn.gov/content/dam/tn/veteranservices/learning/job-

aids/VADoDPTSDCPGPocketCardFinal.pdf

Coll, J. E., Weiss, E. L., & Yarvis, J. S. (2011). No one leaves unchanged: Insights for civilian

mental health care professionals into the military experience and culture. *Social Work in*

*Health Care*, *50*(7), 487-500. https://doi.org/10.1080/00981389.2010.528727

Cusack, K., Jonas, D. E., Forneris, C. A., Wines, C., Sonis, J., Middleton, J. C., Feltner, C.,

Brownley, K. A., Olmsted, K. R., Greenblatt, A., Weil, A., & Gaynes, B. N. (2016).

Psychological treatments for adults with posttraumatic stress disorder: A

systematic review and meta-analysis. *Clinical Psychology Review*, *43*, 128-141.

https://doi.org/10.1016/j.cpr.2015.10.003

Dardis, C. M., Reinhardt, K. M., Foynes, M. M., Medoff, N. E., & Street, A. E. (2018). “Who are

you going to tell? Who’s going to believe you?” Women’s experiences disclosing

military sexual trauma. *Psychology of Women Quarterly*, *42*(4), 414-429.

https://doi.org/10.1177/0361684318796783

\*Dekel, S., Solomon, Z., Horesh, D., & Ein-Dor, T. (2014). Posttraumatic stress disorder and

depressive symptoms: Joined or independent sequelae of trauma? *Journal of Psychiatric*

*Research*, *54*, 64-69. https://doi.org/10.1016/j.psychires.2014.03.003

Department of Veterans Affairs. (2015). *PTSD: National Center for PTSD.* Retrieved from https://www.ptsd.va.gov/understand/common/common\_veterans.asp.

\*Dickstein, B. D., Suvak, M., Litz, B. T., & Adler, A. B. (2010). Heterogeneity in the course of

posttraumatic stress disorder: Trajectories of symptomatology. *Journal of Traumatic*

*Stress*, *23*(3), 331-339. https://doi.org/10.1002/jts.20523

\*Donoho, C. J., Bonanno, G. A., Porter, B., Kearney, L., & Powell, T. M. (2017). A decade of

war: Prospective trajectories of posttraumatic stress disorder symptoms among deployed

US military personnel and the influence of combat exposure. *American Journal of*

*Epidemiology*, *186*(12), 1310-1318. https://doi.org/10.1093/aje/kwx318

\*Eekhout, I., Reijnen, A., Vermetten, E., & Geuze, E. (2016). Post-traumatic stress symptoms 5

years after military deployment to Afghanistan: An observational cohort study. *The*

*Lancet Psychiatry*, *3*(1), 58-64. https://doi.org/10.1016/S2215-0366(15)00368-5

\*Fink, D. S., Lowe, S., Cohen, G. H., Sampson, L. A., Ursano, R. J., Gifford, R. K., Fullerton, C.

S., & Galea, S. (2017). Trajectories of posttraumatic stress symptoms after civilian or

deployment traumatic event experiences. *Psychological Trauma: Theory, Research,*

*Practice, and Policy*, *9*(2), 138-146. https://doi.org/10.1037/tra0000147

Foa, E. B., Hembree, E. A., & Rothbaum, B. O. (2007). *Prolonged exposure therapy for PTSD:*

*Emotional processing of traumatic experiences.* Oxford University Press.

Fulton, J. J., Calhoun, P. S., Wagner, H. R., Schry, A. R., Hair, L. P., Feeling, N., Elbogen, E., &

Beckham, J. C. (2015). The prevalence of posttraumatic stress disorder in Operation

Enduring Freedom/Operation Iraqi Freedom (OEF/OIF) veterans: A meta-

analysis. *Journal of Anxiety Disorders*, *31*, 98-107.

https://doi.org/10.1016/j.janxdis.2015.02.003

Galatzer-Levy, I. R., & Bryant, R. A. (2013). 636,120 ways to have posttraumatic stress disorder.

