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Integrative approaches to the diagnosis and treatment of canine post-traumatic stress disorder

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Canine post-traumatic stress disorder is an increasingly recognized condition within veterinary behavioral medicine, reflecting a growing understanding of how trauma affects the psychological well-being of companion animals. Dogs exposed to acute or chronic stressors, including abuse, abandonment, military deployment, and natural disasters, may develop persistent behavioral disturbances consistent with post-traumatic stress disorder. However, diagnosis remains a significant challenge due to overlapping symptoms with other behavioral disorders, absence of standardized diagnostic criteria, and limited veterinary training in animal mental health. The analysis draws upon peer-reviewed literature published between 2005 and 2024 across databases such as PubMed, Scopus, and CAB Abstracts. Selection criteria prioritized studies on post-traumatic stress disorder-related symptomatology, behavioral diagnostics, pharmacotherapy, and therapeutic interventions, with emphasis on methodological rigor and clinical applicability. While both human-based diagnostic frameworks and canine-specific behavioral assessments are discussed, their translational limitations are critically examined. Clinically, canine post-traumatic stress disorder manifests through hyperarousal, avoidance, aggression, anxiety, and depressive-like behaviors. Diagnosis necessitates comprehensive behavioral histories, validated screening instruments, and exclusion of differential diagnoses, including neurological, endocrine, and pain-related conditions. A consistent finding in literature is the essential role of interdisciplinary collaboration, involving veterinarians, behaviorists, psychologists, and professional trainers. Despite this, the veterinary profession continues to lack structured education in behavioral medicine, contributing to underdiagnosis and inconsistent treatment practices. Methodological limitations, including small sample sizes, non-validated outcome measures, and heterogeneity in definitions – further constrain evidence-based advancements. Future priorities include the development of standardized diagnostic criteria, large-scale epidemiological and neurobiological research, and investigation into novel pharmacological agents, including cannabinoid derivatives and neuropeptides. Public and professional education initiatives are also critical to improve recognition and management of post-traumatic stress disorder in dogs. A comprehensive, multidisciplinary, and ethically informed approach is imperative to enhance the quality of life for traumatized animals and to advance veterinary behavioral science.

Keywords: canine PTSD; behavioral disorders; veterinary behavioral medicine; anxiolytic therapy; SSRIs in dogs; multidisciplinary care; neurobiology of stress; welfare in companion animals.

Introduction

Post-traumatic stress disorder (PTSD) in dogs is a severe behavioral and neuropsychological condition that arises because of exposure to intense or prolonged traumatic experiences. Although the term "PTSD" has traditionally been associated with human psychiatry, there is a growing body of evidence indicating that dogs – particularly those exposed to combat environments, abuse, or chronic stress – can exhibit symptoms analogous to human manifestations of the disorder (Maoz et al., 2021).

The clinical signs of canine PTSD include hyperarousal, social withdrawal from humans and other dogs, aggressive or phobic behaviors, as well as disturbances in sleep and appetite. These symptoms can significantly compromise the animal's quality of life and hinder its ability to interact effectively with people and other animals (O'Haire et al., 2024). The lack of standardized diagnostic criteria in veterinary practice further complicates the timely identification and treatment of this condition.

Contemporary treatment strategies for canine PTSD involve both pharmacological and behavioral approaches. Pharmacotherapy typically includes the use of selective serotonin reuptake inhibitors (SSRIs), such as fluoxetine, as well as other agents like trazodone that help mitigate anxiety and stress-related symptoms (Gruen et al., 2021). Behavioral interventions, including systematic desensitization and positive reinforcement, have also demonstrated efficacy in alleviating PTSD symptoms in affected dogs (Butler et al., 2011).

In light of these considerations, the present review aims to synthesize current knowledge concerning the ethological and pharmacological aspects of the diagnosis and treatment of PTSD in dogs. Special emphasis in this article is placed on the analysis of peer-reviewed studies published between 2000 and 2025 to identify recent advances and evidence-based strategies for the effective management of this disorder. To ensure the scientific rigor and high quality of this review, a systematic literature search was conducted using leading academic databases: PubMed, Scopus, Web of Science, and CAB Abstracts. These databases were selected for their scholarly authority, interdisciplinary coverage, and relevance to veterinary, medical, behavioral, and pharmacological research, as well as their access to peer-reviewed publications.

Inclusion criteria for sources in this review comprised: peer-reviewed articles; publications containing original research (clinical observations or experiments), reviews, or meta-analyses; English-language publications; works published primarily between 2000 and 2025; and sources directly addressing the diagnosis, pathophysiology, or treatment of PTSD in dogs.

Exclusion criteria involved studies focused solely on human PTSD without extrapolation to veterinary contexts, and research involving other animal species unless directly compared to canine data.

Ethological foundations of post-traumatic stress disorder in dogs

At the core of this response is the activation of the hypothalamic-pituitary-adrenal (HPA) axis, which triggers the release of cortisol and adrenaline – hormones that mobilize physiological resources to support the "fight-or-flight" reaction (Sherman & Mills, 2008). While this mechanism has proven adaptive under natural selection pressures,

it may become pathological under modern conditions, particularly with prolonged or repeated exposure to stressors (Gruen et al., 2021).

Research indicates that even short-term but intense stress events can induce profound behavioral changes in dogs, closely resembling PTSD mechanisms observed in humans (Titulaer et al., 2013). Cross-species ethological comparisons allow for the interpretation of the canine stress response through adaptive survival models, emphasizing fear as the primary emotion that, under specific conditions, can transform into dysfunctional states (Korpivaara et al., 2017). Early-life experiences play a critical role, as they may or may not sensitize the neuroendocrine system to stress stimuli later in life.

Similar mechanisms have been documented in animal models of PTSD, particularly in rodents, where social isolation has been shown to produce long-lasting alterations in brain structures responsible for fear and anxiety – most notably, the amygdala and prefrontal cortex (Locci & Pinna, 2019). These findings support the validity of inter-species ethological models of PTSD and justify their application in veterinary behavioral medicine.

Behavioral manifestations of PTSD in dogs include a range of maladaptive symptoms such as phobias (especially noise-related), generalized anxiety, hyperarousal, sleep disturbances, and defensive or reactive aggression. Additionally, compulsive behaviors – such as excessive licking, tail chasing, or repetitive circling – are commonly reported (O'Sullivan et al., 2008; Sherman & Mills, 2008). When such behavioral patterns occur in combination, they may indicate the presence of a severe and chronic stress disorder analogous to human PTSD.

Disruption of social skill development in dogs as a contributing factor to PTSD symptoms

The social environment plays a pivotal role in either facilitating or mitigating the development of PTSD in dogs. One of the most prominent risk factors is exposure to combat zones. Military and working dogs subjected to explosions, loud noises, smoke, and erratic human behavior in such settings often exhibit symptoms of hyperarousal, reactive aggression, phobic responses, and avoidance behaviors (Maoz et al., 2021; O'Haire et al., 2024).

