NATURE-BASED THERAPY AND VETERANS WITH PTSD

Nature-Based Therapy: Alternative Treatment Options for North American Military

Veterans with the Diagnosis of PTSD

by

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Abstract

In this capstone project, I explore nature-based therapy as an alternative treatment for North American veterans with the diagnosis of PTSD. I examine the development and diagnosis of PTSD in veteran populations and describe the currently recommended evidence-based psychotherapy treatments. Despite the effectiveness of empirically validated trauma-focused psychotherapies, barriers to treatment completion remain a significant challenge. Through an extensive literature review, I analyze the efficacy of NBTs for veterans with PTSD and offer recommendations for future research and practice to establish NBT interventions as a viable alternative treatment option. My recommendations include consistently defining the NBT field, using modified research study designs, including long-term outcomes in study results, individualizing treatment plans for veterans, conducting ongoing outcome measures, and incorporating NBT into PTSD guidelines and veteran service referrals. Overall, this capstone highlights the ongoing need for effective alternative treatments for veterans with PTSD and offers insight into the potential of NBTs to fill this critical gap.

Keywords: Nature-based therapy, PTSD, veterans, alternative treatment options

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Table of Contents	7
Introduction (Chapter 1)	
Purpose Statement	
Theoretical Model	9
Contribution to the Field	9
Positionality Statement	
Definitions of Terms	
Capstone Chapters Summary	
Literature Review (Chapter 2)	
Theoretical Orientation: The Dynamic Biopsychosocial Model	
Defining Trauma	
Trauma Etiology and Severity	
The Physiology of Trauma	
Diagnostic Categories of Trauma and Stress	
Posttraumatic Stress Disorder	
Symptoms of PTSD	
Prevalence of PTSD in the General Population	
Diagnosis of PTSD Amongst Veterans	
Prevalence of PTSD in Veterans	
Comorbid Disorders	

	Veteran Suicide Rates	28
	Barriers to Treatment Initiation	29
	Evidence-Based Psychotherapy for PTSD	32
	Treatment Drop-Out Rates	36
	The Use of Alternative Treatments for PTSD in Veterans	37
	Inconsistent Understandings of Nature-Based Approaches	38
	Understanding Models of Change	39
	Unifying Considerations of NBT	40
	Nature-Based Therapy Interventions	41
	Efficacy and Outcomes of Nature-Based Therapy	43
	Long-Term Clinical Benefits	48
	Underreported Risks in NBT Practices	49
	Literature Review Conclusion	50
D	iscussion and Applied Practices (Chapter 3)	52
	Discussion	52
	Limitations of NBT Literature and Critiques of 'Best Practice'	55
	Limitations of the Dynamic Biopsychosocial Model	59
	Recommendations	60
	Application 1: Future Studies of NBT Efficacy for Veterans with PTSD	61
	Application 2: Individualized NBT Interventions for Veterans with PTSD	63

Application 3: Systemic NBT Recommendations for Veterans with PTSD	64
Capstone Conclusion	66
References	68

Introduction (Chapter 1)

In Canada and the United States, individuals who enlist in the military to serve and protect their nation can leave after completing their service contracts (Government of Canada, n.d.). Between 1954 and 2019, a total of 600,200 Canadian military members left active service and became CAF veterans (Sweet et al., 2020), while 6.4% of the American population are former service members (U.S. Census Bureau, 2021). However, despite the honorable intentions of military service, it often comes at a steep physical and mental cost for current and former service members (Bond & Craps, 2020; Davis-Berman et al., 2018). Military veterans have often been routinely exposed to traumatic events throughout their service, which increases their likelihood of developing posttraumatic stress disorder (PTSD) (Vance & Howell, 2020). PTSD affects 9.2% of the Canadian general population (Centre for Addiction and Mental Health, n.d.), but for CAF veterans, that number increases to 24% (Sweet et al., 2020). In the U.S., 6% of the American population suffers from PTSD, while 7% of all U.S. veterans have the diagnosis (Schnurr, n.d.). Unfortunately, veterans with a diagnosis of PTSD face significant obstacles when trying to access effective therapeutic services, including long waitlists, complex servicerequesting systems, and discouragement through internal and external experiences of mental illness stigma (Greer & Vin-Raviv, 2019; Vogel & Wade, 2022). For those who successfully begin recommended therapies, treatment drop-out rates compromise the likelihood of veterans following their treatment plans through to completion (Myers et al., 2019). These barriers to accessing PTSD care and treatment plan completion can negatively impact an individual's quality of life, increase the likelihood of developing comorbid mental health conditions, and lead to a higher risk of suicide (Reisman, 2016; Wood et al., 2020). Therefore, there is still a

significant need for effective therapeutic services to help heal veterans with PTSD (Hawkins et al., 2016; Hundt et al., 2020).

Barriers to accessing care and seeing treatment plans through to completion reduce the effectiveness of evidence-based therapeutic approaches (Myers et al., 2019). As such, exploring alternative therapeutic approaches, such as nature-based therapy (NBT), can be essential in treating veterans with PTSD (Hawkins et al., 2016). NBT interventions have shown promising results as effective alternative treatments for PTSD. They offer significant symptom reductions (Stigsdotter et al., 2018) and can help veterans overcome the barriers that prevent many individuals from completing traditionally recommended PTSD treatment options (Harper & Dobud, 2021). Given that approximately half of the veterans who begin evidence-based psychotherapy treatment do not complete their treatment plans (Maguen et al., 2019; Myers et al., 2019), further investigation and implementation of NBT practices can provide veterans crucial support and improve their quality of life (Joshi & Goldman, 2019).

Purpose Statement

In this capstone paper, I thoroughly explore relevant literature on the needs of veterans with the diagnosis of PTSD, including the challenges facing this population in initiating and completing PTSD treatment (Greer & VinRaviv, 2019; Hundt et al., 2020). My overarching research question for the current capstone is: *Can nature-based therapy be considered a viable and effective treatment alternative to current evidence-based psychotherapy treatments for PTSD in veteran populations?* My approach to answering this research question is to explore the various factors that influence the development of PTSD in military veterans, examine current evidence-based recommendations, and review the available literature on NBT interventions with this population. As it stands, current evidence-based treatment is not universally effective for

veterans with PTSD (Hundt et al., 2020; Myers et al., 2019; Steenkamp et al., 2015; Wood et al., 2020), so I explore in this capstone paper how NBT practices may offer an effective alternative to first-line, empirically validated treatments.

Theoretical Model

In this capstone project, I use the dynamic biopsychosocial (dBPS) model to analyze the literature on nature-based therapy as an alternative treatment for veterans with a diagnosis of PTSD and to further critique biomedically-influenced evidence-based literature and wider notions of 'best practice' (Lehman et al., 2017). The dBPS model acknowledges the complex interplay between biological, psychological, and social factors in the development and treatment of PTSD in veteran populations (Lehman et al., 2017). By employing this model, this study examines the biological, psychological, and social mechanisms behind nature-based therapy, such as the impact of exposure to natural environments on the brain and physiological systems (Nagoski & Nagoski, 2020), the effect of nature-based approaches on perceived well-being (Furuyashiki et al., 2019; Ho et al., 2022), and the interpersonal benefits of NBT treatments (Joshi & Goldman, 2019), all while fostering a sense of connection to the natural world (Harper & Dobud, 2021). By utilizing the dBPS model, this capstone project aims to provide a comprehensive and holistic understanding of nature-based therapy as a treatment option for veterans with PTSD and contribute to the growing body of research that recognizes the importance of addressing mental health issues through a multidimensional lens rather than strictly medically-focused perspectives (Lehman et al., 2017).

Contribution to the Field

Since evidence-based treatment recommendations are not universally effective for veterans with the diagnosis of PTSD (Hundt et al., 2020), the findings of this study have the

potential to contribute to the field in several ways. First, this research will provide a complete understanding of the efficacy and feasibility of nature-based therapy as a viable alternative treatment option for veterans with PTSD (Harper & Dobud, 2021; Hawkins et al., 2016). Second, this study can inform the development of clinical practices and policies incorporating naturebased therapy into treatment plans for veterans with PTSD (Davis-Berman et al., 2018). Finally, this research can pave the way for future studies and investigations into NBTs as a viable treatment option for PTSD (Poulsen et al., 2018). By advancing the field's knowledge of effective and accessible approaches to mental illness treatment, this capstone project can ultimately enhance the quality of life for veterans and their families while promoting innovative approaches to mental health care.

Positionality Statement

I would like to first acknowledge that this paper was researched and written on the unceded territory of the Lekwungen/Songhees, WSÁNEĆ, and MÁLEXEŁ (Malahat) nations. I am a guest on Indigenous land that was taken without consent. Throughout my life, I have been privileged to have unrestricted and barrier-free access to this land, allowing me to form a deep and lasting connection to it. I routinely find healing in this land, especially during times of personal need. The personal recognition of my identity as an uninvited guest on Indigenous lands informs how I am learning to value multiple paths to healing and thriving, including those that recognize nature's therapeutic value; this recognition has informed my desire to seek alternative ways of healing.

The area of inquiry, the population, and the studied treatment modalities in this capstone project come from a deeply personal place. Being an able-bodied, middle-class, educated, cis Black male raised and living on Lekwungen/Songhees and WSÁNEĆ lands (colonially known as

Victoria, BC), the scope of my privilege is extensive. The intersectional identity I hold, though, is contextually mediated through positionality. This concept of 'identity-within-context' plays into my researcher position as a fluid spectrum of insider and outsider status (Milligan, 2016). In addition to the identities described above, my father is a Canadian Armed Forces (CAF) veteran with a history of physical health challenges and PTSD. Being the son of a man receiving Veterans Affairs Canada services, my life trajectory has been fully influenced by the direction of his life, both in and out of military service. I have watched his complex pathway to healing post-release, so I am personally invested in this capstone topic. As a 'military brat' who still enjoys the benefits of VAC services, I have an insider perspective of this population, despite not being a CAF veteran. In short, my vested interest in the healing of veterans comes from my family background.

My love for the outdoors and my desire to integrate nature-based therapies in my capstone come from a place of personal healing. After a life-altering event near the end of my bachelor's degree, I rediscovered the therapeutic nature of the outdoors. In recent years, I have learned to acknowledge the privilege of being immersed in nature by living on and having unrestricted access to this land colonially known as Vancouver Island. I work and volunteer at agencies that serve individuals and families in therapeutic and recreational outdoor settings. My interest in exploring the efficacy and viability of nature-based therapy for veterans with PTSD is motivated by a personal journey of nature's healing in my own life.

Definitions of Terms

Adventure Therapy: A nature-based therapy practice that is characterized by engagement in physical activities that are facilitated with therapeutic intent and by interventions that invite challenge and undetermined outcomes (Harper et al., 2019).

Biopsychosocial Model: A theoretical model initially proposed by Engel (1977) and extended by Lehman et al. (2017) that recognizes the importance of biological, psychological, and social factors in the health of individuals.

Ecotherapy: A nature-based therapy practice that upholds an ecosystemic perspective, asserting that humans are beings of nature and that a reciprocal relationship with the natural world increases psychological and environmental well-being (Doherty, 2016).

Evidence-Based Psychotherapy: Psychotherapy treatment approaches that have strong support in literature and are recommended for treating mental health disorders (Myers et al., 2019). *Nature*: The natural world which can be integrated into therapy as a setting, tool, or significant 'other' in the therapeutic process (Harper & Dobud, 2021).

Nature-Based Therapy: Therapeutic interventions formally and informally conducted that integrate four essential therapeutic factors: natural environment, challenge, role of nature, and expansiveness and interconnectedness (Naor & Mayseless, 2021).

Posttraumatic Stress Disorder: A chronic mental health disorder developed by individuals who experience forms of traumatization and are characterized by debilitating symptoms and significant impairments (Watkins et al., 2018).

Trauma: A belated response to an overwhelming event too distressing to be processed as it occurs (Bond & Craps, 2020).

Veteran: An individual who served in a formal military capacity as an enlisted member of the armed forces, such as the army, navy, or air force (Veterans Affairs Canada, n.d.).

Capstone Chapters Summary

In Chapter 2, I begin by outlining my use of the dynamic biopsychosocial model as a theoretical model underpinning my capstone project (Lehman et al., 2017), and I start the present

literature review by defining the concept of trauma and exploring the physiology of the human stress response cycle (Miller-Karas, 2015). I focus on the DSM-5-TR diagnosis of PTSD (APA, 2022) among North American military veterans, discuss the risks of comorbid diagnoses and high suicide rates, and examine the barriers to treatment completion identified in the literature (Myers et al., 2019; Reisman, 2016; Wood et al., 2020). In addition, I review current evidencebased PTSD treatment recommendations and highlight the need for alternative treatments, such as nature-based therapy (Hawkins et al., 2016). I then define two branches of NBT (adventure therapy and ecotherapy) and examine existing literature on NBT interventions' therapeutic impacts (Harper et al., 2019). Finally, I will discuss the limits of my theoretical model and some gaps identified in the literature (Cooley et al., 2020; Kinderman, 2019; Townsend et al., 2018).

In Chapter 3, I discuss the challenges of conducting empirically validated evidence-based research in the nature-based therapy (NBT) field (Gabrielsen et al., 2016) and critique the concept of 'best practice' in NBT literature, highlighting the limitations of relying solely on standardized empirical studies (Harper & Dobud, 2021; Ijaz et al., 2019). The chapter concludes with recommendations for future NBT research and emphasizes the value of contextually-aware interventions that acknowledge each person's unique needs (Gabrielsen et al., 2016).

Literature Review (Chapter 2)

Nature-based therapies offer an alternative approach to achieving therapeutic outcomes (Harper & Dobud, 2021; Hawkins et al., 2016) for a population with ever-increasing rates of need, as seen in service-request waitlists for services in the U.S. and Canada (U.S. Department of Veterans Affairs, 2023; Veterans Affairs Canada [VAC], 2022). In the following sections, I explain the dynamic biopsychosocial (dBPS) model (Lehman et al., 2017) and its application to this research. I explore the etiology and prevalence of PTSD in general and in veteran populations before exploring evidence-based psychotherapy treatments for the disorder. I then shift focus toward nature-based therapy (NBT) as an alternative PTSD treatment option, tracing the development of the NBT field and the use of adventure therapy and ecotherapy practices in the mental health field. Finally, a review is offered on the outcomes of veterans with PTSD in various therapy studies.

Theoretical Orientation: The Dynamic Biopsychosocial Model

In this literature review, I utilize the dynamic biopsychosocial model (Lehman et al., 2017); it is an extension of the original biopsychosocial (BPS) model, which George Engel first proposed in 1977 (Engel, 1977). The original BPS model was a challenge to predominant biomedical ideologies, instead offering a conceptualization of health and illness that recognizes the importance of biological, psychological, and social factors in determining an individual's health outcomes (Engel, 1977). It acknowledges that health and illness are not solely determined by biological factors but rather by the interplay between these three domains. Influential factors include genetics, lifestyle choices, environmental factors, psychological and emotional factors, social support, cultural and societal norms, and healthcare access (Engel, 1977).

Influenced by Bronfenbrenner's (1979) ecological systems theory, which proposes that an individual's development is influenced by multiple interacting systems, such as individual, family, community, and wider cultural contexts, Lehman et al. (2017) extend Engel's framework, creating the dBPS model. dBPS emphasizes the dynamic and interactive nature of the biopsychosocial factors in shaping an individual's health outcomes over time. This dynamic model recognizes that the impact of influential factors is constantly changing over time rather than being static entities impacting an individual (Lehman et al., 2017).

In this review, my analysis of the explored literature is informed by the dBPS model perspective. I utilize this model to conceptualize the influence of these interacting domains on the experience of veterans diagnosed with PTSD. In the following sections, I explore trauma's biological, psychological, and social aspects concerning diagnostic classifications of trauma and PTSD.

Defining Trauma

The concept of trauma has been well studied in literature, but no single definition of *trauma* is accepted in all therapeutic perspectives and cultural discourses (Bond & Craps, 2020). Bond and Craps offer a general description highlighting key factors across common understandings of the term *trauma*. They suggest that trauma is "a belated response to an overwhelming event too shattering to be processed as it occurs" (p. 4). It is not the injury, event, or moment itself that signifies trauma; it is how a person's perception of those events is repressed from conscious memory and results in distressing symptoms later, including "hallucinations, flashbacks, or nightmares" (p. 4). As such, a perception of fear, threat, or danger could be triggered by a certain event for one person, while another individual may not experience that same event as traumatic; therefore, these perceptions are unique to each individual (Miller-Karas, 2015).