*Perspectives on Psychological Science*, *8*(6), 651-662.

https://doi.org/10.1177/1745691613504115

Galatzer-Levy, I. R., Huang, S. H., & Bonanno, G. A. (2018). Trajectories of resilience and

dysfunction following potential trauma: A review and statistical evaluation. *Clinical*

*Psychology Review, 63*, 41-55. https://doi.org/10.1016/j.cpr.2018.05.008

Gilmore, A. K., Lopez, C., Muzzy, W., Brown, W. J., Grubaugh, A., Oesterle, D. W., & Acierno,

R. (2020). Emotion dysregulation predicts dropout from Prolonged Exposure treatment

among women veterans with military sexual trauma-related posttraumatic stress

disorder. *Women's Health Issues*, *30*(6), 462-469.

https://doi.org/10.1016/j.whi.2020.07.004

\*Ginzburg, K., Ein-Dor, T., & Solomon, Z. (2010). Comorbidity of posttraumatic stress disorder,

anxiety and depression: A 20-year longitudinal study of war veterans. *Journal of*

*Affective Disorders*, *123*(1-3), 249-257. https://doi.org/10.1016/j.jad.2009.08.006

\*Ginzburg, K., & Solomon, Z. (2011). Trajectories of stress reactions and somatization

symptoms among war veterans: A 20-year longitudinal study. *Psychological*

*Medicine*, *41*(2), 353-362. https://doi.org/10.1017/S0033291710000528

Hall, L. K. (2011). The importance of understanding military culture. *Social Work in*

*Health Care*, *50*(1), 4-18. https://doi.org/10.1080/00981389.2010.513914

Hall-Clark, B. N., Wright, E. C., Fina, B. A., Blount, T. H., Evans, W. R., Carreño, P. K.,

Peterson, A. L., & Foa, E. B. (2019). Military culture considerations in prolonged exposure therapy with active-duty military service members. *Cognitive and Behavioral Practice*, *26*, 335-350. https://doi/org/10.1016/j.cbpra.2018.07.009

Hayes, S. C., & Hofmann, S. G. (2018). *Process-based CBT: The science and core clinical*

*competencies of Cognitive Behavioral Therapy.* Oakland, CA: Context Press.

Hayes, S. C., & Hofmann, S. G. (2019). The future of intervention science: Process-based

therapy. *Clinical Psychological Science, 7*(1), 37-50.

https://doi/org/10.1177/2167702618772296

Hayes, S. C., Strosahl, K. D., & Wilson, K. G. (2011). *Acceptance and commitment therapy:*

*The process and practice of mindful change*. Guilford Press.

Hayes, S. C., Wilson, K. G., Gifford, E. V., Follette, V. M., & Strosahl, K. (1996). Experiential

avoidance and behavioral disorders: A functional dimensional approach to diagnosis and

treatment. *Journal of Consulting and Clinical Psychology*, *64*(6), 1152-1168.

https://doi/org/10.1037/0022-006X.64.6.1152

Hofmann, S. G., Curtiss, J. E., & Hayes, S. C. (2020). Beyond linear mediation: Toward a

dynamic network approach to study treatment processes. *Clinical Psychology*

*Review*, 101824. https://doi.org/10.1016/j.cpr.2020/101824

Hoge, C. W., Auchterlonie, J. L., & Milliken, C. S. (2006). Mental health problems, use of

mental health services, and attrition from military service after returning from

deployment to Iraq or Afghanistan. *JAMA*, *295*(9), 1023-1032.

https://doi.org/10.1002/jama.295.9.1023

Hoge, C. W., Grossman, S. H., Auchterlonie, J. L., Riviere, L. A., Milliken, C. S., & Wilk, J. E.

(2014). PTSD treatment for soldiers after combat deployment: Low utilization of mental

health care and reasons for dropout. *Psychiatric Services*, *65*(8), 997-1004.

https://doi/org/10.1176/appi.ps.201300307

\*Karstoft, K. I., Armour, C., Elklit, A., & Solomon, Z. (2013). Long-term trajectories of

posttraumatic stress disorder in veterans: The role of social resources. *The Journal of*

*Clinical Psychiatry*, *74*(12), e1163-e1168. https://doi/org/10.4088/jcp.13m08428

\*Karstoft, K. I., Armour, C., Elklit, A., & Solomon, Z. (2015). The role of locus of control and

coping style in predicting longitudinal PTSD-trajectories after combat exposure. *Journal*

*of Anxiety Disorders*, *32*, 89-94. https://doi.org/10.1016/j.janxdis.2015.03.007

Kazdin, A. E., & Blasé, S. L. (2011). Rebooting psychotherapy research and practice to reduce

the burden of mental illness. *Perspectives on Psychological Science, 6*(1), 21-37.