Another major social determinant is abuse and neglect. Chronic physical punishment, verbal aggression, social deprivation, and emotional neglect lead to the development of maladaptive survival strategies in dogs. These include hypervigilance, behavioral inertia, compulsive behaviors, or complete withdrawal from social interactions (Sherman & Mills, 2008; Kim & Cicchetti, 2010).

Extended social isolation, particularly in shelters or laboratory environments, also has a profound negative impact. Studies indicate that the lack of socialization and sensory stimulation during the critical periods of social development results in deficits in adaptive behavior. These deficits may manifest later in life as PTSD-like symptoms (Hekman et al., 2014; Locci & Pinna, 2019).

Comparable findings have been documented in human studies, where social isolation, loss of loved ones, or lack of supportive relationships are associated with poorer PTSD outcomes and an increased risk of chronicity (Kim & Cicchetti, 2010). These parallels underscore the fundamental importance of social context in shaping stress responses across social species, including dogs.

Disruptions in early socialization have a profound impact on behavioral development and are considered a key etiological factor in canine PTSD. The critical period for the formation of adaptive emotional and behavioral responses is between 3 and 14 weeks of age, during which dogs are highly sensitive to new stimuli and social experiences. This phase is marked by intense neural development related to social cognition and learning. A lack of positive interactions with humans, conspecifics, and the physical environment during this period fosters the development of fear, anxiety, and mistrust, thereby laying the groundwork for later PTSD-like pathology (Kutsumi et al., 2012).

Early socialization programs serve as an effective preventive measure against behavioral disorders. Conversely, puppies deprived of such early experiences often display sensory hypersensitivity, fear of strangers or unfamiliar objects, and behavioral rigidity, all of which increase their vulnerability to stress-induced psychopathologies (Overall, 2013).

Interdisciplinary research on PTSD risk factors in dogs reveals significant parallels with human pathogenetic mechanisms

In addition to deficits in early socialization, other pathogenetic factors contribute to the development of PTSD in dogs. Comprehensive anamnesis collection and careful assessment of the dog's emotional state are crucial for the early identification of behavioral markers and for the prevention of chronic progression (Titulaer et al., 2013). Overall, interdisciplinary studies of PTSD risk factors in dogs demonstrate remarkable similarities to those identified in humans. These findings support the use of veterinary behavioral medicine as a model system for investigating stress-induced disorders in social mammals.

The ethological analysis of PTSD in dogs confirms a tight interplay between biological, social, and behavioral factors in the pathogenesis of the disorder. In dogs, as in other social species, trauma responses are grounded in evolutionarily conserved neurobiological mechanisms of survival and emotion-related memory circuits in the brain. Disruption of social development during critical ontogenetic periods, especially in early puppyhood, greatly increases the risk of developing maladaptive stress responses that may evolve into PTSD. Types of traumatic experiences – such as abuse, exposure to warfare, prolonged social isolation, or neglect – have comparable psychoemotional significance and lead to similar patterns of behavioral dysfunction. These patterns include phobias, aggression, anxiety disorders, compulsive behaviors, and hyperarousal, which are considered typical markers of PTSD in canines. Additionally, somatic illness and chronic pain play an important role, acting either as precipitating factors or as complicating elements in the course of the disorder.

In sum, the ethological determinants of PTSD in dogs show substantial convergence with human mechanisms, as demonstrated by both neurobehavioral research and clinical observation. This comparative perspective enriches our understanding of behavioral pathologies in animals and opens new avenues for the development of more effective diagnostic, preventive, and therapeutic strategies, which take into account the individual history, developmental stage, and social context of each dog.

Core diagnostic criteria of post-traumatic stress disorder in dogs: a systemic behavioral, physiological, and anamnestic approach

The diagnostic framework for PTSD in dogs is grounded in a comprehensive analysis of behavioral, physiological, and anamnestic indicators. This integrative assessment enables the establishment of a robust association between a history of trauma and the manifestation of specific clinical symptoms.

Among these indicators, behavioral criteria are the most informative. They typically include the development of pathological anxiety, phobic responses, sleep disturbances, disoriented or destructive behaviors, excessive barking, aggression, social withdrawal or, conversely, clinginess, as well as prominent compulsive behavior patterns (Sherman & Mills, 2008; Yin, 2009). These reactions often appear disproportionate or irrelevant to the current context and may be triggered by sensory cues – sounds, smells, visual stimuli, or environments – linked to prior trauma (Luescher & Medlock, 2009).

Physiological signs are generally non-specific but may reflect chronic stress. Common manifestations include tachycardia, hyperventilation, pupil dilation, hypersalivation, tremors, appetite alterations, and dysregulation of the hypothalamic-pituitary-adrenal axis (Hekman et al., 2014). Objective physiological markers such as salivary or hair cortisol levels and heart rate variability have been proposed as useful tools for identifying autonomic nervous system dysfunction (Dreschel, 2010; Part et al., 2014).

A critical component of diagnosis involves a detailed anamnesis, which requires thorough owner interviews regarding the dog's early-life conditions, socialization history, exposure to potentially traumatic events, and subsequent behavioral changes. Particular attention must

be given to possible instances of abuse, physical or psychological trauma, or environmental factors conducive to PTSD development.

Assessment of the living environment is likewise essential. This includes evaluating the physical setting for chronic stressors such as noise pollution, confinement, or social isolation. The dog's interactions with humans and other animals should also be considered, as deficient socialization or the absence of positive social experiences may contribute to the emergence of social anxiety, a core feature of PTSD (Schalke et al., 2005; Millot et al., 2020).

The diagnostic process benefits significantly from standardized behavioral assessment tools. One widely validated instrument is the Canine Behavioral Assessment and Research Questionnaire (C-BARQ), which quantifies behavioral tendencies across various domains, including fearfulness, aggression, anxiety, compulsivity, and stress-related responses (Hsu & Serpell, 2003). With over 100 items, C-BARQ is extensively used in both veterinary behavioral research and clinical settings. It facilitates the identification of stress-linked behavioral syndromes and helps differentiate trauma-related behaviors from those stemming from other psychological or somatic disorders (Jones & Gosling, 2005).

Table 1 presents an integrative framework for the diagnosis of post-traumatic stress disorder in dogs, structured across seven core domains: behavioral indicators, physiological responses, anamnestic data, environmental factors, standardized behavioral assessments, differential diagnoses, and comorbidity considerations. This multidimensional approach highlights the complexity of PTSD diagnosis and underscores the necessity of combining clinical observation, validated instruments, and thorough history-taking.