Although one's cognitive appraisal of danger influences one's likelihood of traumatization (Tafet, 2022), children too young to verbally recount or articulate trauma events are susceptible to traumatization also (Kira et al., 2016). Kira et al. (2016) found that adversities at ages when memories are not fully formed can direct behaviour at later ages due to emotional impacts at unconscious and neurological levels. Responses to potentially traumatic events can lead to trauma but are not solely dependent on cognitive appraisal or articulation (Kira et al., 2016). This phenomenon was demonstrated in a study of sixty children who experienced a motor vehicle accident, all of whom were tested for pediatric PTSD; the nine children with PTSD symptomology beyond the six-month follow-up had elevated levels of plasma noradrenaline, a physiological marker of traumatic neurological effects (Pervanidou et al., 2007). Additionally, a research meta-analysis of pediatric PTSD and brain development found that children with pediatric PTSD show disrupted hippocampus development and reduced brain grey matter, contributing to impaired threat regulation and, consequently, traumatization (Herringa, 2017).

Traumatization can occur even when a traumatic event is not experienced firsthand (Bradford & Levin, 2020; Miller-Karas, 2015). *Vicarious trauma* describes the experience of people who experience trauma by witnessing the aftermath of a traumatic incident or by hearing stories, often in graphic detail, of the event (Miller-Karas, 2015). The literature infrequently discusses this phenomenon, compared to the experiences of trauma survivors (Barros et al., 2020), which is a common occurrence in helping professionals in the fields of counselling and emergency response (Miller-Karas, 2015). In an attempt to categorize different traumatic events as major or minor, Dr. Francine Shapiro suggests there are two types of trauma: "'large-T'... [and] 'small-t' trauma" (Shapiro, 1987; as cited in Miller-Karas, 2015, p. 2).

"Large-T' Trauma includes major events such as natural disasters, war, sexual assaults, child abuse, or acts of terrorism. Examples of 'small-t' trauma could be a dental procedure, a dog bite, a routine surgery, a fall, or a minor car accident" (p. 2).

Any distinction between a large-T and small-t trauma is culturally determined by societal narratives that dictate what is deemed a severe or minor traumatic event (Miller-Karas, 2015). Trauma can develop after any stressor from natural disasters to schoolyard bullying (Watkins et al., 2018).

Trauma Etiology and Severity

Trauma has been described in classification taxonomies, like the international classification of diseases (ICD; World Health Organization, 2019) and the diagnostic and statistical manual of mental disorders (DSM-5-TR; American Psychiatric Association, 2022). The DSM-5-TR defines PTSD as exposure to actual or threatened death, injury, or violence, intrusive symptoms, avoidance of related triggers, and negative changes in thoughts and feelings (APA, 2022). However, there are other ways to describe trauma, as evidenced in Kira's (2022) development-based trauma framework (DBTF). This conceptualization suggests that trauma occurs on a horizontal and vertical axis. The DBTF horizontal axis covers the varying forms of trauma, including but not limited to physical events, relational and identity-related incidents, and vicarious trauma experiences. The vertical axis is divided into trauma types, varying in levels of severity" (Kira, 2022):

- Type I includes individual events, such as a car accident;

- Type II are related events that have ended, including multiple incidents of sexual abuse;
- Type III are events that are happening and are ongoing, like discrimination (Kira, 2022;
 Kira et al., 2023).

As suggested in Kira's (2022) DBTF framework, Kira et al. (2023) assert that Type III traumas, which are continuous and may threaten individuals' and people groups' identities, have the greatest potential for compounding traumatization and leading to more complex, treatment-resistant forms of PTSD characterized by dissociation. For example, racism (Type III) can lead to gang violence (Type II) and individual incidents of physical assault (Type J). In other words, racism (often considered a cultural factor) encourages gang violence (interpersonal aggression), which leads to more incidents of assault, thereby exposing individuals to all three levels of trauma in a compounding experience of traumatization (Kira, 2022). In line with Kira's assertions that ongoing, multiple incidents of trauma increase trauma symptom severity, Kube et al. (2023) found a statistically significant link between multiple traumatic events and psychological consequences. Their study demonstrates how experiencing multiple traumatic events and more situations that have the potential to cause further trauma, thereby leading to more severe trauma symptoms (Kube et al., 2023).

The Physiology of Trauma

In the previous sections, the distressing results of trauma are highlighted primarily through a cognitive lens; the role of perception and cognition certainly should not be understated in the development of traumatization (Miller-Karas, 2015). Concurrently, trauma affects the biology of individuals as well by triggering individuals' biological stress responses (Nagoski & Nagoski, 2020). In the following sections, I briefly outline the physiology of the human stress response in relation to the human nervous system.

Stress versus Stressor

Stress is a change in one's physiology that happens following any demand, and this biological stress response is an evolutionarily adaptive strategy that helps humans cope with all kinds of demands (Miller-Karas, 2015; Nagoski & Nagoski, 2020). Tafet (2022) further differentiates between positively appraised and negatively perceived stress: positive *eustress* involves predictable and desirable experiences that are often limited in time and can fulfill one's expectations, while negative distress involves undesirable, uncontrollable threats imposed by external forces. A *stressor*, on the other hand, is a demanding event that triggers one's stress response (Nagoski & Nagoski, 2020). Stressors can trigger eustress or distress and may be external (i.e., witnessing a traumatic event) or internal (i.e., self-image issues or shame) (Nagoski & Nagoski, 2020).

The Stress Response Cycle

The human nervous system, which has a central and a peripheral branch, keeps people internally balanced when demanding stressors occur (Miller-Karas, 2015; Svorc, 2018). The autonomic nervous system (ANS), which is one function of the peripheral nervous system, regulates unconscious and automatic physiological processes that occur in the human body (including hormone secretion and internal organ functions) (Miller-Karas, 2015; Svorc, 2018). When an event is perceived as a threat, the sympathetic nervous system (SNS), one aspect of the ANS, prepares the body for 'fight or flight' by releasing stress hormones like adrenaline and cortisol into the bloodstream (Miller-Karas, 2015). After a distressing threat subsides, the parasympathetic nervous system (PSNS) slowly returns the activated body to a state of calm by enacting measures that conserve energy and restore balance (Miller-Karas, 2015; Svorc, 2018). Stress hormones will slowly leave the bloodstream while the PSNS decreases blood pressure, breathing speed, and perspiration, ultimately returning the body to the 'rest and digest' state (Miller-Karas, 2015). This SNS-activation and PSNS-deactivation cycle regulates the body's stress response in all kinds of stressful situations (Nagoski & Nagoski, 2020).

An Incomplete Stress Response Cycle

Although stressors do not guarantee traumatization, a single traumatic event can disrupt and overwhelm the stress response cycle, leading to traumatization and the development of a trauma- or stressor-related disorder (APA, 2022). In cases of trauma exposure, the SNS can become overactivated when a traumatic event generates distressing stimuli and perceptions (Tafet, 2022). If trauma stressors occur too frequently, the PSNS response cannot effectively calm the overactivated system to return it to baseline (Nagoski & Nagoski, 2020); this constitutes an incomplete stress response cycle. Without completing the sympathetic-parasympathetic stress cycle, adrenaline, cortisol, and other stress hormones will linger in the body, leading to long-term overactivation and an inability to rest and recover following traumatic events (Nagoski & Nagoski, 2020).

Diagnostic Categories of Trauma and Stress

In North America, mental health disorders are diagnosed using the DSM-5-TR (APA, 2022). Various trauma- and stressor-related disorders are defined and categorized to accurately differentiate between mental illnesses (APA, 2022). *Reactive attachment disorder*, typically diagnosed in children aged nine months to five years, is characterized by abnormal attachment behaviours that do not seek support from a caregiver or respond to care from an attachment figure (APA, 2022). Disinhibited social engagement, another disorder diagnosed in children, is

typified by inappropriately familiar behaviours with strangers that have persisted for over 12 months, like willingly leaving a caregiver's side in unfamiliar settings (APA, 2022). *Adjustment disorders*, diagnosed in adults, involve emotional and behavioural symptoms that can be related to a specific stressor and only persist beyond six months if the identified stressor is recurring or persistent (APA, 2022). Adjustment disorders can occur following any form of intense stressor, whereas *acute stress disorder* is characterized by threats of or exposure to death, serious injury, or sexual violence; at least nine forms of distressing symptoms must be present from the five categories of intrusion, negative mood, dissociation, avoidance, and arousal (APA, 2022). Symptomology must not exceed 31 days to warrant an acute stress disorder diagnosis. However, in cases where distressing symptoms persist beyond one month after the identified trauma event, a person's diagnosis is updated to *posttraumatic stress disorder* (APA, 2022), discussed in the following section.

Posttraumatic Stress Disorder

PTSD is a chronic mental health disorder developed by individuals who experience forms of traumatization and characterized by debilitating symptoms and significant impairments (APA, 2022; Watkins et al., 2018). Like acute stress disorder, PTSD symptomology develops after an individual has been exposed to "actual or threatened death, serious injury, or sexual violence" (APA, 2022, F43.10), and these trauma exposures can include direct experience, second-hand witnessing, recounted stories, and work-related electronic exposure. There is a wide array of symptoms associated with a PTSD diagnosis, such as distressing dreams or memories, dissociative flashbacks, and physiological reactions (APA, 2022). To satisfy DSM-5-TR criteria, at least one expression of the above symptoms must be present for longer than one month;

otherwise, acute stress disorder, which persists from three days up to one month following a traumatic event, is a more appropriate diagnosis (APA, 2022).

The DSM-5-TR asserts that in a diagnosable case of PTSD, distressing disturbances cannot be attributed to substance use or the physiological effects of alternative medical conditions (APA, 2022). When diagnosing PTSD, practitioners identify a primary trauma incident that corresponds to the individual's intrusive symptoms and avoidant behaviours (APA, 2022). The DSM-5-TR states that sexualized violence, torture, and other interpersonal acts are stressors that may contribute to especially severe and prolonged PTSD symptomology (APA, 2022; Goldstein et al., 2016). This was demonstrated in Parnell et al.'s (2018) study of activeduty military women who received PTSD treatment for military sexual trauma. Their study found that individuals with sexual trauma were more likely to require a disability evaluation and have more severe symptomology than those receiving treatment without having a history of sexual trauma. Another study examined the likelihood of PTSD symptomology in individuals who have been exposed to numerous traumatic events while living in particularly hazardous areas like warzones (Lancaster et al., 2016). The authors found it to be the perception of danger caused by warzone stressors, rather than mere exposure to warzone stressors, that increases the likelihood of PTSD (Lancaster et al., 2016).

Symptoms of PTSD

According to the DSM-5-TR, PTSD symptoms can refer to any combination of the following: intrusive memories of the traumatic event; distressing dreams related to the traumatic event; flashbacks or other dissociative reactions where one feels the traumatic incident is happening again; prolonged psychological distress after exposure to environmental cues related to the event; and physiological reactions to cues resembling an aspect of the event (APA, 2022).

Additionally, individuals with the diagnosis of PTSD often avoid stimuli or cues resembling an aspect of the traumatic event, all while experiencing a consequent decrease in mood after the incident. Flynn et al.'s (2022) study of alcohol cravings in military veterans receiving PTSD residential treatment demonstrated that avoidance symptoms lead to increased self-medicating behaviours, specifically with alcohol (a depressant drug) but not with stimulants; the authors suggest that this highlights veterans' desire to minimize an avoidant fear response. Memory disturbances are another symptom common to PTSD, about both past events as well as prospective, future-oriented intentions (Swain & Takarangi, 2021). Insomnia has been found to be a reliable predisposing factor for hypertension and troubled functioning in the cardiovascular system (Gaffey et al., 2020). Other symptoms include increased reactivity to environmental cues, unprovoked irritability and anger outbursts, sleep disturbances, and significant stress and impairment in social, professional, and personal areas of functioning (APA, 2022). Other studies have also demonstrated that for those with PTSD, common symptoms include hypervigilance, emotional reactivity, and intrusive thoughts can all be precursors in the development of psychotic symptoms (Hardy et al., 2021; Jin et al., 2022).

Symptoms of PTSD also affect individuals' interpersonal lives: Straud et al. (2022) report that 84.7% of the active service members and veterans with PTSD participating in their study reported using psychological aggression with their partners on a weekly basis, while 11.4% of respondents reported weekly incidents of physical aggression. More broadly, impairment in social functioning has also been strongly associated with the diagnosis, extending the problem for veterans and other traumatized individuals beyond just familial and intimate relationships (Greer & Vin-Raviv, 2019).

Prevalence of PTSD in the General Population

PTSD symptomology can develop for anyone exposed to trauma, and 70% of the general population across 24 nations has been exposed to a traumatic event in their lifetime (Benjet et al., 2016). For Canadian and American populations specifically, 64% and 71% (respectively) have reported at least one instance of trauma exposure (Benjet et al., 2016; Statistics Canada, 2022), and the number of respondents who had reportedly experienced more than four traumatic events was 31% (Benjet et al., 2016). Although many people experience traumatic events and have little or no lasting symptoms, some individuals exposed to trauma will develop symptomology that constitutes a PTSD diagnosis (Watkins et al., 2018). The Centre for Addiction and Mental Health ([CAMH]; n.d.) states that 9.2% of Canadians will develop PTSD in their lifetime, and for the American population, recent research outcomes have reported prevalence rates between 6.1% - 8.3% (APA, 2022; Goldstein et al., 2016).

Intersectional Identities

The intersection of culture and ethnicity further informs PTSD prevalence rates (Patil et al., 2018). The DSM-5-TR highlights Latinx, African American, and Native American populations as having higher rates of PTSD than Whites (APA, 2022). The severity of trauma symptoms can compound for members of different ethnic groups based on the accumulative effects of their social identities (Patil et al., 2018). For example, one individual experiencing discrimination based on both their race and class may experience more severe mental illness outcomes than an individual experiencing discrimination based on only one of those categories (McClendon et al., 2021). Intersectional identities have unique effects on PTSD symptomology that are not so easily generalized, however; McClendon et al.'s (2021) study found that gender differences in Black veterans affected PTSD severity, while White and Latinx veterans did not

exhibit similar differences. The authors concluded that to more precisely understand the impact of discriminatory stress on PTSD severity, the intersection of race/ethnicity and gender together was necessary instead of considering these factors alone (McClendon et al., 2021).

The intersection of gender identity similarly influences prevalence rates of PTSD; the female gender correlates with rates of PTSD double those of their male counterparts (Brunet et al., 2015; Letica-Crepulja et al., 2020; van den Berg et al., 2017). The DSM-5-TR suggests this may be due to the higher likelihood of a female experiencing a traumatic event such as sexual assault and other forms of interpersonal violence (APA, 2022). Research shows that women of Afro-Caribbean, African-American, and White backgrounds had higher odds of developing PTSD than men of these identities, but these gender differences have not been observed for Latinx or Asian individuals (Valentine et al., 2019).

Diagnosis of PTSD Amongst Veterans

People of every gender, age, and background can experience trauma, so it is no surprise that PTSD affects millions of North Americans every year (Davis-Berman et al., 2018). Military veterans, though, have an even greater risk of suffering from PTSD than the general population (Kaplan et al., 2017; Reisman, 2016). It is commonplace for military service members to be required to remain in states of vigilance and arousal for extended periods of time (Bettmann et al., 2020). Because of the traumatic nature of prolonged combat exposure, it is no surprise that "the origins of the PTSD diagnosis are inextricably connected with the lives of American veterans of the Vietnam War... and later as patients of the Veterans Administration Medical System" (Bond & Craps, 2020, p. 34).

Prevalence of PTSD in Veterans

American Veterans

The U.S. Veterans Administration views PTSD as a significant problem: at least two million U.S. veterans have PTSD (Davis-Berman et al., 2018). Roughly 30% of veterans from the Vietnam War have PTSD, and Operations Iraqi Freedom and Enduring Freedom active personnel are diagnosed at a rate between 11% – 20% annually. After only 30 days of deployment, 138,000 US service members were diagnosed with PTSD in 2015 (Greer & Vin-Raviv, 2019), and Reisman (2016) estimated that in the prior 13 years, about 500,000 US troops received a PTSD diagnosis.

Canadian Veterans

Canadian veterans experience PTSD at similar rates to their American counterparts; findings from the 2019 *Life After Service Studies* survey indicate that about 640,000 former Canadian Armed Forces (CAF) members live in Canada, and 24% reported having PTSD (Sweet et al., 2020). Specifically, CAF veterans who left military service between 2015 – 2018 showed higher rates of PTSD, depression, and anxiety than veterans released prior to 2015, and all CAF veterans reported higher prevalence rates than non-veteran Canadians of comparable age and sex (Sweet et al., 2020). In Brunet et al.'s (2015) survey of over 9,000 full-time service members and reservists in the Canadian Armed Forces (CAF), 6.6% of the total sample reported a PTSD diagnosis, with the percentage increasing to 7.7% when subtracting participants who had reported zero incidents of trauma exposure. With regard to sex, the likelihood of female CAF troops developing PTSD was double that of their male counterparts (Brunet, 2015; Sweet et al., 2020). Other risk factors in the development of veteran PTSD include being younger when exposed to trauma, having lower socioeconomic status, being a racial minority, completing a higher number of deployments, releasing at a lower military rank, and lacking familial and social support networks (Reisman, 2016; Sweet et al., 2020).

