A Systematic Review of Posttraumatic Stress and Resilience Trajectories: Identifying Predictors for Future Treatment of Veterans and Service Members

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Data link available at <https://osf.io/2dnhe/>

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Abstract

Posttraumatic stress disorder (PTSD) often presents with comorbidities and can result in 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 of resilience trajectories (i.e., including some studies that used the same data sets and/or samples), 73.4% reported a resilience trajectory, while the remaining 26.6% encompassed heterogeneous symptomatic trajectories on average. 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

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A Systematic Review of Posttraumatic Stress and Resilience Trajectories: Identifying Predictors for Future Treatment of Veterans and Service Members

Posttraumatic stress disorder (PTSD) disproportionately affects certain populations, such as veterans and service members ([Fulton](#_bookmark4) [et al., 2015](#_bookmark4); [Hoge et al., 2006](#_bookmark16); [Steenkamp et al., 2015](#_bookmark38)). In veterans, approximately 23% of Operation Iraqi Freedom and Operation Enduring Freedom veterans meet diagnostic criteria for PTSD ([Fulton et al., 2015](#_bookmark4)). Further, 12% of Gulf War veterans and 15% of Vietnam veterans are diagnosed with PTSD ([Department](#_bookmark17) [of Veterans Affairs, 2015](#_bookmark17)).

In veterans and service members, PTSD is associated with substance use disorders ([Najavits et al., 2018](#_bookmark33)) and depression ([Kimbrel et al., 2016](#_bookmark22)), among other psychological and physical health problems. Subclinical and clinical levels of PTSD are also associated with poorer functional outcomes in veterans ([Bergman](#_bookmark5) [et al., 2017](#_bookmark5)). Although veterans and service members represent a small percentage of the population (i.e., less than 10%; [Bergman](#_bookmark5) [et al., 2017](#_bookmark5); [Hoge et al., 2006](#_bookmark16)), 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](#_bookmark38)), and developing, administering, and dis­seminating evidence-based treatments is essential.

# Evidence-Based Treatments for PTSD

Trauma-focused psychotherapies, such as Cognitive Processing Therapy (CPT; [Monson et al., 2006](#_bookmark29)) and Prolonged Exposure Therapy (PE; [Foa et al., 2007](#_bookmark2)) are gold-standard treatments for PTSD. Meta-analytic reviews of both CPT ([Asmundson et al., 2019](#_bookmark1)) and PE ([Cusack et al., 2016](#_bookmark14)) demonstrate clinically meaningful results in combined civilian and military samples. Gold-standard treatments such as PE can be modified in combat settings (i.e., *M* = 7.50 sessions; [Peterson et al., 2020](#_bookmark20)). Other treatment modalities, such as Present-Centered Therapy ([Resick et al., 2015](#_bookmark23)), have shown promise for reducing PTSD symptoms in service members.

Despite dissemination efforts for CPT and PE, including within the Veterans Health Administration (VHA), these gold-standard treatments are less effective for veterans and service members ([Kitchiner et al., 2019](#_bookmark24)). In a descriptive review conducted by [Steenkamp et al. (2015)](#_bookmark38), 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 or interviews), although mean posttreatment scores were still at or above clinical cutoffs for PTSD. In a follow-up to [Steenkamp et al. (2015)](#_bookmark38), [Steenkamp et al. (2020a)](#_bookmark40) 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, approximately 60% remained above the clinical threshold for PTSD symptoms in two trials. It is important to note that [Steenkamp et al. (2015)](#_bookmark38) included CPT and PE studies with various comparison groups and did not include individuals with substance use disorders and PTSD despite the high fre­quency with which PTSD occurs with substance use disorders ([Najavits et al., 2018](#_bookmark33)). In a response to [Steenkamp et al. (2020a)](#_bookmark40), [Schnurr et al. (2020)](#_bookmark30) 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 an opportunity for improvement to psychotherapeutic intervention in veterans and service members ([Schnurr et al., 2020](#_bookmark30); [Steenkamp et al., 2020b](#_bookmark42)). 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. Army soldiers with PTSD report high psychotherapy treatment dropout rates (i.e., 24%; [Hoge et al., 2014](#_bookmark18)), and the stigmatization of mental health in the military may prevent individuals from seeking help ([Coll et al.,](#_bookmark11) [2011](#_bookmark11)). As service members transition from the military to civilian context, cultural factors may also not be adequately considered by providers or assessment tools ([Tkachuck et al., 2021](#_bookmark45)). 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](#_bookmark43); [Tkachuck et al., 2021](#_bookmark45)). 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](#_bookmark9)).