Table 1
Core diagnostic criteria of post-traumatic stress disorder in dogs

Diagnostic domain	Key features	Assessment tools / methods
Behavioral indicators	– pathological anxiety – phobic reactions – hypervigilance – sleep disturbances – destructive behavior – excessive vocalization – aggression – social withdrawal or overattachment – compulsive behaviors	– structured clinical observation – owner interviews – C–BARQ (Canine Behavioral Assessment and Research Questionnaire) – video analysis in home environment
Physiological indicators	– tachycardia – hyperventilation – mydriasis (pupil dilation) – hypersalivation – tremors – altered appetite – endocrine dysregulation (e.g., HPA axis)	– measurement of cortisol (salivary, serum, or hair) – heart rate variability analysis – veterinary physical examination
Anamnestic factors	– history of trauma (abuse, abandonment, injury, disasters) – lack of early socialization – exposure to chronic stressors – environmental instability	– detailed behavioral history – owner–provided behavioral timelines – structured anamnesis questionnaires
Environmental assessment	– chronic stress exposure (noise, confinement) – deficient social interaction – inadequate enrichment – negative interactions with humans or animals	– on–site environmental evaluation – structured environmental checklists – owner–provided video or photographic documentation
Standardized behavioral assessment	– behavioral syndromes linked to trauma – quantification of anxiety, fear, and compulsivity – differentiation from normal or temperament–based behaviors	– C–BARQ – other validated ethological inventories (if available) – behavioral scoring protocols
Differential diagnosis	– rule out epilepsy, cognitive dysfunction, chronic pain, endocrine disorders	– neurological exams – endocrinological panels (e.g., thyroid function, ACTH test) – diagnostic imaging (MRI, EEG) – pain assessment scales
Comorbidity considerations	– concurrent behavioral or somatic disorders – overlapping symptom profiles	– multidisciplinary case review – referral to veterinary specialists (neurology, endocrinology, orthopedics)

The table emphasizes the role of standardized tools such as C-BARQ, as well as the importance of excluding neurological, endocrine, and somatic pathologies through specialized diagnostic procedures. By systematizing diagnostic criteria, the table aims to support evidence-based clinical decision-making and foster interdisciplinary collaboration in the assessment and management of canine PTSD.

Differential diagnosis is a necessary step in excluding conditions that may mimic PTSD symptoms, such as canine cognitive dysfunction, endocrine imbalances, epilepsy, or chronic pain syndromes. It is also crucial to recognize the often chronic or recurrent nature of PTSD and the frequent presence of comorbidities, which can complicate both diagnosis and management. A multidisciplinary diagnostic approach is therefore recommended to ensure comprehensive assessment and effective therapeutic planning.

Differential diagnosis of post-traumatic stress disorder in dogs and the role of diagnostic biomarkers and neuroimaging

Differential diagnosis of PTSD in dogs is a crucial step in establishing an accurate diagnosis and developing an effective treatment strategy. Since PTSD is characterized by a wide range of behavioral symptoms, such as anxiety, aggression, phobias, hyperexcitability, and compulsive behaviors, it is essential to rule out other pathological conditions that may be presented with similar clinical manifestations. These include neurological, endocrine, and somatic disorders that can produce overlapping symptoms.

One of the primary diagnostic steps is the exclusion of neurological diseases such as epilepsy, brain tumors, traumatic brain injury, or other central nervous system pathologies that may lead to behavioral alterations. For instance, epileptic seizures may be manifested not only with physiological symptoms (e.g., convulsions) but also with behavioral changes such as aggression, disorientation, or altered social interactions. Additionally, a history of head or neck trauma should be carefully assessed, as brain injury can exert prolonged effects on canine behavior, including cognitive impairment and changes in emotional responsiveness (Dzik et al., 2018).

Endocrine disorders such as hypothyroidism, Cushing's syndrome, and other dysfunctions of the thyroid or adrenal glands may also lead to behavioral alterations resembling PTSD. Hypothyroidism can be presented as depression, apathy, aggressive behavior, or impaired social interactions, whereas Cushing's syndrome is frequently associated with heightened anxiety, sleep disturbances, and physical chan-

ges, including weight gain, polydipsia, and polyuria (Conroy & Johnson, 2020; Hughes et al., 2021). Therefore, differential diagnosis requires biochemical blood analysis, measurement of thyroid hormones and cortisol levels, and the implementation of specific hormonal testing protocols such as the ACTH stimulation test when Cushing's syndrome is suspected (Lothrop et al., 2017).

With respect to somatic pathologies, it is important to rule out conditions such as chronic pain, arthritis, or gastrointestinal diseases that may irritate the nervous system and lead to behavioral changes in dogs. Animals suffering from chronic pain may display aggressive behavior or avoid social contact due to discomfort (Scott et al., 2020). Physical examination, palpation, radiographic imaging, and laboratory tests for inflammatory or infectious processes are keys to excluding somatic diseases with overlapping symptomatology.

Therefore, a comprehensive differential diagnosis of PTSD should include the exclusion of neurological, endocrine, and somatic conditions through a multifaceted approach involving specialized diagnostic methods and meticulous history-taking. Referral to veterinary specialists such as neurologists, endocrinologists, or orthopedic practitioners may be warranted to confirm the diagnosis and rule out alternative causes of behavioral disturbances.

Neuroimaging, hormonal, and neurochemical markers in the diagnosis and monitoring of PTSD in dogs

The use of neuroimaging technologies, hormonal assays, and neurochemical markers offers valuable tools for the clinical diagnosis and monitoring of PTSD in dogs. Neuroimaging modalities such as magnetic resonance imaging (MRI) and functional MRI (fMRI) enable the evaluation of anatomical and functional changes in the canine brain associated with PTSD. Although primarily applied in research contexts, these technologies are increasingly recognized for their potential utility in clinical practice. For example, studies have shown that dogs with chronic stress or traumatic experiences may exhibit structural brain alterations, including hippocampal atrophy – a region critical for memory formation and regulation of the stress response (Pich, 2017). Such findings advance our understanding of the pathophysiology of PTSD and emphasize the relevance of neuroimaging for evaluating brain regions implicated in stress-related processes.

Hormonal markers are also important in diagnosing and monitoring PTSD in dogs. Cortisol, a primary stress hormone secreted by the adrenal glands, is one of the most extensively studied biomarkers in this context. Elevated cortisol levels in blood or saliva have been observed in dogs exposed to traumatic events, particularly in those exhibiting anxious or aggressive behaviors (Handlin et al., 2016). Comparing cortisol levels in dogs diagnosed with PTSD versus healthy controls may aid in diagnostic differentiation and provide a means to evaluate treatment efficacy.

Oxytocin, often referred to as the "bonding hormone," plays a significant role in modulating emotional responses to stress. Dogs with PTSD may exhibit decreased oxytocin levels, resulting in impaired social behaviors and diminished capacity for emotional regulation under stress (Quintana et al., 2017). Given its anxiolytic and prosocial effects, oxytocin may serve as a potential biomarker for stress-related disorders in dogs. Moreover, therapeutic modulation of oxytocin levels – either through behavioral interventions or pharmacological agents – may represent a promising avenue in PTSD treatment.