Comorbid Disorders

As discussed above, traumatic event exposure can lead to the development of PTSD in general and veteran populations, but for many people with this diagnosis, other mental illnesses will develop into co-occurring, comorbid disorders (APA, 2022; Hassan et al., 2017; McMillan et al., 2017; Pagel, 2021; Rytwinski et al., 2013; Swart et al., 2020). For instance, a study of comorbid PTSD and substance use disorder (SUD) found that 46.4% of people with PTSD meet the diagnostic criteria for SUD (Pagel, 2021); the same study also found that 22.3% of respondents could be diagnosed with substance dependence disorder. Social anxiety disorder (SAD) has also been found to co-occur with PTSD, with one study concluding that from their representative sample of over 30,000 respondents, about 1,700 people had PTSD, and 13% of those with PTSD had comorbid SAD (McMillan et al., 2017). In another study, this time focusing on personality and dissociative disorders for people with PTSD, Swart et al. (2020) found that 88% of respondents had a comorbid personality disorder, and 27% had a dissociative disorder.

While many studies examine PTSD comorbidities in the general population (McMillan et al., 2017; Pagel, 2021), some research has explored comorbidity rates for military veterans and active service members specifically (Vujanovic & Back, 2019; Wanklyn et al., 2016). Major depressive disorder (MDD) has been identified as a highly comorbid mental disorder for both populations, with rates consistently reported at approximately 50% for the general public (Rytwinski et al., 2013) and military veterans (Wanklyn et al., 2016). Contrastingly, in a study comparing veteran and general public PTSD comorbidity rates, 52% of veterans with PTSD were

found to have a co-occurring substance use disorder (SUD) compared to the 35% of the general public diagnosed with PTSD and comorbid SUD (Vujanovic & Back, 2019). These findings enforce the DSM-5-TR claim that SUDs, SAD, MDD, and personality disorders are all commonly occurring comorbid disorders for those with the diagnosis of PTSD (APA, 2022), so practitioners should consider the possibility that individuals seeking PTSD treatment may have multiple diagnoses in need of clinical attention (Swart et al., 2020).

Veteran Suicide Rates

For veterans diagnosed with PTSD, the reality of high rates of suicide attempts and completions is a serious public health concern (Simkus et al., 2019; Wood et al., 2020). Canadian studies report higher rates of suicide for veteran populations than for the Canadian general population, with male veterans overall having a 1.4 times higher risk of death by suicide than the general public (that rate jumps to 2.5 times as likely for male veterans under 25 years of age) (Simkus et al., 2019). For male veterans with active duty experience, 32.1/100,000 veterans will die by suicide compared to 20.9 individuals in the general population (Pagel, 2021). For female veterans, regardless of age, the rate remains consistent at 1.9 times higher than the general population's risk of dying by suicide (Simkus et al., 2019). Within the Canadian veteran population, the 2019 *Life After Service Studies* (LASS) report (Sweet et al., 2020) found that in the three-year period since the 2016 LASS edition, CAF veteran suicide rates increased from 21.7% to 26.2% for males, and from 23.9% to 28.6% for female veterans.

The presence of a PTSD diagnosis is already strongly associated with suicide in veterans of combat circumstances (Pagel, 2021), yet comorbid disorders further increase the risk of suicide for people with preexisting PTSD (McMillan et al., 2017). McMillan et al. (2017) found that while 13% of people with a sole diagnosis of PTSD reported a previous suicide attempt, the

rate dramatically increased by 3.37 times for individuals with co-occurring PTSD and SAD; in other words, more than 1 in 3 individuals with PTSD and SAD were found to have attempted suicide in the past. Certainly, the need for PTSD treatment and suicide intervention for veteran populations is well supported in the literature.

Barriers to Treatment Initiation

Treatment Access

Despite the significant prevalence of and risks associated with PTSD for veteran populations, barriers to treatment exist on systemic and individual levels (Greer & Vin-Raviv, 2019). In the United States, the 2014 Veterans Access, Choice and Accountability Act was passed following media coverage of excessive waitlist lengths for and subsequent deaths of veterans awaiting care (Jones et al., 2021). One beneficial outcome of this legislation was the increased use of community care options for veterans, purchased by U.S. Veterans Affairs to supplement their own governmental provision options (U.S. Government Accountability Office, 2019). These efforts aimed to counteract the lengthy U.S. waitlists for veterans requesting service and have successfully increased service provisions, although waitlist lengths continue to increase annually (Vance & Howell, 2020).

Meanwhile, in Canada, the National Association of Federal Retirees (NAFR) (NAFR 2020) offers governmental recommendations to support Canadian veterans. On the topic of gender recommendations, the current veteran systems are characterized by systemic biases and a general gender-blind attitude toward all service members (Eichler, 2016). Serving women are injured and medically released at rates higher than men (MacLean, 2018), but a plan to ensure equitable veteran benefits and care for women has not been enacted by the Government of Canada as of yet (NAFR, 2020). The NAFR (2020) also suggest that instead of having ill or

injured veterans navigate "32 separate policies and 28 distinct eligibility groups" (p. 4) to qualify for services, a simplified, needs-based program accessible to veterans and their families is required.

There are also diagnostic barriers to treatment. Historically, diagnostic categorizations for PTSD have been revised to reduce omissions of legitimate PTSD cases (Watkins et al., 2018). One specific example is how DSM versions before the fifth edition defined a "traumatic stressor" as an event "outside the range of usual human experience" (p. 2). This, the authors explain, was problematic because traumatic events deemed too frequent or commonly occurring were omitted. Predating the acceptance of PTSD into the DSM, veterans with psychological problems had limited support, often opting to self-medicate instead (Bond & Craps, 2020).

More recently, the U.S. Department of Veterans Affairs loosened diagnostic requirements, thereby increasing the likelihood of veterans successfully qualifying for a PTSD diagnosis and disability compensation (Vance & Howell, 2020). Systemic barriers to service access for veterans with PTSD and other operational stress injuries (OSIs) have loosened, increasing the likelihood of successful service provisions, yet an even greater need for services has led to a 50% increase in service waitlist lengths overall (Davis-Berman et al., 2018). In reports that led to the Veterans Access, Choice and Accountability Act being passed in 2014, of the 847,000 U.S. veterans who applied for healthcare services, 238,000 (28%) died before receiving services (Davis-Berman et al., 2018). As opposed to veteran services in Canada, where serving CAF members, Royal Canadian Mounted Police, and veterans are all eligible for VAC services, active military members in the U.S. struggling with PTSD are not eligible to receive any treatment through the U.S. Department of Veterans Affairs before discharge from active service (U.S. Department of Veterans Affairs, 2023; Veterans Affairs Canada, n.d.); this is a significant barrier to PTSD treatment access for American military members that Canadians do not experience.

The Impact of Stigma

Another challenge facing people diagnosed with PTSD is mental illness *stigma*, the stereotypes and prejudice experienced and felt by people with mental illness from external sources and internal beliefs (Vogel & Wade, 2022). For many people with diagnosed mental illnesses, stigma is a powerful treatment deterrent that can influence individuals' choice to avoid environments where they may be identifiable as a person with a psychiatric diagnosis (Vogel & Wade, 2022). For veterans, even when access to veteran services is a possibility, the stigma surrounding mental health treatment is often a significant deterrent (Bettmann et al., 2022a). Bettmann et al. (2022a) identify three mental health treatment stigma categories in veteran populations: self-stigma, public stigma, and career-related negative consequences. Veterans' negative attitudes toward mental health treatment and internalized beliefs about its ineffectiveness for themselves constitute perceptions that deter personal enrollment in available PTSD services (Littman et al., 2021). Military culture champions "courage, strength, resiliency, personal sacrifice, mental toughness, and high stress tolerance" (Bettmann et al., 2020, p. 277), but receiving mental health treatment equates to weakness. Some military members taking sick leave for their PTSD symptoms believe that they are viewed by others as if they fake their symptoms and are not legitimately sick (Poulsen et al., 2018).

Secondly, the concept of public judgement and labeling is another deterrent to veterans' treatment access; literature has extensively explored the messages contributing to these social beliefs. Mittal et al.'s (2013) qualitative study illuminated public stereotypes associated with PTSD-diagnosed veterans. Commonly-reported PTSD stereotypes include "dangerous and

violent," "crazy," "numb," "shell-shocked," "cold-hearted," "unfit to raise your kids," "unreliable," "distant," "robot," "unstable," "on guard," and "pissed off at world" (p. 90). Mittal et al.'s participants also reported believing that society holds them responsible for choosing to join the military, thereby blaming them for causing their own illness. These perceptions are perpetuated even in their own homes, with family members being another identified source of social stigma (Mittal et al., 2013). Regarding veterans' anticipated career-related negative consequences, internalized beliefs that "I am crazy" and "I am a danger to others" (Coleman et al., 2017, p. 1886) were common. Additionally, active service members with PTSD feared that changes and interruptions of their regular duties would be seen as proof of a mental health difficulty, with officers feeling questioned about their leadership abilities and lower-ranking units being deemed non-deployable (Coleman et al., 2017). Participants believed that peers and higher-ranked members who were responsible for advancing participants' careers saw them as weak because they needed psychotherapy for their mental illness (Bettmann et al., 2022a). These beliefs undermine peer confidence and reinforce the mental illness label while detracting from career advancement. Despite the negative impact of mental health stigma on veterans with PTSD, evidence-based psychotherapy (EBP) remains the most recommended intervention strategy for people with this mental health diagnosis.

Evidence-Based Psychotherapy for PTSD

Evidence-based psychotherapy (EBP) is the most commonly recommended intervention strategy for individuals with the diagnosis of PTSD (Derrien et al., 2020). To ensure best practice, recommendations fielded by various practice guidelines consistently point towards modalities that have been empirically validated (International Society for Traumatic Stress Studies [ISTSS], n.d.; VA/DoD Clinical Practice Guideline Working Group, 2017). Psychotherapeutic treatment recommendations include prolonged exposure therapy (PE), cognitive processing therapy (CPT), eye-movement desensitization reprocessing (EMDR), and other generalized psychotherapies (Bisson et al., 2020; Cook et al., 2019; NICE, 2018; Watkins et al., 2018).

Prolonged Exposure Therapy

Multiple PTSD treatment guidelines have strongly recommended prolonged exposure therapy (PE) for treating PTSD symptomology (ISTSS, n.d.). PE is one EBP that is highly recommended by the American Psychological Association and the Veterans Health Administration and Department of Defense (VA/DoD Clinical Practice Guideline Working Group, 2017). The fundamental belief underlying PE is that trauma is not processed emotionally at the time of the event, so participating clients receive a combination of psychoeducation, various forms of exposure, and breath training over the course of PE treatment (Foa et al., 2007). Randomized trial results have demonstrated higher efficacy of PE in PTSD symptom reduction compared to supportive counselling and relaxation training (Foa et al., 2007). In a study comparing PE efficacy to that of a pharmaceutical treatment, a diagnosis of PTSD was only sustained in 29% of respondents post-treatment, and the 2-year follow-up assessment highlighted a slight increase of reported benefits beyond the post-treatment 71% efficacy rate (Zoellner et al., 2019). Rauch et al. (2021) assert that PE is a significantly effective intervention for PTSD, yet concede that there are high client drop-out rates due to intense trauma-focused sessions.

Cognitive Processing Therapy

CPT, another EBP recommended in multiple guidelines (ISTSS, n.d.; VA/DoD Clinical Practice Guideline Working Group, 2017), is a trauma-focused therapy that postulates survivors of traumatic events have distorted cognitions about the world, other people, and themselves (Resick et al., 2017). Through processes called *assimilation* and *over-accommodation*, individuals create maladaptive beliefs after an incident of trauma in an attempt to make sense of transpired events and to avoid future traumatization (Resick et al., 2017). The aim of CPT is to correct faulty thinking by shifting beliefs towards *accommodation*, the process by which maladaptive beliefs are altered enough that newer, more adaptive beliefs can be learned (Resick et al., 2017). In a study of adolescents and adults receiving CPT and measuring for PTSD and depression score reductions, LoSavio et al. (2021) noted that participants experienced an average reduction of 3.27 points per completed session. Since the average number of sessions attended by participants who completed treatment was 11.4, their study found that individuals who completed CPT therapy had an average reduction of 74% of symptoms (LoSavio et al., 2021).

Eye Movement Desensitization and Reprocessing Therapy

Eye movement desensitization and reprocessing therapy (EMDR), an evidence-based psychotherapy strongly recommended in the ISTSS (n.d.), is a treatment approach that aims to reprocess traumatic memories inadequately stored in the brain (Wilson et al., 2018). The primary goal of EMDR is to process trauma memories in order to facilitate the correction of distorted thoughts and maladaptive behaviours (Gallagher et al., 2016). EMDR has been extensively researched and empirically validated in Eastern and Western countries, where it has been found to be effective in treating PTSD symptomology, depression, and anxiety, which affirms its validity in varying cultural contexts (Wilson et al., 2018). Low reported drop-out rates compared to PE indicate that EMDR is a more tolerable form of therapy (Hurley, 2018; Wilson et al., 2018). In their comparative study of intensive daily EMDR versus weekly EMDR for veterans, Hurley (2018) found that both formats were equally effective, maintaining high completion rates and offering significant symptom reductions that were sustained at 1-year follow-up (mean

reduction of 35.8 points for daily EMDRA, 35.7 for weekly EMDR, as reported using the Impact of Events Scale-Revised [IES-R]). Meta-analyses of EMDR literature, however, highlight that EMDR systematic reviews have inadequately followed process guidelines to ensure high-quality efficacy reviews, which undermines the reliability of positive EMDR evidence (Opheim et al., 2019).

Non-Trauma-Focused Treatment Modalities

Psychotherapy modalities that do not focus directly on trauma cognitions can also be beneficial in treating PTSD symptoms, albeit with lower reductions in overall symptomology (Watkins et al., 2018). Treatment modalities classified as 'trauma-focused' directly explore with clients the memories and perceptions of their significant trauma incidents, while general modalities aim to alleviate PTSD symptoms without explicitly addressing trauma. As such, EBP recommendations exist for psychotherapy treatments without a trauma focus, although current research strongly recommends trauma-focused approaches as first-line treatments (ISTSS, n.d.; VA/DoD Clinical Practice Guideline Working Group, 2017). The ISTSS offers a list of twenty acceptable non-trauma-focused interventions, which include CBT, mindfulness-based stress reduction (MBSR), somatic experiencing, supportive counselling, and more (ISTSS, n.d.). Watkins et al. (2018) similarly identified relaxation training and interpersonal therapy as other non-trauma-focused intervention strategies for professional consideration.

One randomized controlled trial studied the difference in self-reported and clinicianreported efficacy of PE and relaxation training for veterans with PTSD (Thorp et al., 2019). Findings suggest that both PE and relaxation training offered participants improvement in their symptomology, with moderate benefits for relaxation training and large benefits for PE. Both treatments offered effective symptom reduction, but PE showed greater and longer-lasting

35

benefits (Thorp et al., 2019). Consistent with current best-practice guidelines, these findings suggest that non-trauma-focused psychotherapies should remain a secondary treatment recommendation in the treatment of PTSD symptomology.

Treatment Drop-Out Rates

Even when veterans successfully initiate PTSD treatment, subsequent drop-out rates significantly diminish the effect of provided services (Bettmann et al., 2022b; Myers et al., 2019). Imel et al. (2013) conducted a meta-analysis of dropout rates in trauma-focused, non-trauma-focused, and trauma-avoidant psychotherapies. PTSD treatment drop-out rate estimates of trauma-focused treatments (PE and CPT specifically) were reported at 36%; comparatively, trauma-avoidant treatments showed 22% of participants dropped out. In line with Watkins et al.'s (2018) evaluation of these rates, it is a "substantial minority of individuals [who] drop out of PTSD treatment" (p. 5). Bowersox et al. (2013) and Hamilton et al. (2013) report that treatment attrition is most common in younger veterans who express fear of stigmatization (as cited in Bettmann et al., 2020). Additionally, avoidance is a hallmark of PTSD, which itself can sustain PTSD by contributing to veterans' tendency to drop out of psychotherapy services, especially those that directly focus on trauma (Bettmann et al., 2020). One study of 265,566 American veterans showed that in a three-year period, 22.8% completed at least a first session of CPT or PE, and only 9.1% completed treatment (Maguen et al., 2019).

In a study of 311 veterans referred to an evidence-based psychotherapy (EBP) such as prolonged exposure therapy or cognitive processing therapy, 82 individuals initiated at least one session of recommended EBP (Myers et al., 2019). Myers et al. extend the preceding literature by redefining PTSD *treatment completion* as the presence of a clinician letter of psychotherapy termination (which was not dependent on the number of sessions completed). Alternatively,
previous studies' definitions of treatment completion have been determined by the completion of a set number of sessions, which is not an accurate measure of true treatment completers (Szafranski, Smith, Gros, & Resick, 2017). Of the 82 veterans who initiated an EBP as recommended, about half (38 individuals) completed treatment (Myers et al., 2019).