https://doi/org/10.1177/1745691610393527

Kimbrel, N. A., Meyer, E. C., DeBeer, B. B., Gulliver, S. B., & Morissette, S. B. (2016). A 12-

month prospective study of the effects of PTSD-depression comorbidity on suicidal

behavior in Iraq/Afghanistan-era veterans. *Psychiatry Research*, *243*, 97-99.

https://doi/org/10.1016/j.psychres.2016.06.011

Kitchiner, N. J., Lewis, C., Roberts, N. P., & Bisson, J. I. (2019). Active duty and ex-serving

military personnel with post-traumatic stress disorder treated with psychological

therapies: Systematic review and meta-analysis. *European Journal of*

*Psychotraumatology*, *10*, 1684226. https://doi/org/10.1080/20008198.2019.1684226

Knowles, K. A., Sripada, R. K., Defever, M., & Rauch, S. A. M. (2019). Comorbid mood and

anxiety disorders and severity of posttraumatic stress disorder symptoms in treatment-

seeking veterans. Psychological Trauma: Theory, Research, Practice, and Policy, 11(4),

451-458. https://doi/org/10.1037/tra0000383

Koenig, C. J., Maguen, S., Monroy, J. D., Mayott, L., & Seal, K. H. (2014). Facilitating culture-

centered communication between health care providers and veterans transitioning from military deployment to civilian life. *Patient Education and Counseling*, *95*, 414-420. https://doi/org/10.1016/j.pec.2014.03.016

Konnert, C., & Wong, M. (2015). Age differences in PTSD among Canadian veterans: Age

and health as predictors of PTSD severity. *International Psychogeriatrics*, *27*(2), 297-

304. https://doi.org/10.1017/S1041610214001884

Koo, K. H., Hebenstreit, C. L., Madden, E., & Maguen, S. (2016). PTSD detection and

symptom presentation: Racial/ethnic differences by gender among veterans with

PTSD returning from Iraq and Afghanistan. *Journal of Affective Disorders*, *189*, 10-

16. https://doi.org/10.1016/j.jad.2015.08.038

Livingston, N. A., Berke, D. S., Ruben, M. A., Matza, A. R., & Shipherd, J. C. (2019).

Experiences of trauma, discrimination, microaggressions, and minority stress among

trauma-exposed LGBT veterans: Unexpected findings and unresolved service

gaps. *Psychological Trauma: Theory, Research, Practice, and Policy*, *11*(7), 695-703.

https://doi.org/10.1037/tra0000464

\*Madsen, T., Karstoft, K.-I., Bertelsen, M., & Andersen, S. B. (2014). Postdeployment suicidal

ideations and trajectories of posttraumatic stress disorder in Danish soldiers: A 3-year

follow-up of the USPER Study. *The Journal of Clinical Psychiatry, 75*(9), 994-1000.

https://doi/org/104088/JCP.13m08910

Mattson, E., James, L., & Engdahl, B. (2018). Personality factors and their impact on PTSD and

post-traumatic growth is mediated by coping style among OIF/OEF veterans. *Military*

*Medicine, 183*(9-10), e475-480. https://doi/org/10.1093/milmed/usx201

McCaslin, S. E., Bramlett, D., Juhasz, K., Mackintosh, M.-A., & Springer, S. (2020). Veterans

and disaster response work: The role of continued service in meaning making and

recovery. In S. E. Schulenberg (Ed.), *Positive psychological approaches to disaster:*

*Meaning, resilience, and posttraumatic growth* (pp. 61-79)*.* Switzerland: Springer.

McCutcheon, V. E., Grant, J. B., & Schulenberg, S. E. (2020). Answering the call of COVID-19:

An integrated mental health response considering education, training, research, and

service. *Psychological Trauma: Theory, Research, Practice, and Policy, 12*(S1), S284-

S286. https://doi/org/10.1037/tra0000896

Meyer, E. G., & Wynn, G. H. (2018). The importance of US military cultural competence. In: L.

Roberts & C. Warner (Eds.), *Military and veteran mental health* (pp. 15-33). Springer.

https://doi.org/10.1007/978-1-4939-7438-2\_2

Monson, C. M., Schnurr, P. P., Resick, P. A., Friedman, M. J., Young-Xu, Y., & Stevens, S. P.

(2006). Cognitive Processing Therapy for veterans with military-related posttraumatic

stress disorder. *Journal of Consulting and Clinical Psychology*, *74*(5), 898-907.

https://doi/org/10.1037/0022-006X.74.5.898

Moore, C. L., Wang, N., Johnson, J., Manyibe, E. O., Washington, A. L., & Muhammad, A.