Thus, neuroimaging, hormonal, and neurochemical biomarkers offer significant diagnostic and monitoring capacities for PTSD in dogs. These methods facilitate a more precise evaluation of physiological changes associated with trauma exposure and support the development of individualized treatment strategies. Nevertheless, further research is required to validate and expand the routine application of these technologies in clinical veterinary practice. The key aspects of PTSD diagnosis in dogs include behavioral and physiological criteria, thorough assessment of medical history and environmental context, the use of standardized behavioral rating scales, and differential diagnosis to exclude other conditions. A comprehensive diagnostic approach must incorporate both behavioral observations and physiological markers – such as cortisol, serotonin, and oxytocin levels. Additionally, neuroimaging, although still emerging in clinical settings, offers promising prospects for advancing our understanding of canine neurophysiology in the context of stress. The demonstrated utility of behavioral assessment tools, such as the Canine Behavioral Assessment and Research Questionnaire (C-BARQ), enhances the precision and consistency of behavioral diagnostics, which is vital for effective monitoring and therapeutic decision-making.

Table 2 summarizes the principal neuroimaging techniques and neuroendocrine biomarkers relevant to the diagnosis and monitoring of post-traumatic stress disorder in dogs.

Table 2
Diagnostic and monitoring modalities for PTSD in dogs: neuroimaging, hormonal, and neurochemical biomarkers

Domain	Tool / marker	Clinical significance	Current limitations
Neuroimaging	Structural MRI	Detection of brain changes (e.g., hippocampal atrophy) linked to chronic stress	Limited clinical availability; requires sedation; primarily research-based
	Functional MRI (fMRI)	Identification of altered activity in stress-regulating brain regions	High cost and technical complexity
Hormonal markers	Cortisol (serum, saliva, hair)	Elevated levels correlate with acute or chronic stress response	Circadian variation; influenced by non-specific stressors
	Oxytocin	Decreased levels may indicate impaired social bonding and stress regulation	Limited normative data in dogs; sampling challenges
Neurochemical markers	Serotonin (5-HT)	Involved in mood regulation; dysregulation associated with anxiety and aggression	Requires specialized assays; variability across individuals
	Norepinephrine (NE)	Elevated levels reflect hyperarousal; implicated in fear-conditioning pathways	Not routinely measured in clinical practice
	Dopamine	Altered levels linked to motivational and affective dysregulation	Interpretation complicated by polypharmacy and behavioral comorbidities
Combined indices	Cortisol:oxytocin ratio	Emerging biomarker of stress-reactivity and resilience	Requires further validation

These modalities support a deeper understanding of the neurobiological basis of canine PTSD, offering potential indicators for clinical assessment, therapeutic targeting, and treatment monitoring. While promising, the practical application of these tools remains constrained by logistical, technical, and interpretative limitations, necessitating further research and standardization for routine veterinary use. Collectively, these findings underscore the importance of an integrative evaluation of the dog's condition – combining clinical history, behavioral symptomatology, physiological indices, and advanced diagnostic tools. Accurate diagnosis and successful treatment of PTSD in dogs rely on this multifactorial approach, which minimizes diagnostic errors and facilitates the selection of optimal therapeutic strategies.

Pharmacological treatment of PTSD in dogs depends on the clinical presentation and severity of the condition

Pharmacological intervention constitutes a vital component of the therapeutic strategy for PTSD in dogs. The primary objective of such therapy is to correct neurochemical imbalances that arise in response to stress-inducing events, particularly traumatic experiences. Given the multifactorial and heterogeneous nature of PTSD, effective man-

agement typically necessitates the use of various classes of pharmacological agents, each with distinct mechanisms of action, indications, side-effect profiles, and clinical considerations. To date, there is no universally accepted standard pharmacological regimen for the treatment of PTSD in canine patients; therefore, a multimodal approach, combining pharmacologic and behavioral interventions, is generally employed. Below, we provide an overview of the principal drug classes utilized in the management of this disorder.

Selective serotonin reuptake inhibitors (SSRIs) such as fluoxetine and sertraline are the most commonly prescribed medications for managing PTSD in dogs. These agents inhibit serotonin reuptake in presynaptic neurons, thereby increasing synaptic serotonin concentrations, improving neurotransmission, and stabilizing mood. Fluoxetine, administered orally at a dosage of 1–2 mg/kg daily, has demonstrated efficacy in reducing behavioral disturbances associated with separateon anxiety and compulsive disorders (Echeverri & Govendir, 2022). However, clinicians should be aware of potential side effects, including sleep disturbances, anorexia, and gastrointestinal upset, and monitor patients closely during treatment (Echeverri & Govendir, 2022).

Alternative anxiolytics: Trazodone and Buspirone. Trazodone, a serotonin receptor antagonist with sedative properties, is frequently employed to manage anxiety symptoms in dogs, particularly in cases characterized by hyperarousal. Dosage typically ranges from 1 to 5 mg/kg daily, adjusted based on clinical response. Buspirone, a nonsedative anxiolytic, modulates serotonin receptor activity and effectively reduces anxiety levels. A standard dosage of buspirone is approximately 0.25–0.50 mg/kg administered twice daily (Sodhi et al., 2018). Common side effects may include mild sedation, sleep disturbances, and gastrointestinal symptoms.

Benzodiazepines. Diazepam has been used in cases of situational anxiety, such as noise phobias. Owners who administered diazepam for thunderstorm phobia were more likely to perceive the medication as effective compared to those using it for separation anxiety. Notably, higher doses (≥ 0.8 mg/kg) were more frequently associated with hyperactivity as an adverse effect compared to lower doses (Herron et al., 2008).

α_2-Adrenergic agonists, including dexmedetomidine and clonidine, have been explored for their sedative and anxiolytic effects in canine PTSD management. Clonidine, in particular, has shown promise in managing fear-based behavioral disorders. In a study involving 22 dogs with various fear-related conditions – such as separation anxiety, noise phobia, and fear-induced aggression – clonidine, administered in conjunction with behavior modification protocols, was associated with improved outcomes in 70% of anxiety-phobia cases and 92% of fear-aggression cases. Adverse effects were minimal, with only one case of heightened noise sensitivity reported (Ogata & Dodman, 2011). Despite encouraging results, further controlled trials are necessary to confirm the safety and efficacy of clonidine in veterinary behavioral medicine.

Emerging therapies: Cannabinoids and Ketamine. Recent research has investigated novel compounds for their therapeutic potential in canine PTSD. Cannabinoids, particularly cannabidiol (CBD), are gaining attention for their anxiolytic and analgesic properties. Unlike tetrahydrocannabinol (THC), CBD lacks psychoactive effects, rendering it potentially safer for veterinary use. Preliminary studies suggest that CBD can reduce anxiety and stress, enhance appetite, and alleviate pain in dogs. The standard dosage is approximately 0.1–0.5 mg/kg administered twice daily. Nonetheless, further investigation is warranted to determine long-term safety and therapeutic efficacy in canine PTSD (Vaughn et al., 2020).