Hundt et al. (2020) interviewed 28 veterans who dropped out of PE or CPT to qualitatively analyze their reasons for EBP non-completion. Of the interviewed respondents, 57% cited practical reasons for non-completion (i.e., scheduling challenges, family obligations); 32% claimed that the trauma-focused EBP was too stressful (i.e., not having confidence that they could overcome the emotional challenge of focusing on trauma); and 50% did not 'buy in' to the process (i.e., preferring a present-focused modality, objecting to CPT homework) (Hundt et al., 2020).

The problem with high drop-out rates is that fewer veterans referred to EBPs experience significant symptom reductions (Myers et al., 2019). Veterans who successfully complete treatment, however, report substantial decreases in PTSD symptomology (Myers et al., 2019). This is problematic because higher rates of PTSD symptomology in veterans correlate with higher risks of hospitalization and death (Trivedi et al., 2015).

The Use of Alternative Treatments for PTSD in Veterans

As explored in previous sections, there are specific therapeutic approaches that have been extensively researched and empirically validated for PTSD treatment; literature has provided evidence that PE, CPT, and EMDR are effective first-line treatments for PTSD (NICE, 2018; ISTSS, n.d.). Despite the recommended use of these EBPs, there remain high percentages of veterans referred to EBP PTSD treatments who retain their PTSD diagnosis post-treatment (60–72%; Steenkamp et al., 2015), more who choose never to initiate psychotherapy services at all

(74%; Myers et al., 2019), and others still who begin but do not see through their treatment to completion (54%; Myers et al., 2019). Treatment barriers such as mental illness stigma (Vogel & Wade, 2022), over-activation during trauma-focused treatments leading to early treatment termination (Imel et al., 2013), and more contribute to low treatment completion rates (Bettmann et al., 2020; Myers et al., 2019). In response to these ongoing challenges for veterans diagnosed with PTSD, practitioners have turned to alternative therapy modalities to supplement EBP PTSD treatments (Harper & Dobud, 2021; Hawkins et al., 2016); nature-based therapy constitutes one such category of alternative PTSD treatment.

Inconsistent Understandings of Nature-Based Approaches

Understandings of the human-nature connection are not new to the therapeutic milieu, with theorists like Wilson (1984) asserting the fundamental relationship between humans and nature 40 years ago, while Indigenous peoples have lived in intimate connection with the land and water since the time of creation (Claxton, 2021). Nature is fundamental to the human experience, but its application in therapy has been conceptualized in countless ways; to this day, nature-based therapy (NBT) literature is vastly inconsistent due to the varying definitions and practices of NBT used around the globe (Harper et al., 2019). Researchers studying different variations of NBT have cited theories of change dating back to the '90s to conceptualize their findings (Kotera et al., 2022; Palsdottir et al., 2023). Before exploring different practices of NBT, the following sections describe the intricacies of the NBT field by highlighting two dated theoretical perspectives commonly referenced in NBT literature to this day (Bettmann et al., 2021; Kotera et al., 2022; Palsdottir et al., 2023).

Understanding Models of Change

Stress Reduction Theory

Stress reduction theory (SRT; Ulrich et al., 1991) is one model of change that has offered a conceptual framework to understand results from recent studies of NBT efficacy (Bettmann et al., 2021; Kotera et al., 2022). SRT takes an evolutionary stance on the restorative properties of nature; according to SRT, the human brain evolved while immersed in the natural world, so processing natural stimuli puts less strain on the human brain than does more urban, man-made environments, like cities and indoor spaces (Ulrich et al., 1991). Stress recovery demands mental attention, so the process of recovering from stressful situations is not as effective in urban environments. Therefore, SRT posits natural settings are more effective in stress reduction and recovery than man-made settings; this supports NBT practices' valuation of outdoor settings in treatment. Ulrich et al. (1991) measured both the presence of parasympathetic responses in study participants who were exposed to natural settings as well as the absence of those responses when participants were exposed to urban settings. In Kotera et al.'s (2022) systematic review of NBT efficacy, which specifically focused on forest bathing practices of mindful breathing, walking, and yoga, physiological markers of stress reduction (heart rate and blood pressure) were reduced through the practices of forest bathing. These findings support the SRT assertion that natural, nonthreatening stimuli reduce stress.

Attention Restoration Theory

Another model of change that has been cited in NBT efficacy studies (Bettmann et al., 2021; Palsdottir et al., 2023) is *attention restoration theory* (ART; Kaplan, 1995). ART proposes that human attention fatigues over time as people direct their focus toward necessary tasks while shutting out unnecessary or distracting stimuli (Kaplan, 1995). This 'directed attention fatigue'

leaves people vulnerable to stress, but the natural world offers the opportunity for 'soft fascination,' which aids people in regaining the ability to give their attention to necessary stimuli (Kaplan, 1995). ART has been cited as a theoretical framework in various NBT studies and approaches over the years (Bettmann et al., 2021; Harper & Dobud, 2021; Hawkins et al., 2016). For example, in a recent study of nature-based interventions for anxious college students, Palsdottir et al. (2023) developed a nature-based psychoeducational intervention group that utilized core components of ART and mindfulness practices in order to reduce anxiety symptoms and improve mindfulness. Their study argues the importance of restorative soft attention for mental health benefits, which is a key concept in ART (Kaplan, 1995).

Unifying Considerations of NBT

While models of change like SRT and ART offer conceptual frameworks that inform some NBT studies, few theories encapsulate how the vast array of NBT practices bring about effective change. Naor and Mayseless (2021), however, take a different approach to conceptualize NBT practices at large. Using a qualitative study utilizing grounded theory methodology to synthesize a unifying theory of the therapeutic factors in NBT practices, they arrived at four distinct factors essential to the NBT field.

First, they theorized that the *natural environment* could be understood as a "unique therapeutic setting" (p. 581), embodying a growth orientation, a non-judgmental presence, and a portrayal of wholeness. The 'aliveness' present in the cyclicality of nature encourages growth in clients, while the unconditional acceptance of the environment towards peoples' self-expression contributes to feeling whole and integrated. Second, *challenge* refers to the way NBT interventions challenge, confront, and question the limiting perceptions individuals have. Amidst challenge and perceived risk, NBT practices promote growth through the discovery of personal

strengths and the creation of widened beliefs. Third, the influential *role of nature* in NBT practices speaks to the active involvement of the natural environment in individuals' therapeutic journey; examples include in-the-moment situations during outdoor therapies that reflect aspects of self, encourage attunement to patterns in the environment, and promote growth through symbolic and concrete interactions (Naor & Mayseless, 2021). Finally, an *expansiveness and interconnectedness* experienced through nature consider the way NBTs expand perspectives of life and encourage an ecological sense of belonging. This occurs through experiencing one's personal issues in relation to the immensity of the natural environment, sometimes understood as seeing 'the bigger picture.' This sense of belonging and purpose, Naor and Mayseless claim, is foundational to mental health.

These four essential factors (*natural environment*, *challenge*, *role of nature*, and *expansiveness and interconnectedness*), distilled through qualitative grounded theory, provide a conceptual framework for the vast array of NBT practices represented across Naor and Mayseless' (2021) study. This theory of NBT practice unifies understandings of NBT, which may serve to guide future research efforts towards a consistently-defined field. The following sections explore two main branches of NBT practice: adventure therapy and ecotherapy (Harper et al., 2019).

Nature-Based Therapy Interventions

Adventure Therapy

Adventure therapy (AT) is an NBT practice that has historically encompassed recreation therapy, wilderness therapy, outdoor play therapy, and more. Gass et al. (2020) define AT as "the prescriptive use of adventure experiences provided by mental health professionals, often conducted in natural settings that kinesthetically engage clients on cognitive, affective, and behavioral levels" (p. 1). In contrast, others describe therapeutic adventure and recreation as beneficial in the absence of trained clinicians (Harper & Dobud, 2021). The AT approach, therefore, is characterized by engagement in physical activities that are facilitated with therapeutic intent and by interventions that invite challenge and undetermined outcomes (Harper et al., 2019). AT activities can be both a supportive factor in the process of therapy, or they can *be* the 'therapy,' depending on the practitioner, client, and therapy goals (Harper et al., 2019). AT can be both individual-focused and group-based, so the approach also considers the value of social connection and ecological experiences as central to the therapy process (Gass et al., 2020). When AT is facilitated in group-based settings, like hiking, river rafting, camping, canoeing, and more (Bettmann et al., 2020), the needs of every participating individual are considered in order to ensure safety for everyone; this is important because AT interventions can range from lowchallenge and low-risk to high-challenge and high-risk (Gass et al., 2020). Other central tenets of AT include experiential learning, connection to place and location, psychosocial learning, and "an alternative entrance to awareness" (Harper et al., 2019, p. 30).

Ecotherapy

Ecotherapy is another NBT practice that holds some similarities to AT, but it remains its own distinct NBT practice for a few key reasons (Doherty, 2016). While adventure therapies are often merely facilitated in outdoor locations, ecotherapy holds a wider perspective of nature-intherapy, postulating humans as beings of nature themselves, in relationship with the natural environment rather than merely *using* the environment as a means to heal (Clare & Tudor, 2023; Doherty, 2016). The introduction of this ecological perspective into the therapeutic space emphasizes healing as a reciprocal interaction of humans and the natural world, where nature is a valuable teacher, and practitioners recognize the immense therapeutic value of the interconnected, ecological environment (Clare & Tudor, 2023). Doherty (2016) asserts that an awareness and active strengthening of this reciprocity increases both psychological and environmental well-being. Similar to AT, ecotherapy is not one exclusive set of practice interventions; rather, ecotherapy is a collection of approaches underpinned by an ecopsychology perspective (Doherty, 2016). Some examples of ecotherapy in practice include horticultural therapy, which involves a relationship between the therapist, client, and the plants they tend (Harper et al., 2019), animal-assisted approaches such as equine therapy, and even walk-and-talk and outdoor play therapies (Walker et al., 2021). While ecotherapy has a strong theoretical basis, what ecotherapy lacks in its present stage are precise observations and interventions for practitioners to follow (Clare & Tudor, 2023).

Efficacy and Outcomes of Nature-Based Therapy

Researchers have explored the efficacy of ecotherapy and AT through various study methods. In recent years, NBT literature has explored this concept through the use of qualitative interviews (Furuyashiki et al., 2019) and quantitative randomized controlled trials (RCTs) (Ho et al., 2022). The following sections offer evidence of the effectiveness of NBT practices.

Nature's Therapeutic Impact on Various Populations

Richardson et al. (2021) study the predictive importance of five nature-factors on increased wellbeing for UK adults who experienced various forms of unfacilitated nature interactions: nature connectedness; time in nature; engagement with nature through simple activities; indirect engagement with nature; and knowledge and study of nature. The authors found that *nature connectedness* and *engagement through simple activities*, such as relaxing in a garden, smelling flowers, and collecting beach shells, was a greater predictor of increased wellbeing than other nature-factors, including *time in nature*. The way participants perceived

their connection to nature correlated with feelings of a 'worthwhile life' and 'less illbeing', while simple activity engagement was the greatest predictor of 'happiness' in the study (Richardson et al., 2021).

Stigsdotter et al.'s (2018) work compares the efficacy of a clinician-facilitated NBT and a validated trauma-focused CBT approach called StreSS. This RCT explored the relative benefit of these approaches for adult populations with stress illnesses, using CBT-trained psychologists in the trial and control groups. StreSS was administered as 1-hour sessions weekly, while the NBT approach in this study involved three weekly sessions of a CBT-based conversation with mindfulness-based stress reduction (MBSR) psychoeducation, paired with gardening activities and relaxation time. Participants in both groups received ten weeks of therapy, and the study found both treatments highly effective. No significant differences in primary or secondary outcomes are reported, leading the authors to assert that both interventions were equally efficacious, but only one is currently empirically validated. Causal factors could not be determined in their study.

In a study of forest bathing for Japanese adults with varying levels of depressive tendencies, Furuyashiki et al. (2019) study psychological and physiological indicators of treatment efficacy. In a guided intervention, participants slowly walked through the forest for a period of two hours while forest guides explained the natural environment, demonstrated breathing methods, taught yoga and mindfulness, and encouraged social interaction throughout the experience. The effects of this ecotherapy approach were measured pre- and postintervention, and the researchers found greater psychological benefits for participants with higher depressive tendency scores than those with lower scores. The authors reported significant improvements in mental health and insignificant changes in physiological indicators, suggesting that short-term benefits of the studied forest bathing practice were maximized in those with greater depressive tendencies and that treatment had insignificant physiological impacts.

Ho et al. (2022) conducted a study exploring the effect of active nature interactions on psychological functioning in Chinese working adults. This RCT involved an ecological, nonpsychotherapy intervention of 30-minute lunchbreaks spent walking slowly, photographing, sketching butterflies, drinking tea, observing birds, and napping in an Eco Garden; the control group was asked to remain indoors during lunchbreaks over the 10-day study period. These sensory activities correlated with stress recovery benefits, increased life satisfaction, and significant positive mental health increases; such changes were not observed in the control group. Treatment benefits did not last beyond the three-month follow-up, leading the authors to conclude that the mental health impacts of the measured intervention are immediate but diminishing long-term. They recommend sustaining nature-based practices long-term to offer lasting benefits.

Nature's Therapeutic Impact on Veterans with PTSD

Multiple studies explore the impact of NBT practices on veterans with PTSD (Bettmann et al., 2022a; Joshi & Goldman, 2019; Poulsen et al., 2018). In their study on nature exposure for veterans receiving an empirically validated PTSD psychotherapy, Bettmann et al. (2022a) administered pre- and post-intervention surveys for veterans participating in Sierra Club Military Outdoors programs. Specifically, clinicians administered CPT in the mornings, and outdoor recreation activities occurred in the afternoon for up to eleven consecutive days. PTSD symptomology was determined by the Posttraumatic Stress Disorder Checklist (PCL-5), and results from their study found the outdoor afternoons restorative and supportive. Each participant's individual increases of time outdoors correlated with lower PTSD symptomology on the following day. In other words, an individual who spent more time doing outdoor activities on Day 3 than on Day 2 of the study would report lower self-reported PTSD symptomology on Day 4 than they reported on Day 3. Additionally, spending more days in the program (11 consecutive days were the most; five was the least) correlated with a greater overall reduction of symptomology. Long-term PTSD symptom reductions were not maintained at three and sixmonth follow-ups. Bettmann et al. (2022a) conclude that veterans with PTSD could benefit from nature exposure through recreation in addition to traditional mental health treatments.

Joshi and Goldman (2019) studied an adventure therapy organization in Florida, USA, named "Swamp Apes" (SA), which offers outdoor programs to military veterans with histories of trauma and PTSD symptoms. SA programs include hiking, kayaking, and novel, challenging tasks in Everglades National Park, like trail-clearing and eradicating an invasive species of snake (the Burmese Python). The researchers administered a questionnaire and semi-structured interview to 10 'swamp apes' alumni, after which efficacy and program benefits were coded and synthesized to examine the legitimacy of SA as a template for future recreation therapy programs. Qualitative analysis of the interview results suggests the program offered many benefits to participants, including a meaningful place where one could escape life stressors, feel remote, and experience awe. Reductions in PTSD symptoms and increased quality of life were among the self-reported benefits of SA, and the authors suggest that future research should test SA for its impact on veterans' biopsychosocial functioning (Joshi & Goldman, 2019).

Poulsen et al. (2018) conducted qualitative research with eight Danish male veterans with PTSD who underwent ten weeks of ecotherapy in a therapy forest garden in Copenhagen. Participants completed three hours of therapy three times per week. In a semi-structured interview format, the researchers spoke with each participant four separate times: before, during, and twice after the NBT completion. Every participant reported positive impacts on bodily symptoms of PTSD, such as headaches, memory impairment, sleep disturbances, and sensitivity to sounds triggering memories of war; some experienced minor benefits, and others reported a complete absence of symptoms. Breathing techniques learned through NBT participation were found to be useful in daily activities like riding a crowded bus or grocery shopping, and the experience of building social connections with other veterans was invaluable to many of the participants. The authors highlight that participants' symptom changes happened at different rates, with some immediately and after the intervention had already ended (Poulsen et al., 2018).

Wheeler et al. (2020) designed and completed two experiments with different samples of veterans with PTSD. Their first experiment explores the effects of non-psychotherapeutic, peer group-based recreational activities. Thirty veterans (25 males, five females) with PTSD completed a one-day intervention of facilitated horseback riding, falconry, or angling (fishing). The results of the study indicated clinically significant changes in PTSD symptomology. In the two weeks post-intervention follow-up, 57% of the participants had clinically significant changes.

In a second experiment, Wheeler et al. (2020) conducted a waitlist RCT study offering an angling activity to a primary intervention group of 9 individuals and to the waitlist control group (who subsequently became a delayed second intervention group of 9 individuals). For the full sample of 18 participants across the initial and delayed intervention groups, 67% made reliable improvements, and 28% of the 18 were deemed clinically significant reduction of PTSD symptomology. These improvements were fully sustained until the 4-month follow-up interviews. Wheeler et al.'s (2020) findings in these two studies add to the growing literature

base of NBT efficacy by offering significant improvements through this recreation-centric AT in participants who had no current or prior history of psychotherapy.