Despite decreased effectiveness compared to other populations experiencing PTSD, trauma-focused cognitive-behavioral therapies remain the most evidence-supported options for service delivery ([Schnurr et al., 2020](#_bookmark30)). 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 ([Department of](#_bookmark19) [Veterans Affairs & Department of Defense, 2017](#_bookmark19)) recommend a wide array of approaches that emphasize idiographic patient care. The current systematic review asserts that understanding predictors of different 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 et al., 2018](#_bookmark6)). Examining outcomes over time provides more information than cross-sectional assessment, such as predictors of symptomatic and resilient trajectories. [Bonanno (2004)](#_bookmark7) delineates four common trajectories in adults following stressful or traumatic events. The first is the *resilience trajectory*, or the nondevelopment of clinical symptoms over time.

The *chronic trajectory* is characterized by consistently high levels of PTSD symptomatology. The *recovery trajectory* encompasses symptoms at a clinical (or subclinical) level with decreasing levels of intensity over time. Finally, the *delayed onset trajectory* comprises symptoms at a subclinical level initially, with increasing intensity. Others have identified different patterns of trajectories. As an example, [Orcutt](#_bookmark35) [et al. (2004)](#_bookmark35) described two trajectories in Gulf War veterans, specifically symptoms that increased over time and a less symp­tomatic trajectory. 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)](#_bookmark6) conducted a review examining com­mon predictors of PTSD trajectories following exposure to hetero­geneous, potentially traumatic events across different populations. Predictors of the trajectories (e.g., 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 populations. Recognizing and discussing specific predictor variables for 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).

# **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 during July and August of 2019 (i.e., studies meeting inclusion criteria but published after this date would *not* have been included). Two authors indepen­dently coded articles. After data extraction (see below), included articles were checked by a third author to ensure accuracy in both extraction and adherence to inclusion criteria. The inclusion criteria were informed by the review and statistical evaluation conducted by [Galatzer-Levy et al. (2018)](#_bookmark6), 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 above 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 percentage of individuals included in each trajectory and/or sought to estimate a single trajectory across a given group (and were thus not included in percentage calculations). Articles published before 2000 were screened 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 1 year after exposure were also included (i.e., when applicable to specific studies measuring outcomes before and after deployment). Most publications assessed participants (a) after deploy­ment, (b) before and after deployment, or (c) before, during, and after deployment. The final pool consisted of 1,514 articles. After screening 1,514 abstracts and excluding articles based on the criteria mentioned above (including exclusion of duplicate articles), 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) flowchart, see <https://osf.io/2dnhe/>.

# Data Extraction for Included Articles

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, postdeployment 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 different symptomatic trajectories compared to other symptomatic trajectories, deployment status, and the data set for studies using the same data set to answer different questions.

# Results Resilience Trajectory Averages

Percentages (when applicable) from the retained studies were averaged to determine the average percentage of participants in

resilience or symptomatic trajectories. After averaging percentages across studies reporting resilience trajectories for participants, 73.4% followed a resilience trajectory, while different symptomatic trajectories accounted for the remainder of study participants on average (26.6%). As mentioned, percentages were averaged across each publication that reported a specific percentage of individuals in a resilience trajectory (i.e., including different publications reporting data from the same data set and studies reporting trajectory infor­mation for different cohorts). For context, one study differentiated a resilience trajectory from a resistant trajectory (i.e., representing symptomatology lower than the resilience trajectory). When explor­ing the added percentage of the resilience and resistant trajectories in average calculations across other studies, 74.8% of participants followed a resilience trajectory, with 25.2% encompassing different symptomatic trajectories on average.

# Trauma- and Stressor-Related Predictors

A full list of predictors for resilient trajectories compared to different symptomatic trajectories and vice versa for all results is presented at <https://osf.io/2dnhe/> and the [Supplemental Materials](https://doi.org/10.1037/pro0000451.supp). 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.