Ketamine, traditionally utilized as an anesthetic, possesses neuroplastic and anxiolytic properties that render it a promising agent for PTSD treatment. Evidence suggests that ketamine mitigates symptoms of anxiety and depression by activating NMDA receptors and modulating glutamatergic neurotransmission (Vlerick et al., 2018). The initial dose typically ranges from 0.5–1.0 mg/kg via injection, with effects lasting several hours. However, ketamine administration necessitates stringent monitoring due to cardiovascular side effects such as hypertension, tachycardia, and hallucinations.

The pharmacological treatment of PTSD in dogs encompasses a spectrum of therapeutic agents – ranging from well-established drugs such as SSRIs and benzodiazepines to emerging compounds like cannabinoids and ketamine. Each class presents distinct therapeutic benefits and safety considerations, emphasizing the importance of individualized treatment plans. Clinicians must carefully consider the animal's clinical presentation, comorbidities, and behavioral profile when selecting pharmacologic interventions, while also remaining vigilant to potential side effects and drug interactions.

Recent studies highlight a bidirectional relationship between epilepsy and anxiety, suggesting that both pharmacologic and behavioral interventions may benefit these patients (Watson et al., 2018). Nevertheless, pharmacologic management may be accompanied by adverse reactions, including sedation and cardiac arrhythmias, warranting careful monitoring.

Table 3 provides a structured overview of the principal pharmacological agents used in the treatment of post-traumatic stress disorder in dogs. It outlines the major drug classes, representative agents, mechanisms of action, primary clinical indications, recommended dosages, common adverse effects, and relevant clinical considerations.

Table 3
Overview of pharmacological agents for the treatment of PTSD in dogs

Drug class	Example agents	Mechanism of action	Indications	Dosage, mg/kg	Common side effects	Clinical notes
SSRIs	Fluoxetine, Sertraline	Inhibition of serotonin reuptake → increased synaptic serotonin	Generalized anxiety, compulsive disorders, PTSD	1–2 mg/kg once daily	GI upset, anorexia, sleep disturbances	First-line treatment; monitor closely during initiation (Echeverri & Govendir, 2022).
Serotonin antagonist / anxiolytic	Trazodone	Serotonin receptor antagonist; sedative and anxiolytic	Hyperarousal, situational anxiety	1–5 mg/kg once daily	Mild sedation, GI upset	Often used adjunctively with SSRIs; titrate dose individually.
Anxiolytics (non-sedative)	Buspirone	Partial agonist at 5-HT1A receptors	Generalized anxiety, mild fear-based behaviors	0.25–0.5 mg/kg BID	Sedation, sleep disturbances	Less effective in severe cases; long onset of action (Sodhi et al., 2018).
Benzodiazepines	Diazepam	GABA-A receptor agonist → CNS depressant	Situational anxiety (e.g., thunderstorms)	0.5–1.0 mg/kg as needed	Sedation, paradoxical hyperactivity	Caution with long-term use; risk of dependence and disinhibition (Herron et al., 2008).
α2-Adrenergic agonists	Clonidine, Dexmedetomidine	Inhibits norepinephrine release → sedative, anxiolytic effects	Noise phobia, fear-aggression, separation anxiety	Clonidine: 0.01–0.05 mg/kg BID	Bradycardia, mild hypotension, noise sensitivity	Often used with behavior therapy; low adverse event profile (Ogata & Dodman, 2011).
Cannabinoids	Cannabidiol (CBD)	Modulation of endocannabinoid system → anxiolytic, anti-inflammatory	Stress, anxiety, pain syndromes	0.1–0.5 mg/kg BID	Drowsiness, GI symptoms (rare)	Lacks psychoactivity of THC; still under clinical investigation (Vaughn et al., 2020).
NMDA Antagonist	Ketamine	NMDA receptor antagonist → enhances glutamatergic plasticity	Refractory anxiety, depression, PTSD	0.5–1 mg/kg (injection)	Hypertension, tachycardia, hallucinations	Requires monitoring; reserved for severe or treatment-resistant cases (Vlerick et al., 2018).

This comparative format facilitates evidence-based decision-making in veterinary behavioral medicine by highlighting the therapeutic scope and limitations of each pharmacological option. The table underscores the necessity of individualized treatment plans, guided by the animal's specific behavioral profile, comorbidities, and treatment response.

Ultimately, while newer agents offer promising alternatives, their clinical application must be guided by rigorous evidence and ethical considerations. Continued research and standardized clinical trials are imperative to enhance our understanding of the safety, efficacy, and long-term outcomes of these treatments in veterinary behavioral medicine.

Positive reinforcement, systematic desensitization, and counterconditioning are fundamental methods of behavioral therapy in the treatment of dogs with PTSD

Behavioral therapy constitutes an essential component in the management of post-traumatic stress disorder (PTSD) in dogs, as it facilitates the correction of behavioral disturbances such as anxiety, phobias, aggression, and hyperexcitability. The primary goal of behavioral therapy is to modify the animal's responses to stress-inducing stimuli and to foster new, more adaptive behavioral patterns. The most effective methods include positive reinforcement, systematic desensitization, and counterconditioning.

Positive reinforcement is the foundation of many contemporary approaches to animal training and behavioral problem correction. This method is based on encouraging desirable behaviors through the use of positive stimuli, such as treats, toys, or verbal praise. A crucial aspect of this method lies in its ability to establish an association between a desired behavior and pleasant outcomes. In the case of dogs suffering from PTSD, positive reinforcement helps reduce reactivity to stressors and encourages more calm and balanced behavior. Systematic desensitization involves the gradual and controlled exposure of the animal to a traumatic or stress-inducing stimulus at a safe intensity, with incremental increases in intensity or frequency over time. The principle of this method is to habituate the animal to the stressful element without provoking a negative reaction. For example, in treating noise phobia, the dog is initially exposed to a very soft version of the sound, with volume gradually increased until the animal can respond calmly to the stimulus. Desensitization allows animals to gradually adapt to traumatic situations and diminishes their emotional responses (Landsberg et al., 2013).

Counterconditioning is another crucial behavioral therapy technique, which involves replacing negative associations with positive ones. The basis of counterconditioning is the substitution of an undesirable response to a stress-inducing stimulus with a desired one, enabling the animal to form a new, positive association with the same stimulus. For instance, if a dog exhibits fear toward a particular situation or object, treats or toys can be used to replace the negative association with a positive one. This transformation in perception helps reduce PTSD symptoms (McMillan, 2017).

In summary, positive reinforcement, systematic desensitization, and counterconditioning are foundational methods of behavioral therapy in the treatment of PTSD in dogs. These approaches contribute not only to the alleviation of stress-related symptoms but also to the improvement of the animal's overall emotional well-being, which is crucial for its adaptation to the environment and normal functioning.