In a systematic review of literature exploring NBT impacts on psycho-physiological stress recovery, Corazon et al. (2019) synthesize results from 36 studies, finding that across the included studies, there is substantial reported evidence of emotional change and stress recovery following NBT treatment. The authors also highlight that of the 36 included research studies, only three were randomized controlled trials. Although RCTs offer the most rigorous scientific validation, the vast majority of NBT literature involves non-randomized trials, and the authors did not want an incomplete summary of the findings across literature (Corazon et al., 2019).

Long-Term Clinical Benefits

There are gaps in NBT literature regarding the long-term clinical benefits of NBTs for treating PTSD (Bettmann et al., 2021; Bettmann et al., 2022a; Townsend et al., 2018). Studies of treatment efficacy for veterans with PTSD receiving AT or ecotherapy rarely report long-term findings, and those that do often describe long-term regression of PTSD symptomology benefits (Bettmann et al., 2021; Townsend et al., 2018). For example, Bettmann et al. (2021) reported short-term changes in symptomology but did not study long-term post-intervention follow-up; meanwhile, Bettmann et al. (2022a) did report on long-term findings but found treatment benefits to be short-lived. Townsend et al. (2018) produced a quantitative study of the benefits of a week-long family recreation AT retreat for injured veterans. Although they found immediate short-term benefits in reducing symptoms of PTSD that were sustained for their participants at 3- and 6-month follow-ups, benefits beyond the 6-month follow-up term were not studied and were suggested to be reported in future research (Townsend et al., 2018). This fails to add to the literature on long-term treatment outcomes, thus highlighting a gap present in NBT literature.

Gelkopf et al. (2013) conducted one of the earliest RCT studies in PTSD-NBT literature, in which the researchers measured various mental health changes in a year-long weekly sailing program for Israeli veterans with PTSD. Using a modified 30-item Stanford Acute Stress Reaction Questionnaire (SASRQ), the authors quantified an average 8% decrease in PTSD symptomology and reported benefits that influenced quality-of-life factors such as job retention and volunteer endeavours following treatment. Although their study was conducted over a 12month span of time, no follow-ups were conducted after the initial symptomology decreases reported in their post-intervention measures (Gelkopf et al., 2013); thus, their study's positive treatment outcomes cannot be considered long-term, further highlighting this significant gap in the literature.

Underreported Risks in NBT Practices

Another important gap in the literature is the underreported and minimally discussed risks associated with NBT practices, all of which require informed consent from participants (Cooley et al., 2020; Jordan & Marshall, 2010). Particularly in adventure therapy approaches, experiential learning and recreation-based challenge interventions pose legitimate safety concerns, and under the assumption of clinical expertise and risk management, the literature does not consistently speak to the risks and drawbacks of NBT involvement. Cooley et al.'s (2020) meta-synthesis of the NBT field revealed two areas of underreported risk: *weather*, where participants may not be prepared with appropriate footwear and clothing for inclement conditions, and *physical safety*, where over-exertion is possible when therapeutic activities are too physically demanding and can cause mid- and post-session injuries. Underreported risks in certain NBT practices may serve to overgeneralize the accessibility of certain NBT practices when in reality, barriers to these forms

of treatments exist and should be considered in discussions of veteran treatment alternatives (Cooley et al., 2020).

Additionally, nature-based interventions are commonly provided in public places, although exceptions exist (see Corazon et al., 2018; Poulsen et al., 2016). For NBT practices in public locations, risks to and breaches of confidentiality are possible. Jordan and Marshall (2010) describe the need to create clearly communicated contracts with clients when embarking on NBT work, as complete discretion may not be possible when therapy takes place in the unpredictable, uncontrollable setting of nature, where the public may be in a relatively close proximity to the therapy session location. Similarly, issues of professional boundaries are rarely addressed in literature, as the unpredictability of the outdoors may require adaptations to traditional professional boundaries, including emotional safety and physical support (Naor & Mayseless, 2021). These risks are present for all populations and are applicable to many NBT practices, but the inconsistent reporting of risks and minimally present conversations about informed consent in nature-based research constitute an important gap in NBT literature.

Literature Review Conclusion

Veterans with PTSD are a vulnerable population who exists all over the world and who have gradually received increasing recognition of the traumatic events and psychological damage to which they are routinely exposed (Bettmann et al., 2020; Reisman, 2016). Trauma exposure may not guarantee traumatization, but the increased volume of exposure for veterans has created a serious problem for individuals and healthcare providers alike (U.S. Department of Veterans Affairs, 2023; Veterans Affairs Canada VAC, 2022). The current literature review explores trauma and the psychiatric diagnosis of posttraumatic stress disorder, as defined in the most recent version of the diagnostic and statistical manual of mental disorders, DSM-5-TR (APA,

2022). Rates of PTSD remain higher in veteran populations than in the general populace, and comorbid psychiatric diagnoses dramatically increase suicide rates (Hester, 2017). With stigma and other barriers to psychological treatment further exacerbating low treatment completion rates, the problem of PTSD in veteran populations is a significant one (Myers et al., 2019; Vogel & Wade, 2022).

The study of nature-based therapy is an emerging field of literature with varying definitions and descriptions (Harper & Dobud, 2021), but the practices of adventure therapy and ecotherapy have been utilized for many years (Doherty, 2016; Gass et al., 2020). Research within the NBT field has revealed overwhelmingly positive short-term benefits and has suggested that some NBT practices treating PTSD symptomology have similar short-term benefits as empirically validated and recommended PTSD psychotherapies (Bettmann et al., 2022a; Joshi & Goldman, 2019; Poulsen et al., 2018).

Despite literature offering evidence of the positive impacts of nature-based interventions for veterans diagnosed with PTSD, NBT is not currently a recommended treatment option in various PTSD best practice guides (ISTSS, n.d.; VA/DoD Clinical Practice Guideline Working Group, 2017). In Chapter 3, I explore how NBT researchers struggle to employ high-quality, empirically validated evidence-based studies for NBT research (Corazon et al., 2019; Gabrielsen et al., 2016), and I additionally critique notions of best-practice at large (Ijaz et al., 2019), asserting that standardizing empirical research cannot solely determine the effectiveness of NBT practices (Harper & Dobud, 2021). Toward the end of the chapter, I offer research recommendations for future NBT studies while reminding practitioners of the immense value of individualized, contextually-specific nature-based interventions.

Discussion and Applied Practices (Chapter 3)

As outlined in Chapter 1, this capstone project aims to evaluate the efficacy of naturebased therapy practices and explore the feasibility of nature-based therapy interventions as alternative treatments for veterans with PTSD. In Chapter 2, I review existing literature on the biological, psychological, and social aspects of PTSD in military veteran populations. I also highlight the continued need for veteran populations to offer evidence-based psychotherapy recommendations despite problematic treatment completion rates. Chapter 2 concludes with a review of NBT literature and the suggested effectiveness of NBT interventions for veterans with PTSD. In this third chapter, I synthesize key findings from the literature review and employ the dynamic biopsychosocial perspective to examine literature concerning the limitations of empirically validating NBT studies. As discussed in Chapter 1, my research question is, *Can nature-based therapy be considered a viable and effective treatment alternative to current evidence-based psychotherapy treatments for PTSD in veteran populations*? I answer this question and offer recommendations for future NBT researchers, practitioners, and North American veteran service agencies before closing with my final remarks.

Discussion

Key Considerations

By reviewing the literature on PTSD development and prevalence, veterans' experiences of treatment, and current NBT interventions, I have discovered some key findings worth further consideration. I began this capstone with limited knowledge of the etiology and risk factors of PTSD in veterans, my minimal information coming only from my father's personal experience as a CAF veteran working through his own PTSD experience. This capstone literature review shows how commonplace comorbid disorders are for those with a PTSD diagnosis (Reisman, 2016; Rytwinski et al., 2013; Vujanovic & Back, 2019; Wanklyn et al., 2016). PTSD is a mental disorder with one of the highest correlations with successful and unsuccessful suicide attempts (Pagel, 2021). Being a military veteran only increases the likelihood of attempting suicide (Simkus et al., 2019). Although there are recommended first-line treatment options that focus on a person's trauma experience in aims to alleviate distressing PTSD symptomology (ISTSS, n.d.; VA/DoD Clinical Practice Guideline Working Group, 2017; Watkins et al., 2018), the vast majority of individuals referred to these evidence-based psychotherapies do not follow their treatment plans through to completion (Myers et al., 2019). The reasons that diagnosed veterans fail to initiate or complete recommended treatments range from lengthy waitlists, gender biases, and complex service-requesting systems to internal and external mental illness stigma and aversion to the model of trauma-focused treatment (Eichler, 2016; Greer & Vin-Raviv, 2019; Hundt et al., 2020; NAFR, 2020; Vogel & Wade, 2022).

The NBT literature I review in this capstone shows that NBT interventions have been used to treat veterans with PTSD for years (see Gelkopf et al., 2013). The examined studies consistently offer positive efficacy results for various NBT practices for this population (Bettmann et al., 2022a; Joshi & Goldman, 2019; Poulsen et al., 2018; Stigsdotter et al., 2018; Wheeler et al., 2020). Although few studies have explored the long-term benefits of NBTs, shortterm efficacy is well-established in literature (Bettmann et al., 2021; Gelkopf et al., 2013; Townsend et al., 2018). These findings coax me toward recommending increased use of NBTs for veterans with the diagnosis of PTSD, but further considerations are warranted.

A Critical Reflection

In reflection on the key findings of this capstone's literature review, the limited success of current evidence-based recommendations, the ongoing need for veterans to initiate and complete PTSD treatment, and the reported efficacy of NBT interventions for veterans with PTSD particularly stand out to me. Many veterans struggle with this debilitating condition despite current treatment recommendations and veteran services in Canada and the U.S. Available PTSD treatment recommendations for veterans are largely based on efficacy studies of treatments for the general population (ISTSS, n.d.; Weeks et al., 2021). However, veterans with PTSD, a population that exhibits high rates of comorbid disorders and complex treatment needs (Myers et al., 2019; Vujanovic & Back, 2019; Wanklyn et al., 2016), constitute a group that is more complex than study participant samples typically referenced in treatment guidelines (see ISTSS, n.d.). As such, general population treatment recommendations do not fully capture the needs of this population; randomized controlled trials and other study methods that infer or generalize findings from small or non-representative samples, after all, have decreased external validity and therefore should not represent the larger population of individuals with that given disease (Deaton & Cartwright, 2018; Nimavat et al., 2020; Stewart, 2022). Evidently, current PTSD guidelines (ISTSS, n.d.; VA/DoD Clinical Practice Guideline Working Group, 2017) do not acknowledge NBTs as a viable option due to a lack of accepted empirically validated evidence (Harper & Dobud, 2021). This ongoing challenge has led me to believe that naturebased therapies offer a feasible alternative treatment option to address this issue.

Upon further reflection, I know that limitations exist in NBT research and the theoretical model I use in this literature review. Firstly, the dBPS model was developed in response to biomedical reductionism, which views health strictly through a biological lens (Lehman et al., 2017). The dBPS model acknowledges the importance of biological, psychological, and social factors in pathology and healing (Lehman et al., 2017; Pilgrim, 2015). The many external influences and eco-relational factors within nature-based therapy interventions create a

fundamental problem for reductionist science, which aims to determine causality through rigorous empirical validation (Harper et al., 2019). As such, I highlight the limitations of using classic RCT design methods for studying complex interventions like NBTs (Gabrielsen et al., 2016).

Secondly, my use of the dBPS model (Lehman et al., 2017) in this literature review acknowledges that biological, psychological, and social factors influence PTSD development. The dBPS model as a whole, however, still has reductionist tendencies because it does not recognize the way factors interact complexly between themselves (Kinderman, 2019). The following sections will explore these limitations in greater depth, leading to my capstone recommendations.

Limitations of NBT Literature and Critiques of 'Best Practice'

NBT Research is Predominantly Rated as Weak in Quality

In their systematic review of NBT impacts on psycho-physiological stress recovery, Corazon et al. (2019) synthesize results from 36 studies. However, only three are RCTs, and the remaining studies use non-randomized trial methods. The authors quality-checked all included literature utilizing Effective Public Health Practice Project (EPHPP) standards, which provide strong, moderate, or weak ratings based on a study's reported methodological approach. None of the 36 studies (even the RCTs) were considered to be of strong quality based on the EPHPP (Corazon et al., 2019). These quality ratings suggest that research on NBT treatments has been methodologically weak in the past eight years because rigorous randomized study designs have been infrequently or successfully utilized.

Randomized Controlled Trials are Problematic in NBT Contexts

Most NBT studies, including the RCTs in this capstone's literature review, provide correlative data (Harper & Dobud, 2021; Naor & Mayseless, 2021). Many sources in recent years have been either qualitative design studies or systematic reviews intending to find correlative trends across previous research (Greer & Vin-Raviv, 2019; Harper et al., 2021; Joshi & Goldman, 2019; Poulsen et al., 2018). Since correlative relationships cannot definitively illuminate the specific impactful therapeutic factors of a studied treatment (Stewart, 2022), from a strictly empirical perspective, little evidence exists empirically explaining the efficacy of NBT interventions for PTSD in veteran populations (Davis-Berman et al., 2018). RCT studies aim to explore the efficacy of particular interventions by randomizing participants to avoid bias and isolate therapeutic components (Stewart, 2022). Without studying the specific mechanisms of change in NBTs or minimizing participant bias through randomization, however, NBT studies will remain correlative and potentially biased, suggesting but not empirically proving (Stewart, 2022) the efficacy of NBT practices for veterans with PTSD.

Having abandoned their attempt at an ecotherapy RCT, Gabrielsen et al. (2016) describe the challenges of conducting RCTs in NBT research and suggest they may create unethical practices in the NBT field. According to Stewart (2022), randomized controlled trials carry the most significant empirical weight because they compare findings and eliminate speculation about causal factors; they aim to isolate and measure the effects of a particular intervention. In contrast, qualitative interviews, clinical measures, and case study analyses explore detailed subjective experiences but do not provide statistically reliable efficacy (Stewart, 2022). However, the challenges for RCTs in NBT studies present themselves when exploring how design flaws for RCT research in the NBT field are difficult to avoid (Gabrielsen et al., 2016). Recruitment for studies of NBT efficacy often attracts individuals with a nature-positive bias (Corazon et al., 2019), so it is, therefore, challenging to ensure an experiment and control group are truly identical when participants in the control group are not receiving their treatment of choice (Gabrielsen et al., 2016). One study found that control group participants in a horticulture therapy RCT sought alternative ways to participate in gardening activities throughout the trial period after being assigned to the non-NBT treatment group (Hoffman et al., 2018).

Garbrielsen et al. (2016) question the ethics of offering a no-treatment control when control group participants expect treatment; if participants in the control group expect to receive treatment, they may feel disappointed or misled, which raises ethical concerns. The authors suggest that researchers must be transparent in communicating with participants about the nature of the study and the possibility of being assigned to a no-treatment control group. Additionally, researchers need to ensure that the no-treatment control group receives the same level of care and attention as the treatment group, including access to any other forms of treatment or support that may be available. Ensuring ethical treatment in RCT studies is far simpler, Gabrielsen et al. (2016) point out, when participants in a pharmaceutical treatment control group receive a placebo drug. Instead, independent variables are virtually indistinguishable in NBT studies, where the treatment being studied is complex and multi-faceted. In sum, Gabrielsen et al. (2016) describe how difficult it is to design RCT experiments in the NBT field that empirically validate specific variables while ensuring high-quality research study methodology and upholding standards of ethical practice.

Discourses of Best Practice

Systematic reviews and RCTs are considered the gold standards for empirically validated study methodologies (Stewart, 2022). However, sole reliance on these study methods fails to

acknowledge that valid critiques of these methodologies exist (Harper et al., 2021; Ijaz et al., 2019). It is crucial to consider the limitations of empirically-validated 'best practice' (Harper, 2010), including how it may not capture the complexity of social and environmental factors that influence treatment efficacy (Harper et al., 2021; Stewart, 2022) and how it may fail to acknowledge feasible alternative treatment options in favour of empirically-validated, recommended psychotherapies (Ijaz et al., 2019).

Researchers challenge the universally recognized preeminence of randomized controlled trials and best practice (Harper & Dobud, 2021; Ijaz et al., 2019; Iyioha, 2011). Discursive notions of evidence-based practice uphold a hierarchy of evidence, discrediting alternative knowledge claims, clinical judgement, and humanistic approaches favouring scientific ones (Harper, 2010; Ijaz et al., 2019). With powerful governing bodies deeming RCTs and systematic reviews of RCTs the highest forms of evidence and qualitative data the lowest, programs and study designs deemed 'best practice' are replicated elsewhere without considering the individual needs of study participants (Harper, 2010). Ijaz et al. (2019) highlight this fundamental limitation in order to bring attention to the biomedical influence of current best practice guidelines (Peacock et al., 2017); notions of 'best practice' favour scientific evidence-validation without challenging the problematic assumption that classic RCT designs and other highly-regarded study methodologies definitively capture the vast interplay of connected factors in NBTs and other complex treatment paradigms (Ijaz et al., 2019). Ijaz et al. offer a call for researchers to embrace modified RCT study designs that can fit better with complex treatment methods and for practitioners to champion the preferences of individual patients because even empirically validated treatments are not universally effective.