(2016). Return-to-work outcome rates of African American versus White veterans served

by state vocational rehabilitation agencies: A randomized split-half cross-model

validation research design. *Rehabilitation Counseling Bulletin*, *59*(3), 158-171.

https://doi/org/10.1177/0034355215579917

Mustillo, S. A., & Kysar-Moon, A. (2017). Race, gender, and post-traumatic stress disorder in

the US military: Differential vulnerability? *Armed Forces & Society*, *43*(2), 322-345.

https://doi/org/10.1177/0095327X16652610

Najavits, L. M., Krinsley, K., Waring, M. E., Gallagher, M. W., & Skidmore, C. (2018). A

randomized controlled trial for veterans with PTSD and substance use disorder: Creating

change versus seeking safety. *Substance Use & Misuse*, *53*(11), 1788-1800.

https://doi/org/10.1080/10826084.2018.1432653

\*Nash, W. P., Boasso, A. M., Steenkamp, M. M., Larson, J. L., Lubin, R. E., & Litz, B. T.

(2015). Posttraumatic stress in deployed Marines: Prospective trajectories of early

adaptation. *Journal of Abnormal Psychology*, *124*(1), 155-171.

https://doi/org/10.1037/abn0000020

Norman, S. B., Trim, R., Haller, M., Davis, B. C., Myers, U. S., Colvonen, P. J., Blanes, E.,

Lyons, R., Siegel, E. Y., Angkaw, A. C., Norman, G. J., & Mayes, T. (2019). Efficacy of

integrated exposure therapy vs integrated coping skills therapy for comorbid

posttraumatic stress disorder and alcohol use disorder: A randomized clinical trial. *JAMA*

*Psychiatry*, *76*(8), 791-799. https://doi/org/10.1001/jamapsychiatry.2019.0638

\*Orcutt, H. K., Erickson, D. J., & Wolfe, J. (2004). The course of PTSD symptoms among Gulf

War veterans: A growth mixture modeling approach. *Journal of Traumatic Stress*, *17*(3),

195-202. https://doi/org/10.1023/B:JOTS.0000029262.42865.c2

\*Palmer, L., Thandi, G., Norton, S., Jones, M., Fear, N. T., Wessely, S., & Rona, R. J. (2019).

Fourteen-year trajectories of posttraumatic stress disorder (PTSD) symptoms in UK

military personnel, and associated risk factors. *Journal of Psychiatric Research*, *109*,

156-163. https://doi/org/10.1016/j.jpsychires.2018.11.023

Peterson, A. L., Foa, E. B., Resick, P. A., Hoyt, T. V., Straud, C. L., Moore, B. A., Favret, J. V.,

Hale, W. J., Litz, B. T., Rogers, T. E., Stone, J. M., Villarreal, R., Woodson, C. S.,

Young-McCaughan, S. Y., & Mintz, J. (2020). A nonrandomized trial of Prolonged

Exposure and Cognitive Processing Therapy for combat-related posttraumatic stress

disorder in a deployed setting. *Behavior Therapy*.

https://doi.org/10.1016/j.beth.2020.01.003

Pietrzak, R. H., Feder, A., Singh, R., Schechter, C. B., Bromet, E. J., Katz, C. L., Reissman, D.

B., Ozbay, F., Sharma, V., Crane, M., Harrison, D., Herbert, R., Levin, S. M., Luft, B. J.,

Moline, J. M., Stellman, J. M., Udasin, I. G., Landrigan, P. J., & Southwick, S. M.

D. (2014). Trajectories of PTSD risk and resilience in World Trade Center responders:

An 8-year prospective cohort study. *Psychological Medicine*, *44*(1), 205-219.

https://doi.org/10.10178/S0033291713000597

\*Polusny, M. A., Erbes, C. R., Kramer, M. D., Thuras, P., DeGarmo, D., Koffel, E., Litz, B., &

Arbisi, P. A. (2017). Resilience and posttraumatic stress disorder symptoms in National

Guard soldiers deployed to Iraq: A prospective study of latent class trajectories and their

predictors. *Journal of Traumatic Stress*, *30*(4), 351-361. https://doi.org/10.1002/jts.22199

\*Porter, B., Bonanno, G. A., Frasco, M. A., Dursa, E. K., & Boyko, E. J. (2017). Prospective

post-traumatic stress disorder symptom trajectories in active duty and separated military

personnel. *Journal of Psychiatric Research*, *89*, 55-64.