The formation of alternative behavioral models as a key aspect of PTSD correction in dogs

An important component of the therapeutic process for canine post-traumatic stress disorder (PTSD) is the transformation of maladaptive, distress-related responses to stress-inducing stimuli into more adaptive behavioral models. This is achieved by replacing old habits and reaction patterns with new behaviors that are more effective in mitigating stress and improving the dog's quality of life. Alternative behavioral models may include calm responses to stressful stimuli, reduced anxiety or aggression, and the development of stable, positive social interactions with other animals or humans.

One of the principal approaches to shaping such behaviors is training through positive reinforcement for calm and orderly behavior in stressful situations. This may involve rewarding the dog for the absence of an adverse reaction to a specific object or sound that previously triggered intense fear or aggression. It is essential in this process to ensure clear, consistent communication and reinforcement in order to avoid confusion and to facilitate proper adaptation to the new behavioral model. In our view, the active involvement of the dog's owner in the behavioral correction process is an indispensable part of therapy. Owners should be directly engaged in the behavioral therapy program, as their role in maintaining stability and providing a sense of safety is critical. Not only should owners learn to correctly apply methods of positive reinforcement and desensitization, but they must also offer continuous support and reinforcement of desired behavior. Positive interactions with the owner significantly influence the dog's emotional state, contributing to anxiety reduction and fostering a sense of security. Importantly, the owner must be patient and consistent in applying therapeutic strategies, as behavioral change often requires time and repetition.

Environmental modifications represent another important factor in the treatment of canine PTSD. The environment should be conducive to the dog's psychological and physical well-being. Minimizing stressors such as loud noises, aggressive encounters with other animals, or unpredictable changes in daily routines can greatly facilitate the dog's adaptation and recovery. Regularity and environmental stability are essential for dogs suffering from PTSD, as predictability in their surroundings helps reduce anxiety. In particular, maintaining a structured daily routine – including consistent feeding times, walks, and enrichment activities – supports the normalization of physiological and psychological processes.

Regarding routine as a therapeutic factor, it is critical that the dog's daily schedule remains stable and is not altered unnecessarily. Owners must ensure that the dog's environment remains predictable, which may help restore a sense of safety. For example, the establishment of consistent times for feeding, walks, and sleep allows the dog to perceive its environment as stable, thus reducing stress and enhancing trust in the owner. Research has shown that environmental stability facilitates recovery of social responsiveness and the development of new adaptive behavioral patterns in dogs with PTSD (Landsberg et al., 2013).

In conclusion, the development of alternative behavioral models, along with the provision of a stable environment and routine, are key elements in the treatment of PTSD in dogs. Coordination between the owner, the environment, and therapeutic interventions is essential to achieving maximum therapeutic efficacy and facilitating the dog's adaptation to stress-related challenges.

Specialist-led behavioral therapy as a key component in the treatment of canine post-traumatic stress disorder

Veterinary behaviorists possess specialized education and experience in the field of animal psychology and behavioral medicine, which enables them to perform thorough evaluations of a dog's mental state and to design individualized treatment programs. These professionals often collaborate with general veterinary practitioners to ensure a comprehensive approach to care that addresses both the emotional and physiological needs of the animal.

A central element of such therapy involves behavior modification techniques, particularly the use of positive reinforcement, systematic desensitization, and counterconditioning, as previously discussed. Veterinary behaviorists are trained to apply targeted strategies tailored to traumatized dogs, including the identification of stress triggers, development of coping mechanisms to facilitate interactions with people and other animals, and owner training in behavioral therapy techniques. A critical part of this process is educating the owner not only in behavioral management strategies but also in understanding the psychological and emotional needs of their pet.

This type of therapy requires continuous observation of the dog's behavior, with therapeutic strategies adjusted in accordance with the animal's progress. It is crucial that owners receive clear guidance and are able to implement these strategies independently under professional supervision.

Such collaborative engagement fosters a stable and supportive environment that facilitates the dog's recovery and adaptation. It also serves as the foundation for utilizing modern tools to monitor therapeutic progress in dogs with PTSD. Behavioral and emotional monitoring tools provide a more accurate assessment of therapeutic outcomes and enable timely adjustments to the treatment approach. One such tool is the Canine Behavioral Assessment and Research Questionnaire (C-BARQ), which allows both professionals and owners to systematically evaluate changes in behavior throughout the treatment process. This instrument assesses parameters such as anxiety levels, aggression, social interactions, phobias, and other relevant indicators, providing a comprehensive picture of the dog's behavioral dynamics (Wilkins et al., 2024).

Additional monitoring technologies may include video recordings of the dog's behavior in various contexts and mobile applications that allow owners to document the animal's responses to specific stimuli or situations. These tools enable behaviorists to analyze the dog's adaptation process in detail and to adjust therapeutic strategies in real time. Regular assessments and timely therapeutic adjustments are vital for achieving optimal outcomes in PTSD treatment. Equally important is the active involvement of the owner, who provides essential information regarding the dog's behavior outside clinical sessions and contributes to the consistency and success of therapy. Table 4 summarizes the principal behavioral therapy methods and support strategies used in the management of post-traumatic stress disorder (PTSD) in dogs. Each method is categorized by its underlying mechanism, therapeutic objective, and example of clinical application.

Table 4
Core methods and therapeutic strategies in the behavioral treatment of canine PTSD

Method / strategy	Mechanism of action	Therapeutic goal	Clinical application / example
Positive reinforcement	Strengthening desirable behavior through rewarding stimuli	Reduce anxiety and reinforce calm, non-aggressive responses	Rewarding calm behavior in response to previously aversive stimuli (e.g., sound desensitization)
Systematic desensitization	Gradual exposure to fear-inducing stimuli under controlled intensity	Habituate the dog to stressful stimuli, reducing fear response	Gradual increase in sound volume to treat noise phobia
Counterconditioning	Replacing negative associations with positive outcomes	Form new adaptive emotional responses to trauma-related cues	Providing treats during exposure to previously feared objects or environments
Alternative behavioral modeling	Substitution of maladaptive responses with calm, socially acceptable behaviors	Interrupt PTSD-linked behavior patterns; promote resilience	Training the dog to sit calmly when exposed to stress-inducing stimuli
Owner involvement in therapy	Direct participation in behavioral sessions, consistent application of techniques	Ensure continuity of behavioral modification and emotional security	Daily reinforcement of desired behaviors by the owner; avoidance of punishment-based techniques
Environmental modifications	Reduction of unpredictable or aversive stimuli; creation of stable daily routines	Support emotional recovery and physiological stability	Consistent feeding/walk schedules; minimizing loud or sudden noises
Specialist-guided behavioral therapy	Individually tailored interventions based on professional behavioral assessment	Optimize therapy through expert guidance and monitoring	Use of C-BARQ and video recordings to track progress and adapt treatment strategies

The table integrates both foundational behavioral techniques and adjunct strategies such as environmental modifications and professional oversight, illustrating a comprehensive approach to behavioral rehabilitation.