Limitations of the Dynamic Biopsychosocial Model

In Chapter 2, I discuss the impact of varying NBT practices on veterans and other populations diagnosed with PTSD concerning physical interventions and cognitive therapeutic activities within varying social spaces (Bettmann et al., 2022a; Poulsen et al., 2018; Wheeler et al., 2020). Earlier sections of the literature review discussed the physiology of PTSD (Nagoski & Nagoski, 2020; Svorc, 2018; Tafet, 2022) and the contextually-specific sociopolitical and cultural factors that impact Canadian and American veterans receiving PTSD treatment (Bond & Craps, 2020; Statistics Canada, 2022). The dynamic biopsychosocial model is a comprehensive model that conceptualizes the etiology and treatment of mental illnesses across dynamic domains and suggests that multi-level interventions can offer diagnosed individuals holistic healing (Lehman et al., 2017). At the same time, limitations exist in the application of this theoretical model in the current literature review.

While the original BPS model (Engel, 1977) and the subsequent dBPS model (Lehman et al., 2017) denounce biological reductionism and conceptualize psychological and social factors that contribute to mental illness etiology, the models do not entirely avoid reductionism; the dBPS model's emphasis on interconnected biological, psychological, and social domains oversimplifies interactivity between these domains and can overlook important nuances and complexities within unique research contexts (Kinderman, 2019; Pilgrim, 2015). This is demonstrated in my inclusion of Wheeler et al.'s (2020) study, a randomized control trial that reported participants' gender, age, employment status, and medication use but did not explore interactive positionality; neither the in-group impacts of peer-based interventions nor any external cultural events that may have occurred during the specified timeframe of the study were examined as efficacious elements (Kinderman, 2019). The dBPS may be able to identify

influential factors impacting the participants' treatment experience, but it cannot articulate the way these contextual factors intricately interact with each participant's treatment outcomes, which may change based on the composition of the participant group or the particular time in history in which the study is conducted. To these complex relationships, the dBPS model has little response; it only proposes that each factor impacts the individual, reducing the treatment experience to the influence of individual factors (Pilgrim, 2015). This reductionist conceptualization is one limitation of the dBPS in the current literature review.

Additionally, the dBPS model aims only to identify various contributing factors in cases of PTSD diagnosis for veterans. However, it does not clarify the causal relationships between the interacting biological, psychological, and social domains (Farre & Rapley, 2017). In Joshi and Goldman's (2019) study, participants described the various benefits of involvement in the Swamp Apes program, including reduced PTSD symptomology and increased quality of life. The authors, however, speak to the need for a causal emphasis in future research to determine the biopsychosocial benefits of SA (Joshi & Goldman, 2019), and the dBPS model offers the present literature review no additional conceptualizations regarding the causal relationship between the SA program's biological, psychological, and social interventions and reported outcomes. The dBPS model's inability to describe these reciprocal interactions can also be considered a limitation in the current literature study.

Recommendations

Based on my findings in the literature review and the limitations discussed after that, I have several recommendations to improve the use of NBT interventions for veterans with the diagnosis of PTSD. From the start, I intended to answer the question, *Can nature-based therapy be considered a viable and effective treatment alternative to current evidence-based*

psychotherapy treatments for PTSD in veteran populations? Based on the literature I reviewed, NBTs can be considered a viable and effective alternative treatment option for veterans with the diagnosis of PTSD, and my recommendations are as follows.

Firstly, there is a need to strengthen future NBT literature by consistently defining the NBT field, using waitlisted control groups in modified RCT designs, and including long-term outcomes in study results (Gabrielsen et al., 2016; Naor & Mayseless, 2021). Secondly, PTSD treatment for veterans needs to be individualized to incorporate unique treatment needs and to conduct ongoing outcome measures (Harper & Dobud, 2021; Ijaz et al., 2019). Finally, NBTs should be included in PTSD guidelines as an alternative treatment option, and veteran service agencies should have a role in acknowledging and referring veterans to NBT interventions (Davis-Berman et al., 2018). These recommendations, which I discuss in greater detail in the following sections, aim to address current research's limitations and improve the quality and accessibility of PTSD treatment options for North American military veterans.

Application 1: Future Studies of NBT Efficacy for Veterans with PTSD

As explored in this capstone's literature review, nature-based therapies have shown promising results as an alternative treatment for veterans with PTSD. Nevertheless, RCT and qualitative studies have only offered short-term, correlative outcomes while rarely showing evidence of high-quality rigor in experimental designs. While this questions the validity of positive efficacy results in NBT literature, the dynamic biopsychosocial lens critiques the sole preeminence of empirically validated 'best practices' determined through reductionist study methodologies that isolate individual causal factors. Traditional RCT methods do not fit well with NBT practices; in reality, NBT interventions rely on the complex interaction of biological, psychological, and social influences. Therefore, future NBT efficacy studies should be conducted but remain mindful of this significant limitation by administering study methodologies that better fit the complexities of NBT interventions. Although establishing with certainty causal relationships will remain aspirational in NBT literature, studying correlative efficacy rates in NBT treatments for veterans with PTSD remains crucial for better articulating the benefits of NBTs as alternative treatments for veterans diagnosed with PTSD. As such, future research should uphold a consistent definition of NBT interventions, employ more rigorous study methods that fit better with the unique environments of NBT practices, and offer long-term results that shed further light on the lasting effects of these interventions.

A Consistent Definition of NBT

Before conducting further research on NBT interventions for veterans with PTSD, it is essential to have a consistent definition of what constitutes NBT-based PTSD treatment for veteran populations. Naor and Mayseless (2021) propose a definitive NBT theory that highlights four essential factors: *natural environment*, *challenge*, *role of nature*, and *expansiveness and interconnectedness*. Such a definition would provide clarity and consistency in future research endeavours so that researchers studying the effectiveness of NBT interventions for veterans with PTSD will investigate and measure the same aspects of interventions.

Randomized Waitlist-Controlled Study Methods

Secondly, although traditional RCT methods are practically and ethically incapable of measuring causal NBT variables, and reductionist study methods may fail to account for the complex interplay between variables, study designs altered to better fit the needs of NBT interventions can offer more rigorous correlative results for the further development of the NBT field. Various studies have suggested that utilizing a waitlisted control group design when conducting randomized trials may better fit the complexities of NBT practices (Davis-Berman et al., 2018; Gabrielsen et al., 2016; Ijaz et al., 2019). By placing the comparison group on a waitlist while the experimental group receives the intervention in question, followed by the comparison group later, both participant groups can receive the intervention and control for confounding variables.

Long-Term Results

Finally, long-term efficacy results are crucial in understanding the potential benefits of NBTs for PTSD treatment (Townsend et al., 2018). Long-term follow-up measures provide insight into the sustainability and effectiveness of interventions toward improving the quality of life of study participants over an extended period (Caruana et al., 2015). In future research, follow-up measures at the 1-year point and beyond would significantly extend the literature by adding to the predominantly short-term efficacy studies available in treating veteran PTSD through NBT interventions.

Application 2: Individualized NBT Interventions for Veterans with PTSD

PTSD in military veterans is developed and sustained through biological, psychological, and social means, so NBT intervention strategies should continuously consider veterans' unique treatment needs and evaluate intervention effectiveness. Another recommendation I propose is that practitioners should individualize PTSD treatment plans for veterans accessing NBT interventions (Ijaz et al., 2019). The following subsections explore these concepts in more depth.

Population Treatment Needs

NBTs can be individualized to meet the unique needs of veterans with PTSD by exploring the following (Cooley et al., 2020): specific safety risks and challenges involved in certain NBT intervention types (i.e., challenges involved in treatment may pose a safety risk for an individual); physical capabilities of individuals receiving treatment (i.e., physical exertion may be beyond the recipient's fitness levels); prior skills that enhance treatment engagement (i.e., skills veterans may already possess like plant identification or survival skills); and nature activity preferences (i.e., passive contemplative versus exercise-based activities). By providing such a 'menu' of NBT intervention options, these personalized approaches can increase the likelihood of successful treatment completion rates and, consequently, higher levels of treatment efficacy (Buckley et al., 2018; Cooley et al., 2020; Hundt et al., 2020).

Ongoing Outcome Measures

Regular, ongoing outcome measures are essential for evaluating the effectiveness of an individualized treatment plan. Harper and Dobud (2021) recommend that outcome measures be collected at regular intervals to evaluate the effectiveness of the chosen NBT treatment and encourage practitioners to adjust the plan if necessary. Outcome measures can also help identify potential treatment challenges and opportunities for improvement (Ijaz et al., 2019), such as whether a particular intervention has been well received or if the veteran is dissatisfied with the level of exertion/contemplation during treatment interventions. Collecting and analyzing outcome measures is necessary to ensure that veterans receive effective and tailored treatment plans that meet their unique needs, ultimately leading to improved health outcomes and quality of life.

Application 3: Systemic NBT Recommendations for Veterans with PTSD

The NBT field must adopt a consistent understanding of NBT practice so PTSD practice guidelines will include NBTs as viable non-trauma-related treatments. Additionally, Canadian and American veteran service agencies must cover NBT interventions as a part of veteran health care support. Literature on the current state of North American veterans with a diagnosis of PTSD shows that strong, evidenced-based research is available, with trauma-focused psychotherapies, such as prolonged exposure therapy, cognitive processing therapy, and eye movement desensitization and reprocessing therapy, being highly recommended by various bestpractice guidelines (ISTSS, n.d.; VA/DoD Clinical Practice Guideline Working Group, 2017). Despite these empirically-validated treatment referrals, significant barriers exist to treatment completion; veterans consequently drop out of treatment or fail to initiate treatment, minimizing the benefits of these first-line evidence-based psychotherapies (Myers et al., 2019). The direct focus on trauma in these treatment modalities can hinder treatment completion rates, and for some veterans, these EPBs simply do not fit with their treatment preferences (Hundt et al., 2020; Myers et al., 2019). As such, NBT interventions, shown in literature to have promising efficacy rates, offer veterans with PTSD alternative avenues of support in symptom management and overall well-being increases.

Recognition as a Viable Non-Trauma-Related PTSD Treatment

In order to integrate NBT interventions into the broader field of PTSD treatment, it may be necessary to include them in the list of recommended non-trauma-focused therapy options. As discussed earlier, adopting Naor and Mayseless' (2021) NBT practice definition would allow for more cohesive NBT literature to develop; a clear understanding of what these therapies are and how they can be implemented will increase their ability to be included in PTSD practice guidelines. The International Society for Traumatic Stress Studies provides a comprehensive list of evidence-based therapies for PTSD, but NBTs are currently absent from this list (ISTSS, n.d.). Including NBT interventions in this recommendation list could increase awareness and acceptance of these interventions among PTSD treatment providers and ultimately lead to more widespread use of NBTs.

Access Through National Veteran Service Agencies

In order to maximize the accessibility of NBT treatments for veterans with PTSD, veterans affairs services and other service providers should do their part in referring veterans to NBT (Davis-Berman et al., 2018). By facilitating access to NBTs, these services could improve treatment completion rates for veterans with PTSD symptomology by encouraging access to this effective alternative treatment option. Improving these rates would be another step towards servicing the thousands of veterans suffering from PTSD symptoms who never complete traditionally recommended psychotherapies.

Capstone Conclusion

I began this capstone journey with hopes of learning whether literature supported the notion that nature-based interventions are restorative and therapeutic for North American veterans with the diagnosis of PTSD. I found considerably promising results, criticisms of biased positive efficacy findings, and an ever-increasing service need for this high-risk population. NBT literature, in its current state, has significant 'empirical validation' shortcomings, but the dynamic biopsychosocial model through which I analyze the literature takes me one step back to consider the shortcomings of empirically validating NBTs. The complexity of NBT interventions, including the biological influence of outdoor settings, psychological factors of participant individuality, and social impacts of varying NBT intervention styles, all thwart the likelihood of definitively validating NBT mechanisms of change. The conclusion I offer in this capstone is that the need of veterans who experience significant barriers to initiating and completing recommended trauma-focused PTSD treatments is too great to ignore, and viable, efficacious options beyond those recommended in current best-practice guidelines exist in the field of NBT. By strengthening the validity of future research, championing the individuality of

veterans seeking PTSD treatment, and encouraging systemic NBT recommendations through veteran service agencies, the number of North American veterans receiving practical support will grow, thus providing a solution to address the ongoing challenges of veterans with the diagnosis of PTSD.

References

- American Psychiatric Association. (2022). Diagnostic and statistical manual of mental disorders: DSM-5-TR (5th ed., text revision.). American Psychiatric Association Publishing.
- Barros, A. J. S., Teche, S. P., Padoan, C., Laskoski, P., Hauck, S., & Eizirik, C. L. (2020).
 Countertransference, defense mechanisms, and vicarious trauma in work with sexual offenders. *The Journal of the American Academy of Psychiatry and the Law, 48*(3), 302–314. <u>https://doi.org/10.29158/JAAPL.003925-20</u>
- Benjet, C., Bromet, E., Karam, E. G., Kessler, R. C., McLaughlin, K. A., Ruscio, A. M., Shahly, V., Stein, D. J., Petukhova, M., Hill, E., Alonso, J., Atwoli, L., Bunting, B., Bruffaerts, R., Caldas-de-Almeida, J. M., de Girolamo, G., Florescu, S., Gureje, O., Huang, Y., ... & Koenen, K. C. (2016). The epidemiology of traumatic event exposure worldwide: results from the World Mental Health Survey Consortium. *Psychological Medicine*, *46*(2), 327–343. <u>https://doi.org/10.1017/S0033291715001981</u>
- Bettmann, J. E., Anderson, I., Makouske, J., & Hanley, A. (2022a). Mental health outcomes of peer-led therapeutic adventure for military veterans. *Journal of Experiential Education*, 45(3), 295–315.

https://doi.org/10.1177/10538259211049535/ASSET/IMAGES/LARGE/10.1177_10538 259211049535-FIG2.JPEG

Bettmann, J. E., Anstadt, G., & Kolaski, A. Z. (2020). Therapeutic adventure for military veterans with mental illness: A conceptual argument. *Ecopsychology*, 12(4), 277–284. <u>https://doi.org/10.1089/eco.2019.0045</u>

- Bettmann, J. E., Cambron, C., & Long, E. (2022b). Improvement in veterans' openness to seeking professional psychological help after participating in therapeutic adventure trips. *Ecopsychology*. <u>https://doi.org/10.1089/eco.2022.0040</u>
- Bettmann, J. E., Prince, K. C., Ganesh, K., Rugo, K. F., Bryan, A. B. O., Bryan, C. J., Rozek, D. C., & Leifker, F. R. (2021). The effect of time outdoors on veterans receiving treatment for PTSD. *Journal of Clinical Psychology*, 77(9), 2041–2056.
 https://doi.org/10.1002/jclp.23139
- Bisson, J. I., Baker, A., Dekker, W., & Hoskins, M. D. (2020). Evidence-based prescribing for post-traumatic stress disorder. *The British Journal of Psychiatry*, 216, 125–126.

https://doi.org/10.1192/bjp.2020.40

- Bond, L., & Craps, S. (2020). Trauma. Routledge.
- Bradford, J. M. W., & Levin, G. V. de A. (2020). Vicarious trauma and PTSD in forensic mental health professionals. *The Journal of the American Academy of Psychiatry and the Law*, 48(3), 315–318. <u>https://doi.org/10.29158/JAAPL.200025-20</u>
- Brunet, A., Monson, E., Liu, A., & Fikretoglu, D. (2015). Trauma exposure and posttraumatic stress disorder in the Canadian military. *Canadian Journal of Psychiatry. Revue Canadienne de Psychiatrie*, 60(11), 488. https://doi.org/10.1177/070674371506001104
- Buckley, R. C., Brough, P., & Westaway, D. (2018). Bringing outdoor therapies into mainstream mental health. *Frontiers in Public Health*, 6, 119. https://doi.org/10.3389/fpubh.2018.00119
- Caruana, E. J., Roman, M., Hernández-Sánchez, J., & Solli, P. (2015). Longitudinal studies. Journal of Thoracic Disease, 7(11), E537–E540. <u>https://doi.org/10.3978/j.issn.2072-1439.2015.10.63</u>

- Centre for Addiction and Mental Health. (n.d.). Trauma research is saving lives today. *Centre for Addiction and Mental Health*. <u>https://www.camh.ca/en/today-campaign/areas-of-</u> impact/preventing-ptsd/research
- Clare, S., & Tudor, K. (2023). Ecotherapy practice: Perceived obstacles and solutions. *Transactional Analysis Journal*, 53(1), 21–37.