https://doi.org/10.1016/j.jpsychires.2017.01.016

Resick, P. A., Wachen, J. S., Mintz, J., Young-McCaughan, S., Roache, J. D., Borah, A. M.,

Borah, E. V., Dondanville, K. A., Hembree, E. A., Litz, B., & Peterson, A. L. (2015). A

randomized clinical trial of group cognitive processing therapy compared with group

present-centered therapy for PTSD among active duty military personnel. *Journal of*

*Consulting and Clinical Psychology*, *83*(6), 1058-1068.

https://doi.org/10.1037/ccp0000016

Riddle, J. R., Smith, T. C., Smith, B., Corbeil, T. E., Engel, C. C., Wells, T. S., Hoge, C. W.,

Adkins J., Zamorski, M., & Blazerg, D. (2007). Millennium Cohort: The 2001–2003

baseline prevalence of mental disorders in the US military. *Journal of Clinical*

*Epidemiology*, *60*(2), 192-201. https://doi.org/10.1016/j.clinepi.2006.04.008

Ruef, A. M., Litz, B. T., & Schlenger, W. E. (2000). Hispanic ethnicity and risk for combat-

related posttraumatic stress disorder. Cultural Diversity and Ethnic Minority Psychology,

6(3), 235-251. https://doi.org/10.1037/1099-9809.6.3.235

\*Sampson, L., Cohen, G. H., Calabrese, J. R., Fink, D. S., Tamburrino, M., Liberzon, I., Chan,

P., & Galea, S. (2015). Mental health over time in a military sample: The impact of

alcohol use disorder on trajectories of psychopathology after deployment. *Journal of*

*Traumatic Stress*, *28*(6), 547-555. https://doi.org/10.1002/jts.22055

Schnurr, P. P., Norman, S. B., & Hamblen, J. L. (2020). PTSD treatments for

veterans. *JAMA*, *324*(3), 301.

Schultebraucks, K., & Galatzer‐Levy, I. R. (2019). Machine learning for prediction of

posttraumatic stress and resilience following trauma: An overview of basic concepts and

recent advances. *Journal of Traumatic Stress*, *32*(2), 215-225.

https://doi.org/10.1002/jts.22384

Simpson, T. L., Balsam, K. F., Cochran, B. N., Lehavot, K., & Gold, S. D. (2013). Veterans

administration health care utilization among sexual minority veterans. *Psychological*

*Services*, *10*(2), 223-232.

Sippel, L. M., Roy, A. M., Southwick, S. M., & Fichtenholtz, H. M. (2016). An examination of

the roles of trauma exposure and posttraumatic stress disorder on emotion regulation

strategies of Operation Iraqi Freedom, Operation Enduring Freedom, and Operation New

Dawn veterans. *Cognitive Behaviour Therapy*, *45*(5), 339-350.

https://doi.org/10.1080/16506073.2016.1183037

Sloan, D. M., & Marx, B. P. (2019). *Written Exposure Therapy for PTSD: A brief treatment*

*approach for mental health professionals.* Washington, DC: American Psychological

Association.

\*Snir, A., Levi-Belz, Y., & Solomon, Z. (2017). Is the war really over? A 20-year longitudinal

study on trajectories of suicidal ideation and posttraumatic stress symptoms following

combat. *Psychiatry Research*, *247*, 33-38. https://doi.org/10.1016/j.psychres.2016.10.065

\*Solomon, Z., & Ein-Dor, T. (2009). The longitudinal course of posttraumatic stress disorder

symptom clusters among war veterans. *The Journal of Clinical Psychiatry*, *70*(6), 837-

843. https://doi.org/10.4088/JCP/08m04347

\*Sørensen, H. J., Andersen, S. B., Karstoft, K. I., & Madsen, T. (2016). The influence of pre-

deployment cognitive ability on post-traumatic stress disorder symptoms and trajectories:

The Danish USPER follow-up study of Afghanistan veterans. *Journal of Affective*

*Disorders*, *196*, 148-153. https://doi.org/10.1016/j.jad.2016.02.037

Southwick, S. M., Bonanno, G. A., Masten, A. S., Panter-Brick, C., & Yehuda, R. (2014).