In summary, behavioral therapy constitutes a fundamental component of PTSD treatment in dogs. Its effectiveness largely depends on a well-structured approach that integrates individual behavioral correction and active owner involvement. Methods such as positive reinforcement, systematic desensitization, and counterconditioning play a significant role in mitigating core PTSD symptoms such as anxiety, aggression, and phobias. Additionally, shaping alternative behavioral patterns and establishing stable daily routines create a supportive environment conducive to recovery.

While these therapeutic approaches are essential, the involvement of qualified veterinary behaviorists remains critical. These professionals design personalized treatment plans and oversee the dog's progress through behavioral assessment scales and other monitoring technologies. This ensures the timely identification of any changes in the dog's condition and facilitates the dynamic adjustment of therapeutic interventions. Ultimately, a comprehensive strategy that combines behavioral therapy, accurate behavioral assessment, owner participation, and specialist guidance represents the most effective method for alleviating PTSD symptoms and enhancing the quality of life for affected dogs.

An integrative approach to treating post-traumatic stress disorder in dogs

An integrative approach to the treatment of post-traumatic stress disorder (PTSD) in dogs involves combining pharmacological therapy with behavioral modification methods. This strategy enhances therapeutic efficacy by addressing both neurochemical imbalances and behavioral disturbances. Pharmacological agents can alleviate symptoms such as anxiety, aggression, and depression – core features of PTSD – while behavioral therapy improves the dog's interactions with its environment.

Pharmacological treatment typically includes the use of selective serotonin reuptake inhibitors (SSRIs), tricyclic antidepressants (TCAs), benzodiazepines, and other psychotropic agents aimed at reducing anxiety and stress-related symptoms (e.g., fluoxetine, sertraline, clomipramine). These medications stabilize the dog's emotional state, reduce stress levels, and facilitate adaptation to daily situations. However, while pharmacotherapy is valuable for symptomatic control, it is often insufficient as a standalone long-term treatment. Therefore, combining medication with behavioral intervention is crucial.

Behavioral therapy employs positive reinforcement, counterconditioning, and desensitization techniques to help the dog develop new, adaptive responses to stressors. This combination not only mitigates PTSD symptoms but also equips the animal with alternative behavioral strategies, contributing to long-term recovery. Furthermore, studies suggest that combined pharmacological and behavioral approaches may accelerate therapeutic outcomes and reduce relapse rates (Mills, 2013; Podberscek, 2018).

Animal-assisted interventions (AAIs) are gaining prominence as adjunctive methods in PTSD treatment for dogs. AAIs involve the use of animals to provide psychological support to humans and assist in rehabilitating animals with behavioral disorders such as PTSD. A primary goal of AAIs is to enhance the socialization and emotional stability of dogs recovering from trauma.

AAIs are often integrated into multimodal PTSD treatment regimens in dogs, offering a supportive and low-stress environment conducive to recovery. These interventions may include working with therapeutic animals (e.g., dogs trained in therapeutic assistance) or applying behavioral strategies that incorporate interactions with other animals to reduce stress and aggression (Freeman, 2016).

Research on the efficacy of AAIs in dogs with PTSD indicates that these interventions can be highly beneficial, especially for animals that have experienced extreme stress, such as service dogs returning from military operations. Animal-assisted therapy promotes reengagement with the environment in a naturalistic and less threaten-

ing context, improves social behaviors, and aids in adjustment to new circumstances (Freeman, 2016).

Thus, the integration of pharmacological treatment with behavioral therapy, supplemented by animal-assisted interventions, offers a promising multimodal strategy for managing PTSD in dogs. This approach enhances therapeutic efficacy and supports sustained recovery.

Pharmacological research into the treatment of canine PTSD represents an important domain within neuropsychopharmacology. Given that PTSD encompasses both behavioral and physiological components, there is a need to develop new medications targeting these aspects. Neuropsychopharmacological studies aim to identify specific neurotransmitter and hormonal pathways involved in the pathogenesis of PTSD in dogs.

One promising area involves evaluating novel psychotropic substances, such as cannabinoids and other agents capable of modulating neuroplasticity and reducing stress. Cannabinoids, in particular, show potential for anxiety and stress reduction, making them promising candidates for managing PTSD in dogs (Vaughn et al., 2017).

Genetic studies also hold great potential for uncovering heritable risk factors associated with PTSD development in dogs. This includes investigating polymorphisms in genes regulating neurotransmission, such as those encoding serotonin and dopamine receptors, and other molecules involved in the stress response. These studies may facilitate the development of personalized therapeutic strategies and help identify dogs at increased risk for PTSD. In the future, genetic testing may be used to predict susceptibility to PTSD and guide preventive and therapeutic measures.

Translational research is becoming increasingly significant in advancing scientific approaches to PTSD treatment, as it enables the application of findings from human studies to veterinary practice and vice versa. Many features of PTSD – including emotional distress, neuropsychological alterations, and environmental adaptation – are shared across species, particularly in dogs, which can suffer from analogous psychiatric disorders.

Translational research models provide insight into the mechanisms underlying PTSD and support the transfer of therapeutic innovations from human to veterinary medicine. Studying shared neuropsychological processes – such as cortisol and serotonin level changes – can inform more effective treatment modalities for dogs. At the same time, research on PTSD in dogs may reveal novel therapeutic strategies applicable to humans, including the use of advanced psychopharmacological agents and animal-assisted therapy.

Animal models allow researchers to test new therapeutic approaches under real-life conditions, simplifying the design of clinical trials while mitigating ethical and methodological challenges associated with human research. Given that dogs, like humans, are capable of experiencing trauma, they serve as relevant models for studying PTSD. Moreover, translational research contributes to the development of novel treatments for stress-related disorders in both animals and humans.

Table 5 offers a structured comparison of the principal therapeutic components used in the management of canine PTSD.

Table 5

Integrative therapeutic strategies for managing PTSD in dogs: mechanisms and clinical relevance

Therapeutic modality	Examples / agents	Mechanism of action	Targeted symptoms / effects	Supporting evidence
Pharmacological treatment	Fluoxetine, Clomipramine, Sertraline, Diazepam, Cannabinoids	Modulation of serotonin, norepinephrine, GABA, endocannabinoid systems	Anxiety, fear, aggression, hypervigilance	Mills (2013); Vaughn et al. (2017); Podberscek (2018)
Behavioral therapy	Systematic desensitization, counterconditioning, positive reinforcement	Formation of adaptive behavior patterns; extinction of traumatic memory associations	Avoidance behaviors, maladaptive responses, hyperreactivity	Podberscek (2018)
Animal-assisted interventions (AAIs)	Interaction with conspecifics or therapeutic animals	Reduction of stress through social buffering and emotional engagement	Social withdrawal, stress-induced aggression, emotional dysregulation	Freeman (2016)
Innovative psychopharmacology	Cannabinoids, neuroplasticity-modulating agents	Promotion of neurogenesis, reduction of excitotoxicity and inflammation	Persistent anxiety, treatment resistance	Vaughn et al. (2017); emerging translational studies
Genetic and biomarker-guided therapy	Genetic profiling (e.g., serotonin transporter polymorphisms)	Identification of predisposition and personalized pharmacological targeting	Early intervention, prevention, individualized treatment response	Current research directions in veterinary neurogenetics
Translational research applications	PTSD models in dogs and humans	Cross-species validation of neurobiological pathways and treatment efficacy	Model refinement, treatment innovation, cross-species therapy development	Freeman (2016); translational neuropsychopharmacology literature

The Table 5 shows that pharmacological agents target neurochemical dysregulations underlying PTSD symptoms, while behavioral therapies reshape maladaptive responses through learning. Animal-assisted interventions and novel pharmacological approaches contribute to emotional stabilization and therapeutic engagement. Future-oriented strategies, such as genetic profiling and translational models, support the development of individualized treatments and enhance cross-species knowledge translation in neuropsychiatric care.