# Negative Affectivity and Behavioral Problem Predictors

Predictors for trajectories related to negative affectivity and behav­ioral problems are presented at the OSF link. Increased depression predicted different symptomatic trajectories (e.g., 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

All demographic 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 (with older individuals less likely to be in symptomatic trajectories specifically).

# Service/Occupation and Status Predictors

Those enlisted, reporting combat jobs, in the Army (vs. Navy/ Coast Guard and Air Force), 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 vs. enlisted)/officer status, and lower peacekeeping hassles were less likely to report a symptomatic trajectory (e.g., resilient individuals had lower peace keeping hassles).

# 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 (and a Severe-Stable trajectory compared to a Moderate-Improving trajectory in the case of those with sleep disorders).

# Social/Cultural Factor Predictors

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

# Coping Predictors

Individuals who reported increased internal locus of control were less likely to report a symptomatic trajectory compared to resilience trajectories. In addition, those who indicated 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 preparedness was associ­ated with lower odds of the New-Onset trajectory compared to resilience.

# Discussion

Most participants reported a resilience trajectory when averaging resilience trajectory percentages. 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 different 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). 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 risk factors for PTSD, but adaptive coping strategies in the wake of traumatic and/or stressful events may prevent individuals from developing PTSD ([Thompson et al., 2018](#_bookmark44)). Individuals who were less able to engage in 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 internal locus of control had a decreased likelihood of reporting symptomatic trajectories. Importantly, each of these aforementioned predictors emerged as significant predictors in only one of the studies reviewed, despite the importance of these and other coping factors (e.g., emotion regula­tion strategies) that contribute to the maintenance of trauma-related psychopathology in veterans ([Sippel et al., 2016](#_bookmark34)).

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 increased levels of depression emerged as frequent pre­dictors of resilient and symptomatic posttraumatic stress trajectories, respectively. PTSD frequently co-occurs with depression ([Kimbrel](#_bookmark22) [et al., 2016](#_bookmark22)), anxiety disorders, as well as other psychological problems in veterans ([Knowles et al., 2019](#_bookmark25)), which suggests that psychological problems perhaps share certain components. [Barlow](#_bookmark3) [et al. (2014)](#_bookmark3) discussed how psychological disorders share underly­ing negative affectivity, or neuroticism, and avoidance has also been posited as another nearly ubiquitous transdiagnostic vulnerability factor. 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 toward 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 & Blasé, 2011](#_bookmark21)). 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 for alcohol use. This finding contrasts with other meta-analytic reviews examining risk factors for PTSD, which suggest that smoking does *not* relate to PTSD symptoms ([Xue et al.,](#_bookmark41) [2015](#_bookmark41)). Smoking may be relevant to consider within a PTSD context, as it emerged as a common predictor of symptomatic trajectories. 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.,](#_bookmark3) [2014](#_bookmark3)), which is perhaps not entirely surprising given that avoidance is a symptom cluster for PTSD ([American Psychiatric Association,](#_bookmark0) [2013](#_bookmark0)). Of course, this may be only true for trajectory studies. 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 potential avoidance behaviors (e.g., smoking and alcohol use), consistent with the proliferation of Process-Based Cognitive Behavioral Therapy (PB-CBT) and network models in clinical psychology that consider biological, psychological, and maintenance factors ([Hayes &](#_bookmark15) [Hofmann, 2019](#_bookmark15)).

# 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 as resilient, 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. However, higher education was only signifi­cant in a small number of studies, while “White” and “male” also occurred infrequently. 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](#_bookmark37)). Additionally, [Mustillo](#_bookmark32) [and](#_bookmark32) [Kysar-Moon](#_bookmark32) [(2017)](#_bookmark32) found that increased trauma exposure was associated with higher PTSD rates for servicewomen compared to servicemen, which is corroborated by the results from the current review and other studies ([Xue et al., 2015](#_bookmark41)).

Younger individuals compared to older individuals were more likely to embark on a symptomatic trajectory. This variable emerged as significant in three of the studies, and one study suggested that older individuals were less likely to report a symptomatic trajectory. 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](#_bookmark26)), which may be attributed to a combination of factors such as (a) PTSD criteria not adequately assessing experi­ences in older adults, (b) recall biases, (c) decreased negative affectivity in older veterans and service members, and (d) differ­ences in negative attentional biases (see [Konnert & Wong, 2014](#_bookmark28) 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 current review provides additional evidence suggesting that marginalized 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](#_bookmark27)).