https://doi.org/10.1080/03621537.2023.2152547

- Claxton, N. X. (2021). Indigenous land-based healing pedagogies. In N. J. Harper & W. W. Dobud (Eds.), *Outdoor therapies: An introduction to practices, possibilities, and critical perspectives* (pp. 54–65). Routledge.
- Coleman, S. J., Stevelink, S. A. M., Hatch, S. L., Denny, J. A., & Greenberg, N. (2017). Stigma-related barriers and facilitators to help seeking for mental health issues in the armed forces: A systematic review and thematic synthesis of qualitative literature.
 Psychological Medicine, 47(11), 1880–1892.

https://doi.org/10.1017/S0033291717000356

- Cook, J. M., Fairbank, J. A., Roberts, J., Schulz, P., & American, W. (2019). Summary of the clinical practice guideline for the treatment of posttraumatic stress disorder (PTSD) in adults guideline development panel for the treatment of PTSD in adults, American Psychological Association. https://doi.org/10.1037/amp0000473
- Corazon, S. S., Sidenius, U., Poulsen, D. V., Gramkow, M. C., & Stigsdotter, U. K. (2019).
 Psycho-physiological stress recovery in outdoor nature-based interventions: A systematic review of the past eight years of research. *International Journal of Environmental Research and Public Health*, *16*(10), 1711. <u>https://doi.org/10.3390/ijerph16101711</u>

- Davis-Berman, J., Berman, D., & Berman, N. D. (2018). Outdoor programs as treatment for posttraumatic stress disorder in veterans: Issues and evidence. *Best Practices in Mental Health*, 14(2), 9–20.
- Deaton, A., & Cartwright, N. (2018). Understanding and misunderstanding randomized controlled trials. *Social Science & Medicine*, 210, 2–21.

https://doi.org/10.1016/J.SOCSCIMED.2017.12.005

- Derrien, M. M., Cerveny, L. K., & Havlick, D. G. (2020). Outdoor programs for veterans: Public land policies and practices to support therapeutic opportunities. *Journal of Forestry*, *118*(5), 534–547. <u>https://doi.org/10.1093/jofore/fvaa023</u>
- Doherty, T. J. (2016). Theoretical and empirical foundations for ecotherapy. In M. Jordan & J. Hinds (Eds.), *Ecotherapy: Theory, research & practice* (pp. 12–31). Macmillan. https://doi.org/10.1057/978-1-137-48688-2_2
- Eichler, M. (2016). Learning from the Deschamps report: Why military and veteran researchers ought to pay attention to gender. *Journal of Military, Veteran and Family Health*, 2(1). <u>https://doi.org/10.3138/jmvfh.3394</u>
- Engel, G. L. (1977). The need for a new medical model: A challenge for biomedicine. *Science*, *196*(4286), 129–136. <u>https://doi.org/10.1126/science.847460</u>
- Flynn, A. J., Navarro, G. Y., & Basehore, H. K. (2022). PTSD avoidance symptoms associated with alcohol craving in treatment-seeking veteran population. *Journal of Dual Diagnosis*, *18*(3), 135–143. <u>https://doi</u>.org/10.1080/15504263.2022.2089799
- Foa, E. B., Hembree, E. A., & Rothbaum, B. O. (2007). Prolonged Exposure Therapy for PTSD: Emotional Processing of Traumatic Experiences. New York, NY: Oxford University Press.

- Forbes, D., Pedlar, D., Adler, A. B., Bennett, C., Bryant, R., Busuttil, W., Cooper, J., Creamer, M. C., Fear, N. T., Greenberg, N., Heber, A., Hinton, M., Hopwood, M., Jetly, R., Lawrence-Wood, E., McFarlane, A., Metcalf, O., O'Donnell, M., Phelps, A., ... & Wessely, S. (2019). Treatment of military-related post-traumatic stress disorder: challenges, innovations, and the way forward. *International Review of Psychiatry*, *31*(1), 95–110. <u>https://doi.org/10.1080/09540261.2019.1595545</u>
- Furuyashiki, A., Tabuchi, K., Norikoshi, K., Kobayashi, T., & Oriyama, S. (2019). A comparative study of the physiological and psychological effects of forest bathing (shinrin-yoku) on working age people with and without depressive tendencies. *Environmental Health and Preventive Medicine*, 24(1), 46–46.
 https://doi.org/10.1186/s12199-019-0800-1
- Gabrielsen, L. E., Fernee, C. R., Aasen, G. O., & Eskedal, L. T. (2016). Why randomized trials are challenging within adventure therapy research: Lessons learned in Norway. *The Journal of Experiential Education*, 39(1), 5–14.

https://doi.org/10.1177/1053825915607535

- Gaffey, A. E., Redeker, N. S., Rosman, L., Mullington, J. M., Brandt, C. A., Haskell, S. G., & Burg, M. M. (2020). The role of insomnia in the association between posttraumatic stress disorder and hypertension. *Journal of Hypertension*, *38*(4), 641–648.
 https://doi.org/10.1097/HJH.00000000002311
- Gallagher, T., Gay, N. G., Asnaani, A., & Foa, E. B. (2016). Empirically based trauma therapies.
 In *The Wiley Handbook of the Psychology of Mass Shootings* (pp. 265–292). John Wiley
 & Sons, Inc. <u>https://doi.org/10.1002/9781119048015.ch15</u>
- Gass, M. A., Gillis, H. L., & Russell, K. C. (2020). Adventure therapy: Theory, research, and *practice* (2nd edition.). Routledge.
- Gelkopf, M., Hasson-Ohayon, I., Bikman, M., & Kravetz, S. (2013). Nature adventure rehabilitation for combat-related posttraumatic chronic stress disorder: A randomized control trial. *Psychiatry Research*, 209(3), 485–493.

https://doi.org/10.1016/j.psychres.2013.01.026

- Goldstein, R. B., Smith, S. M., Chou, S. P., Saha, T. D., Jung, J., Zhang, H., Pickering, R. P.,
 Ruan, W. J., Huang, B., & Grant, B. F. (2016). The epidemiology of DSM-5
 posttraumatic stress disorder in the United States: Results from the National
 Epidemiologic Survey on Alcohol and Related Conditions-III. *Social Psychiatry and Psychiatric Epidemiology*, *51*(8), 1137–1148. <u>https://doi.org/10.1007/s00127-016-1208-5</u>
- Government of Canada. (n.d.). Joining the Canadian armed forces. https://forces.ca/en/how-tojoin/
- Greer, M., & N. Vin-Raviv. (2019). Outdoor-based therapeutic recreation programs among military veterans with posttraumatic stress disorder: Assessing the evidence. *Military Behavioral Health*, 7(3). 286–303. <u>https://doi.org/10.1080/21635781.2018.1543063</u>
- Hardy, A., O'Driscoll, C., Steel, C., van der Gaag, M., & van den Berg, D. (2021). A network analysis of post-traumatic stress and psychosis symptoms. *Psychological Medicine*, 51(14), 2485–2492. <u>https://doi.org/10.1017/S0033291720001300</u>
- Harper, N. J. (2010). Future paradigm or false idol: A cautionary tale of evidence-based practice for adventure education and therapy. *The Journal of Experiential Education*, 33(1), 38–55. <u>https://doi.org/10.1177/105382591003300104</u>

- Harper, N. J., Fernee, C. R., & Gabrielsen, L. E. (2021). Nature's role in outdoor therapies: An umbrella review. *International Journal of Environmental Research and Public Health*, 18(10), 5117. <u>https://doi.org/10.3390/ijerph18105117</u>
- Harper, N. J., Rose, K., & Segal, D. (2019). Nature-based therapy: A practitioner's guide to working outdoors with children, youth, and families. New Society Publishers.
- Harper, N. J., & Dobud, W. W. (2021). Outdoor therapies: An introduction to practices, possibilities, and critical perspectives. Routledge.
- Hawkins, B. L., Townsend, J. A., & Garst, B. A. (2016). Nature-based recreational therapy for military service members: A strengths approach. *Therapeutic Recreation Journal*, 50(1), 55–74. <u>https://doi.org/10.18666/TRJ-2016-V50-I1-6793</u>
- Hassan, A. N., Le Foll, B., Imtiaz, S., & Rehm, J. (2017). The effect of post-traumatic stress disorder on the risk of developing prescription opioid use disorder: Results from the National Epidemiologic Survey on Alcohol and Related Conditions III. *Drug and Alcohol Dependence*, 179, 260–266. <u>https://doi.org/10.1016/j.drugalcdep.2017.07.012</u>
- Herringa, R. J. (2017). Trauma, PTSD, and the developing brain. *Current Psychiatry Reports*, 19(10), 69. <u>https://doi.org/10.1007/s11920-017-0825-3</u>
- Hester, R. D. (2017). Lack of access to mental health services contributing to the high suicide rates among veterans. *International Journal of Mental Health Systems*, 11(1), 47. <u>https://doi.org/10.1186/s13033-017-0154-2</u>
- Hofmann, M., Young, C., Binz, T. M., Baumgartner, M. R., & Bauer, N. (2018). Contact to nature benefits health: Mixed effectiveness of different mechanisms. *International Journal of Environmental Research and Public Health*, 15(1), 31.
 https://doi.org/10.3390/ijerph15010031

- Ho, P. L., Li, T. W., Liu, H., Yeung, T. F., & Hou, W. K. (2022). Testing a new protocol of nature-based intervention to enhance well-being: A randomized control trial. *International Journal of Environmental Research and Public Health*, *19*(7), 3931.
 https://doi.org/10.3390/IJERPH19073931
- Hundt, N. E., Ecker, A. H., Thompson, K., Helm, A., Smith, T. L., Stanley, M. A., & Cully, J. A. (2020). "It didn't fit for me:" A qualitative examination of dropout from prolonged exposure and cognitive processing therapy in veterans. *Psychological Services*, *17*(4), 414–421. <u>https://doi.org/10.1037/ser0000316</u>
- Hurley, E. C. (2018). Effective treatment of veterans with PTSD: Comparison between intensive daily and weekly EMDR approaches. *Frontiers in Psychology*, 9, 1458. <u>https://doi.org/10.3389/fpsyg.2018.01458</u>
- Ijaz, N., Rioux, J., Elder, C., & Weeks, J. (2019). Whole systems research methods in health care: A scoping review. *The Journal of Alternative and Complementary Medicine*, 25(S1), S21–S51. <u>https://doi.org/10.1089/acm.2018.0499</u>
- Imel, Z. E., Laska, K., Jakupcak, M., & Simpson, T. L. (2013). Meta-analysis of dropout in treatments for posttraumatic stress disorder. *Journal of Consulting and Clinical Psychology*, 81(3), 394–404. <u>https://doi.org/10.1037/a0031474</u>
- International Society for Traumatic Stress Studies. (n.d.). Posttraumatic stress disorder prevention and treatment guidelines: Methodology and recommendations. <u>https://istss.org/getattachment/Treating-Trauma/New-ISTSS-Prevention-and-Treatment-Guidelines/ISTSS_PreventionTreatmentGuidelines_FNL-March-19-2019.pdf.aspx</u>

- Iyioha, I. (2011). Law's dilemma: Validating complementary and alternative medicine and the clash of evidential paradigms. *Evidence-Based Complementary and Alternative Medicine*, 2011. 1–10. <u>https://doi.org/10.1155/2011/389518</u>
- Jin, Y., Xu, S., Wang, Y., Li, H., Wang, X., Sun, X., & Wang, Y. (2022). Associations between PTSD symptoms and other psychiatric symptoms among college students exposed to childhood sexual abuse: A network analysis. *European Journal of Psychotraumatology*, 13(2), 2141508. <u>https://</u>doi.org/10.1080/20008066.2022.2141508
- Jones, A. L., Fine, M. J., Taber, P. A., Hausmann, L. R. M., Burkitt, K. H., Stone, R. A., & Zickmund, S. L. (2021). National media coverage of the Veterans Affairs waitlist scandal effects on veterans' distrust of the VA health care system. *Medical Care*, 59(6), S322– S326. <u>https://doi.org/10.1097/MLR.000000000001551</u>
- Jordan, M., & Marshall, H. (2010). Taking counselling and psychotherapy outside: Destruction or enrichment of the therapeutic frame? *European Journal of Psychotherapy & Counselling*, 12(4), 345–359. <u>https://doi.org/10.1080/13642537.2010.530105</u>
- Joshi, M., & Goldman, J. Z. (2019). Endure, evolve, achieve: Stakeholder perspectives on the effectiveness of the Swamp Apes program in restoring biopsychosocial functioning of American veterans. *Cogent Psychology*, 6(1).

https://doi.org/10.1080/23311908.2019.1584081

Kaplan, J. B., Bergman, A. L., Christopher, M., Bowen, S., & Hunsinger, M. (2017). Role of resilience in mindfulness training for first responders. *Mindfulness*, 8(5), 1373-1380. <u>https://doi.org/10.1007/s12671-017-0713-2</u>

- Kaplan, S. (1995). The restorative benefits of nature: Toward an integrative framework. *Journal of Environmental Psychology*, 15(3), 169–182. <u>https://doi.org/10.1016/0272-4944(95)90001-2</u>
- Kinderman, P. (2019). A manifesto for mental health: Why we need a revolution in mental health care (1st ed.). Springer International Publishing. <u>https://doi.org/10.1007/978-3-030-</u> 24386-9
- Kira, I. A. (2022). Taxonomy of stressors and traumas: An update of the development-based trauma framework (DBTF): A life-course perspective on stress and trauma. *Traumatology*, 28(1), 84–97. <u>https://doi.org/10.1037/trm0000305</u>
- Kira, I. A., Ashby, J. S., Omidy, A. Z., & Lewandowski, L. (2015). Current, continuous, and cumulative trauma-focused cognitive behavior therapy: A new model for trauma counseling. *Journal of Mental Health Counseling*, *37*(4), 323-340. https://doi.org/10.17744/mehc.37.4.04
- Kira, I. A., Lewandowski, L., Chiodo, L., & Laddis, A. (2016). Is complicated birth one of the early childhood traumas? A framework for birthing trauma, its impacts, and proliferation. *Psychology*, 7(3), 426–443. <u>https://doi.org/10.4236/psych.2016.73045</u>
- Kira, I. A., Shuwiekh, H., & Laddis, A. (2023). The linear and non-linear association between trauma, dissociation, complex PTSD, and executive function deficits: A longitudinal structural equation modeling study. *Journal of Loss & Trauma, 28*(3), 217–234. <u>https://doi</u>.org/10.1080/15325024.2022.2101734
- Kotera, Y., Richardson, M., & Sheffield, D. (2022). Effects of shinrin-yoku (forest bathing) and nature therapy on mental health: a systematic review and meta-analysis. *International*

Journal of Mental Health and Addiction, 20(1), 337–361. <u>https://doi</u>.org/10.1007/s11469-020-00363-4

- Kube, T., Elssner, A. C., & Herzog, P. (2023). The relationship between multiple traumatic events and the severity of posttraumatic stress disorder symptoms evidence for a cognitive link. *European Journal of Psychotraumatology*, *14*(1).
 https://doi.org/10.1080/20008066.2023.2165025
- Lancaster, C. L., Cobb, A. R., Lee, H.-J., & Telch, M. J. (2016). The role of perceived threat in the emergence of PTSD and depression symptoms during warzone deployment. *Psychological Trauma*, 8(4), 528–534. <u>https://doi.org/10.1037/tra0000129</u>
- Letica-Crepulja, M., Stevanovic, A., Protuder, M., Grahovac Juretic, T., Rebic, J., & Franciskovic, T. (2020). Complex PTSD among treatment-seeking veterans with PTSD. *European Journal of Psychotraumatology*, *11*(1), 1716593.

https://doi.org/10.1080/20008198.2020.1716593

- Littman, A. J., Bratman, G. N., Lehavot, K., Engel, C. C., Fortney, J. C., Peterson, A., Jones, A., Klassen, C., Brandon, J., & Frumkin, H. (2021). Nature versus urban hiking for Veterans with post-traumatic stress disorder: A pilot randomized trial conducted in the Pacific Northwest USA. *BMJ Open*, *11*(9). <u>https://doi.org/10.1136/bmjopen-2021-051885</u>
- LoSavio, S. T., Murphy, R. A., & Resick, P. A. (2021). Treatment outcomes for adolescents versus adults receiving cognitive processing therapy for posttraumatic stress disorder during community training. *Journal of Traumatic Stress*, *34*(4), 757–763.

https://doi.org/10.1002/jts.22668

MacLean, M. B. (2018). Veterans in Canada Released Since 1998. Veterans Affairs Canada.