Resilience definitions, theory, and challenges: Interdisciplinary perspectives. *European*

*Journal of Psychotraumatology*, *5*(1), 25338. https://doi.org/10.3402/ejpt.v5.25338

Southwick, S. M., Sippel, L., Krystal, J., Charney, D., Mayes, L., & Pietrzak, R. (2016). Why are

some individuals more resilient than others: The role of social support. *World Psychiatry,*

*15*(1), 77-79. https://doi.org/10.1002/wps.20282

\*Sripada, R. K., Pfeiffer, P. N., Rampton, J., Ganoczy, D., Rauch, S. A., Polusny, M. A., &

Bohnert, K. M. (2017). Predictors of PTSD symptom change among outpatients in the

US Department of Veterans Affairs Health Care System. *Journal of Traumatic*

*Stress*, *30*(1), 45-53. https://doi.org/10.1002/jts.22156

Steenkamp, M. M., Litz, B. T., & Marmar, C. R. (2020a). First-line psychotherapies for military-

related PTSD. *JAMA Insights.* https://doi.org/10.1001/jama.2019.20825

Steenkamp, M. M., Litz, B. T., & Marmar, C. R. (2020b). PTSD treatments for veterans—

reply. *JAMA*, *324*(3), 301-302.

Steenkamp, M. M., Litz, B. T., Hoge, C. W., & Marmar, C. R. (2015). Psychotherapy for

military-related PTSD: A review of randomized clinical trials. *JAMA Psychiatry,* *314*(5),

489-500. https://doi.org/10.1001/jama.2015.8370

Taylor, S., Miller, B. L., Tallapragada, M., & Vogel, M. (2020). Veterans’ transition out of

the military and knowledge of mental health disorders. *Journal of Veterans*

*Studies*, *6*(1), 85–95. https://doi.org/10.21061/jvs.v6i1.131

Thompson, N. J., Fiorillo, D., Rothbaum, B. O., Ressler, K. J., & Michopoulos, V. (2018).

Coping strategies as mediators in relation to resilience and posttraumatic stress disorder.

*Journal of Affective Disorders, 225*(1), 153-159.

https://doi./org/10.1016/j.jad.2017.08.049

Thompson, P., Bryan, C., & Poulin, C. (2014, June). Predicting military and veteran

suicide risk: Cultural aspects. In *Proceedings of the Workshop on Computational*

*Linguistics and Clinical Psychology: From Linguistic Signal to Clinical Reality* (pp. 1-

6). Association for Computational Linguistics.

Tkachuck, M. A., Pavlacic, J. M., Raley, M. J., McCaslin, S. E., & Schulenberg, S. E. (2020).

*Validating military culture: The factor analysis of a military-related adaptation of*

*acculturation.* Manuscript invited for resubmission.

\*Wang, J., Ursano, R. J., Gonzalez, O. I., Russell, D. W., Dinh, H., Hernandez, L., Gifford, R.

K., Cohen, G. H., Sampson, L., Galea, S., & Fullerton, C. S. (2018). Association of

suicidal ideation with trajectories of deployment-related PTSD symptoms. *Psychiatry*

*Research*, *267*, 455-460. https://doi.org/10.1016/j.psychres.2018.06.034

Xue, C., Ge, Y., Tang, B., Liu, Y., Kang, P., Wang, M., & Zhang, L. (2015). A meta-analysis of

risk factors for combat-related PTSD among military personnel and veterans. *PLOS*

*ONE, 10*(3), e0120270. https://doi./org/10.101371/journal.pone.0120270

Zayfert, C., DeViva, J. C., Becker, C. B., Pike, J. L., Gillock, K. L., & Hayes, S. A. (2005).

Exposure utilization and completion of cognitive behavioral therapy for PTSD in a “real world” clinical practice. *Journal of Traumatic Stress, 18*, 637-645. https://doi./org/10.1002/jts.20072

\*Zerach, G., Karstoft, K. I., & Solomon, Z. (2017). Hardiness and sensation seeking as potential

predictors of former prisoners of wars' posttraumatic stress symptoms trajectories over a

17-year period. *Journal of Affective Disorders*, *218*, 176-181.

https://doi./org/10.1016/j.jad.2017.04.025

\*Zerach, G., Solomon, Z., Horesh, D., & Ein-Dor, T. (2013). Family cohesion and posttraumatic

intrusion and avoidance among war veterans: A 20-year longitudinal study. *Social*

*Psychiatry and Psychiatric Epidemiology*, *48*(2), 205-214.

https://doi/org/10.1007/s00127-012-0541-6