The current review identified relatively few sociocultural factors that predicted resilient and symptomatic trajectories. Individuals reporting decreased homecoming exclusion and more social support were less likely to report symptomatic trajectories. Individuals who reported increased concerns about deployment impact on family and life were more likely to embark on a symptomatic trajectory as compared to a resilient trajectory. Unfortunately, each of these factors was examined infrequently, despite the importance of accul­turation and cultural factors in conceptualizing psychopathology in treating veterans and service members ([Hall-Clark et al., 2019](#_bookmark8); [Tkachuck et al., 2021](#_bookmark45)).

# 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](#_bookmark10)). 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](#_bookmark10)).

PB-CBT, one outgrowth of this transition in clinical psychology, consolidates biological, psychological, and social factors into net­work models to understand individual clinical presentations and select evidence-based procedures for clinical intervention ([Hayes &](#_bookmark10) [Hofmann, 2018](#_bookmark10); [Pavlacic & Young, 2020](#_bookmark36)). This model of eviden-tiary 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](#_bookmark12)). 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; see [Department of Veterans Affairs &](#_bookmark19) [Department of Defense, 2017](#_bookmark19)). Rather, process-oriented approaches overlap with contemporary, transdiagnostic and manualized treat­ment packages, and can be integrated concurrently. As examples, [Barlow et al. (2014)](#_bookmark3) emphasize 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](#_bookmark13)), a third-wave behavioral approach, targets core processes (e.g., valued living) in psychotherapy. [Hayes and](#_bookmark15) [Hofmann (2019)](#_bookmark15) 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 the [Hayes and Hofmann (2018)](#_bookmark10) 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 that were dis­cussed in the current review; [Hayes & Hofmann, 2019](#_bookmark15)), which may impact treatment outcomes ([Galatzer-Levy et al., 2018](#_bookmark6)) 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. Consideration of these 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 and veterans 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, moral obligations (see [Hall-Clark et al., 2019](#_bookmark8)), and stigma ([Coll et al., 2011](#_bookmark11)). 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?” ([Hofmann](#_bookmark15) [& Hayes, 2019](#_bookmark15), p. 38) 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 reviews of gold-standard treatments for PTSD ([Steenkamp et al.,](#_bookmark38) [2015](#_bookmark38), [2020a](#_bookmark40)), it is important to consider the way in which psychopathology and problems are conceptualized in these po­pulations. 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 limits the ability to draw firm conclusions regarding salient predictors of symptomatology or lack thereof. These results could be 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 generaliz-ability of the frequency statistics and percentages provided (given that percentages were averaged across included studies to arrive at an overall percentage). For example, some samples were com­prised of individuals who served in different eras (e.g., Iraq) and countries, 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 service members and veterans. 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 had 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 the review conducted by [Galatzer-Levy et al. (2018)](#_bookmark6), with a few exceptions to include a broader range of studies and focus exclusively on veterans and service members while simultaneously drawing out treatment implications for this population. 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, 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 coping strategies that predicted 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; [Weber et al., 2020](#_bookmark39)) 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 may contribute to psychological dysfunction in individuals transi­tioning back to civilian life ([Tkachuck et al., 2021](#_bookmark45)), yet these factors were rarely represented in the longitudinal studies reviewed.

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](#_bookmark41)). Additionally, more research on the relationship between lesbian, gay, bisexual, transgender, and queer (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](#_bookmark8)). This area of focus is also important for margin­alized 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 modeling of complex inter­actions between variables. Machine learning approaches are becom­ing increasingly common in stress research ([Schultebraucks &](#_bookmark31) [Galatzer-Levy, 2019](#_bookmark31)), and expansion of this work may allow synthesizing the risk factors for symptomatic versus resilient trajec­tories. A more thorough approach for understanding 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 consolidate large bodies of literature. On the contrary, we used a coarse frequency method of aggregating predictors and averaging percentages across studies that reported resilience trajectories. 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). Moving toward a process-focused, evidence-based CBT model may help clinicians target the transdiagnostic factors across psychologi­cal problems 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

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