Maguen, S., Li, Y., Madden, E., Seal, K. H., Neylan, T. C., Patterson, O. V., DuVall, S. L., Lujan, C., & Shiner, B. (2019). Factors associated with completing evidence-based psychotherapy for PTSD among veterans in a national healthcare system. *Psychiatry Research*, 274, 112–128. <u>https://doi.org/10.1016/j.psychres.2019.02.027</u>

- McClendon, J., Kressin, N., Perkins, D., Copeland, L. A., Finley, E. P., & Vogt, D. (2021). The impact of discriminatory stress on changes in post-traumatic stress severity at the intersection of race/ethnicity and gender. *Journal of Trauma & Dissociation*, 22(2), 170– 187. <u>https://doi.org/10.1080/15299732.2020.1869079</u>
- McMillan, K. A., Asmundson, G. J. G., & Sareen, J. (2017). Comorbid PTSD and social anxiety disorder: Associations with quality of life and suicide attempts. *Journal of Nervous and Mental Disease*, 205(9), 732–737. <u>https://doi.org/10.1097/NMD.00000000000000704</u>
- Miller-Karas, E. (2015). Building resilience to trauma: The trauma and community resiliency models. Routledge. <u>https://doi.org/10.4324/9780203134115</u>
- Mittal, D., Drummond, K. L., Blevins, D., Curran, G., Corrigan, P., & Sullivan, G. (2013).
 Stigma associated with PTSD: Perceptions of treatment seeking combat veterans.
 Psychiatric Rehabilitation Journal, *36*(2), 86–92. https://doi.org/10.1037/h0094976
- Nagoski, E., & Nagoski, A. (2020). *Burnout: The secret to unlocking the stress cycle*. Ballantine Books. N.Y.
- Naor, L., & Mayseless, O. (2021). Therapeutic factors in nature-based therapies: Unraveling the therapeutic benefits of integrating nature in psychotherapy. *Psychotherapy*, 58(4), 576–590. <u>https://doi.org/10.1037/pst0000396</u>
- National Association of Federal Retirees. (2020, March). *Veterans*. https://www.federalretirees.ca/sites/default/files/2020-04/veterans_final-en-6.pdf

- National Institute for Health and Care Excellence. (2018, December 5). *Post-traumatic stress disorder*. <u>https://www.nice.org.uk/guidance/ng116/resources/posttraumatic-stress-</u> <u>disorder-pdf-66141601777861</u>
- Nimavat, B. D., Zirpe, K. G., & Gurav, S. K. (2020). Critical analysis of a randomized controlled trial. *Indian Journal of Critical Care Medicine*, 24(Suppl 4), S215–S222. https://doi.org/10.5005/jp-journals-10071-23638
- Opheim, E., Andersen, P. N., Jakobsen, M., Aasen, B., & Kvaal, K. (2019). Poor quality in systematic reviews on PTSD and EMDR: An examination of search methodology and reporting. *Frontiers in Psychology*, 10, 1558. <u>https://doi.org/10.3389/fpsyg.2019.01558</u>
- Palsdottir, M., Dolling, A., Park, S., Vitagliano, L. A., Wester, K. L., Jones, C. T., Wyrick, D. L., & Vermeesch, A. L. (2023). Group nature-based mindfulness interventions: Nature-based mindfulness training for college students with anxiety. *International Journal of Environmental Research and Public Health*, 20(2), 1451.
 https://doi.org/10.3390/IJERPH20021451
- Pagel, J. F. (2021). Post-traumatic stress disorder: A guide for primary care clinicians and therapists (1st ed.). Springer. https://doi.org/10.1007/978-3-030-55909-0
- Parnell, D., Ram, V., Cazares, P., Webb-Murphy, J., Roberson, M., & Ghaed, S. (2018). Sexual assault and disabling PTSD in active duty service women. *Military Medicine*, 183(9-10), E481–E488. <u>https://doi.org/10.1093/milmed/usy048</u>
- Patil, P. A., Porche, M. V., Shippen, N. A., Dallenbach, N. T., & Fortuna, L. R. (2018). Which girls, which boys? The intersectional risk for depression by race and ethnicity, and gender in the U.S. *Clinical Psychology Review*, 66, 51–68. https://doi.org/10.1016/j.cpr.2017.12.003

Peacock, S., Carless, D., & McKenna, J. (2018). Inclusive adapted sport and adventure training programme in the PTSD recovery of military personnel: A creative non-fiction. *Psychology of Sport and Exercise*, 35, 151–159.

https://doi.org/10.1016/j.psychsport.2017.12.003

- Pervanidou, P., Kolaitis, G., Charitaki, S., Lazaropoulou, C., Papassotiriou, I., Hindmarsh, P.,
 Bakoula, C., Tsiantis, J., & Chrousos, G. P. (2007). The natural history of neuroendocrine changes in pediatric posttraumatic stress disorder (PTSD) after motor vehicle accidents:
 Progressive divergence of noradrenaline and cortisol concentrations over time. *Biological Psychiatry*, 62(10), 1095–1102. <u>https://doi.org/10.1016/j.biopsych.2007.02.008</u>
- Pilgrim, D. (2015). The biopsychosocial model in health research: Its strengths and limitations for critical realists. *Journal of Critical Realism*, 14(2), 164–180. https://doi.org/10.1179/1572513814Y.0000000007
- Poulsen, D. v., Stigsdotter, U. K., Djernis, D., & Sidenius, U. (2016). "Everything just seems much more right in nature": How veterans with post-traumatic stress disorder experience nature-based activities in a forest therapy garden. *Health Psychology Open*, 3(1). https://doi.org/10.1177/2055102916637090
- Poulsen, D. V., Stigsdotter, U. K., & Davidsen, A. S. (2018). "That guy, is he really sick at all?"
 An analysis of how veterans with PTSD experience nature-based therapy. *Healthcare*, 6(2). <u>https://doi.org/10.3390/healthcare6020064</u>
- Rauch, S. A. M., Yasinski, C. W., Post, L. M., Jovanovic, T., Norrholm, S., Sherrill, A. M.,
 Michopoulos, V., Maples-Keller, J. L., Black, K., Zwiebach, L., Dunlop, B. W., Loucks,
 L., Lannert, B., Stojek, M., Watkins, L., Burton, M., Sprang, K., McSweeney, L.,
 Ragsdale, K., & Rothbaum, B. O. (2021). An intensive outpatient program with

prolonged exposure for veterans with posttraumatic stress disorder: Retention, predictors, and patterns of change. *Psychological Services*, *18*(4), 606–618.

https://doi.org/10.1037/ser0000422

- Reisman, M. (2016). PTSD treatment for veterans: what's working, what's new, and what's next. P&T, 41(10), 623-634.
- Resick, P. A., Monson, C. M., & Chard, K. M. (2017). *Cognitive Processing Therapy for PTSD: A Comprehensive Manual*. New York, NY: Guilford Press.
- Rytwinski, N. K., Scur, M. D., Feeny, N. C., & Youngstrom, E. A. (2013). The co-occurrence of major depressive disorder among individuals with posttraumatic stress disorder: A metaanalysis. *Journal of Traumatic Stress*, 26(3), 299–309. <u>https://doi</u>.org/10.1002/jts.21814
- Schnurr, P. P. (n.d.). *Epidemiology and impact of PTSD*. U.S. Department of Veterans Affairs. https://www.ptsd.va.gov/professional/treat/essentials/epidemiology.asp
- Shala, M., Morina, N., Salis Gross, C., Maercker, A., & Heim, E. (2020). A point in the heart: Concepts of emotional distress among Albanian-speaking immigrants in Switzerland. *Culture, Medicine and Psychiatry, 44*(1), 1–34. <u>https://doi.org/10.1007/s11013-019-09638-5</u>
- Shuda, Q., Bougoulias, M. E., & Kass, R. (2020). Effect of nature exposure on perceived and physiologic stress: A systematic review. *Complementary Therapies in Medicine*, 53, 102514. <u>https://doi.org/10.1016/j.ctim.2020.102514</u>

Statistics Canada. (2022, May 20). Survey on mental health and stressful events, August to December 2021. <u>https://www150.statcan.gc.ca/n1/daily-quotidien/220520/dq220520b-eng.htm</u>

- Steenkamp, M. M., Litz, B. T., Hoge, C. W., & Marmar, C. R. (2015). Psychotherapy for military-related PTSD: A review of randomized clinical trials. *Journal of the American Medical Association*, 314(5), 489–500. <u>https://doi.org/10.1001/jama.2015.8370</u>
- Stewart, A. (2022). *Basic Statistics and Epidemiology: A Practical Guide*. (5th edition.). CRC Press.
- Straud, C. L., Resick, P. A., Foa, E. B., Back, S. E., Monson, C. M., McLean, C. P., Flanagan, J. C., Wachen, J. S., McMahon, C. J., Schuhman, B., Zwetzig, S., Yarvis, J. S., Borah, A. M., Schrader, C. C., Sharrieff, A. F. M., Schobitz, R. P., Roache, J. D., Litz, B. T., Young-McCaughan, S., ... & Peterson, A. L. (2022). Aggression and violent behavior in the military: Self-reported conflict tactics in a sample of service members and veterans seeking treatment for posttraumatic stress disorder. *Aggression and Violent Behavior*. <u>https://doi.org/10.1016/j.avb.2022.101734</u>
- Svorc, P. (2018). Autonomic nervous system (P. Svorc, Ed.). IntechOpen.
- Swain, T. L., & Takarangi, M. K. T. (2021). Preliminary evidence for a relationship between prospective memory and PTSD symptoms in the general population. *Journal of Anxiety Disorders*, 77, 102325. <u>https://doi</u>.org/10.1016/J.JANXDIS.2020.102325
- Swart, S., Wildschut, M., Draijer, N., Langeland, W., & Smit, J. H. (2020). Dissociative subtype of posttraumatic stress disorder or PTSD with comorbid dissociative disorders:
 Comparative evaluation of clinical profiles. *Psychological Trauma*, *12*(1), 38–45.
 https://doi.org/10.1037/tra0000474
- Sweet, J., Poirier, A., Pound, T., & VanTil, L. D. (2020, October 9). *Well-being of Canadian Regular Force Veterans, Findings from Lass 2019 Survey*. Government of Canada.

- Szafranski, D. D., Smith, B. N., Gros, D. F., & Resick, P. A. (2017). High rates of PTSD treatment dropout: A possible red herring? *Journal of Anxiety Disorders*, 47, 91–98. <u>https://doi.org/10.1016/j.janxdis.2017.01.002</u>
- Tafet, G. E. (2022). Neuroscience of stress: From neurobiology to cognitive, emotional and behavioral sciences. Springer.
- Townsend, J., Hawkins, B. L., Bennett, J. L., Hoffman, J., Martin, T., Sotherden, E., & Bridges, W. (2018). Preliminary long-term health outcomes associated with recreation-based health and wellness programs for injured service members. *Cogent Psychology*, 5(1), 1444330. <u>https://doi.org/10.1080/23311908.2018.1444330</u>
- Thorp, S. R., Glassman, L. H., Wells, S. Y., Walter, K. H., Gebhardt, H., Twamley, E., Golshan, S., Pittman, J., Penski, K., Allard, C., Morland, L. A., & Wetherell, J. (2019). A randomized controlled trial of prolonged exposure therapy versus relaxation training for older veterans with military-related PTSD. *Journal of Anxiety Disorders, 64*, 45–54. https://doi.org/10.1016/j.janxdis.2019.02.003
- Trivedi, R. B., Post, E. P., Sun, H., Pomerantz, A., Saxon, A. J., Piette, J. D., Maynard, C., Arnow, B., Curtis, I., Fihn, S. D., & Nelson, K. (2015). Prevalence, comorbidity, and prognosis of mental health among US veterans. *American Journal of Public Health*, 105(12), 2564–2569. <u>https://doi.org/10.2105/AJPH.2015.302836</u>
- Trøstrup, C. H., Christiansen, A. B., Stølen, K. S., Nielsen, P. K., & Stelter, R. (2019). The effect of nature exposure on the mental health of patients: A systematic review. *Quality of Life Research*, 28(7), 1695–1703. <u>https://doi.org/10.1007/s11136-019-02125-9</u>

- Ulrich, R. S., Simonst, R. F., Lositot, B. D., Fioritot, E., Milest, M. A., & Zelsont, M. (1991). Stress recovery during exposure to natural and urban environments. *Journal of Environmental Psychology*, 11, 201–230.
- U.S. Census Bureau. (2021). S2101: Veteran status: American community survey 1-year estimates [Data table].

https://data.census.gov/table?q=S2101&tid=ACSST1Y2021.S2101&moe=false

- U.S. Department of Veterans Affairs. (2023, January 28). *I am a Veteran*. <u>https://www.va.gov/opa/persona/index.asp</u>
- U.S. Government Accountability Office. (2019, June 12). VA health care: Estimating resources needed to provide community care. (GAO-19-478). <u>https://www.gao.gov/products/gao-19-478</u>
- VA/DoD Clinical Practice Guideline Working Group. (2017). VA/DoD Clinical Practice Guideline for the Management of Posttraumatic Stress Disorder and Acute Stress Disorder. Washington, DC: VA Office of Quality and Performance.
- Valentine, S. E., Marques, L., Wang, Y., Ahles, E. M., Dixon De Silva, L., & Alegría, M. (2019). Gender differences in exposure to potentially traumatic events and diagnosis of posttraumatic stress disorder (PTSD) by racial and ethnic group. *General Hospital Psychiatry*, *61*, 60–68. https://doi.org/10.1016/j.genhosppsych.2019.10.008
- Vance, M. C. & Howell, J. D. (2020). Shell shock and PTSD: A tale of two diagnoses. *Mayo Clinic Proceedings*, 95(9), 1827-1830. <u>https://doi.org/10.1016/j.mayocp.2020.06.002</u>
- van den Berg, L. J. M., Tollenaar, M. S., Spinhoven, P., Penninx, B. W. J. H., & Elzinga, B. M. (2017). A new perspective on PTSD symptoms after traumatic vs stressful life events and

the role of gender. *European Journal of Psychotraumatology*, 8(1), 1380470. https://doi.org/10.1080/20008198.2017.1380470

Veterans Affairs Canada. (n.d.). Government of Canada. https://www.veterans.gc.ca/eng

- Veterans Affairs Canada. (2022, June 29). Benefits for Veterans. Facts and Figures. *Government* of Canada. <u>https://www.veterans.gc.ca/eng/about-vac/news-media/facts-figures/1-</u> <u>0#benefits-for-veterans</u>
- Vogel, D. L., & Wade, N. G. (2022). *The Cambridge handbook of stigma and mental health* (D. L. Vogel & N. G. Wade, Eds.). Cambridge University Press.
- Vujanovic, A. A., & Back, S. E. (2019). Posttraumatic stress and substance use disorders: A comprehensive clinical handbook (A. A. Vujanovic & S. E. Back, Eds.). Routledge.
- Watkins, L. E., Sprang, K. R., & Rothbaum, B. O. (2018). Treating PTSD: A review of evidence-based psychotherapy interventions. *Frontiers in Behavioral Neuroscience*, 12, 258–258. <u>https://doi.org/10.3389/fnbeh.2018.00258</u>
- Wanklyn, S. G., Pukay-Martin, N. D., Belus, J. M., St. Cyr, K., Girard, T. A., & Monson, C. M. (2016). Trauma types as differential predictors of posttraumatic stress disorder (PTSD), major depressive disorder (MDD), and their comorbidity. *Canadian Journal of Behavioural Science*, 48(4), 296–305. <u>https://doi.org/10.1037/cbs0000056</u>
- Weeks, M., Park, S-B., Ghanem, S., Plebon-Huff, S., Robert, A. M., MacKay, H., & LeBlanc, A. G. (2021). A systematic review of the prevalence of posttraumatic stress disorder reported in Canadian studies. In *Handbook of Posttraumatic Stress: Psychosocial, Cultural, and Biological Perspectives* (pp. 38–108). Taylor and Francis. https://doi.org/10.4324/9781351134637-3

- Wilson, G., Farrell, D., Barron, I., Hutchins, J., Whybrow, D., & Kiernan, M. D. (2018). The use of eye-movement desensitization reprocessing (EMDR) therapy in treating post-traumatic stress disorder: A systematic narrative review. *Frontiers in Psychology*, *9*, 923–923. https://doi.org/10.3389/fpsyg.2018.00923
- Wilson, E. O. (1984). *Biophilia*. Harvard University Press.

https://doi.org/10.4159/9780674045231

- Wood, D. S., Wood, B. M., Watson, A., Sheffield, D., & Hauter, H. (2020). Veteran suicide risk factors: A national sample of nonveteran and veteran men who died by suicide. *Health & Social Work*, 45(1), 23–30. <u>https://doi.org/10.1093/HSW/HLZ037</u>
- World Health Organization. (2019). *International classification of diseases, 11th revision* (ICD-11). <u>https://icd.who.int/en</u>
- Zoellner, L. A., Roy-Byrne, P. P., Mavissakalian, M., & Feeny, N. C. (2019). Doubly randomized preference trial of prolonged exposure versus sertraline for treatment of PTSD. *The American Journal of Psychiatry*, *176*(4), 287–296.
 https://doi.org/10.1176/appi.ajp.2018.17090995