Hence, integrative treatment approaches for canine PTSD are essential for achieving optimal therapeutic outcomes. The combination of pharmacological therapy, behavioral interventions, and innovative methods such as animal-assisted interventions offers a comprehensive and effective treatment framework. Advances in neuropsychopharmacology and genetics provide opportunities for individualized treatment based on biological markers and genetic profiles. The exploration of new compounds, such as cannabinoids and other psychotropic agents, holds promise for expanding the therapeutic arsenal in veterinary medicine.

Translational research linking human and animal PTSD provides valuable insights for the development of new treatment strategies by leveraging shared pathophysiological mechanisms. This not only enhances treatment options for dogs but also contributes to improved therapeutic approaches for humans. Therefore, an integrative approach that combines pharmacological, behavioral, and innovative therapeutic strategies represents a promising avenue for the effective and sustained treatment of PTSD in dogs.

In clinical practice, one of the major challenges is the underestimation of PTSD in dogs

Many veterinary practitioners, particularly in general practice settings, may not fully recognize PTSD due to limited awareness or because the symptoms often resemble other behavioral or physiological disorders, such as aggression, anxiety, or depression. As a result, PTSD frequently goes undiagnosed, and treatment is often limited to symptomatic or less specific approaches. Additionally, veterinarians may sometimes fail to consider a history of traumatic events, further complicating the diagnostic process. Consequently, the disorder may remain unnoticed, and affected dogs may not receive the appropriate medical care they require.

Another significant issue is the shortage of qualified specialists, particularly veterinarians with expertise in behavioral disorders or animal psychology. Animal behavior specialists are essential for the proper treatment of PTSD, as their knowledge of behavioral therapies and their collaboration with veterinarians in the treatment process can contribute to a comprehensive therapeutic approach. However, the number of veterinary psychologists is limited, and access to such professionals is problematic in certain regions. As a result, many dogs

with PTSD do not receive the necessary support, which may lead to chronic issues and a deterioration in their quality of life.

Furthermore, current research on PTSD in dogs suffers from several critical limitations that undermine scientific reliability. One of the primary concerns is the small sample size in many studies. Numerous investigations are conducted on a limited number of animals, which may compromise the validity of the findings. Since canine PTSD is a relatively novel area within veterinary medicine, large-scale studies involving diverse forms of the disorder are rare. Small sample sizes hinder the ability to draw representative and reliable conclusions.

Another challenge lies in the heterogeneity of methods applied across different studies. This includes both diagnostic approaches (such as rating scales and behavioral tests) and treatment strategies (involving various drugs, dosages, and therapeutic regimens). The lack of standardized diagnostic criteria and treatment protocols contributes to variability in research outcomes and complicates the comparison of treatment efficacy across studies. Moreover, a considerable degree of subjectivity exists in such research, for example, in the interpretation of behavioral markers, which can differ among investigators. This variability reduces the predictability and perceived efficacy of PTSD treatment in dogs and diminishes confidence in the available data.

An important direction in the advancement of veterinary medicine is the development of international diagnostic and treatment protocols for PTSD in dogs

Given that PTSD in dogs is a relatively newly discovered and complex disorder, the creation of international diagnostic and therapeutic protocols represents a critical area for development in veterinary medicine. These protocols would facilitate a standardized approach to managing this condition, ensuring effective and comprehensive treatment for affected dogs. Additionally, they would contribute to the continued professional development of veterinary specialists involved in the care of animals with PTSD.

International protocols could serve as a foundation for establishing unified diagnostic standards, including clear criteria for identifying PTSD in dogs, as well as guidelines for pharmacological and behavioral treatment. Such frameworks would enable clinicians to implement precise and evidence-based treatment plans tailored to the individual characteristics of each dog. Moreover, the development of a unified international approach would facilitate knowledge exchange among professionals, supporting the accumulation of more comprehensive data for future research and continuous improvement of therapeutic strategies.

Considering the rapid advancement of science and technology, along with the growing recognition of animal mental health, there is a reasonable expectation that clearly defined international protocols will emerge soon. These protocols are anticipated to enhance not only the treatment of PTSD but also the overall effectiveness of veterinary practice in this domain.

The analysis of clinical challenges, research limitations, and the prospects of protocol development highlights the necessity for further standardization of approaches to diagnosing and treating PTSD in dogs. As this is a complex and understudied phenomenon, it is crucial to ensure proper qualification of veterinary specialists, accurate diagnostic procedures, and the application of effective treatment methods. Simultaneously, the creation of international protocols will promote the development of a unified therapeutic strategy, improve treatment outcomes, and reduce variability in clinical results.

A multidisciplinary approach is essential for achieving high effectiveness in the treatment of PTSD in dogs

Thus, this review has examined the key aspects of diagnosing and treating post-traumatic stress disorder (PTSD) in dogs, while highlighting the critical role of a multidisciplinary approach in the therapeutic process. Several important conclusions have been drawn, enabling an assessment of the current state of the issue and identification of future directions for scientific and practical development in this field.

The diagnosis of PTSD in dogs remains a complex and multifaceted task, largely due to the symptom overlap with other disorders such as anxiety, depression, or aggression. One of the core components of accurate diagnosis is a thorough case history, particularly with regard to past traumatic events. The use of various behavioral assessment tools, such as the Canine Behavioral Assessment and Research Questionnaire (C-BARQ), along with the exclusion of neurological or somatic conditions, are crucial instruments in this diagnostic process. As for treatment, a combination of pharmacological intervention and behavioral therapy has proven to be the most effective strategy. Selective serotonin reuptake inhibitors (SSRIs), tricyclic antidepressants (TCAs), and other psychotropic agents can reduce PTSD symptoms. However, to achieve long-term results, behavioral methods – such as positive reinforcement, counterconditioning, and systematic desensitization – must be applied concurrently. In some cases, animal-assisted interventions may also be beneficial as part of a comprehensive therapeutic plan. Treating PTSD in dogs requires the integration of knowledge from multiple disciplines, underscoring the importance of a multidisciplinary approach. Collaboration among veterinarians, animal behaviorists, and psychologists allows the development of comprehensive treatment strategies that address both the medical and behavioral components of the disorder. This approach enhances treatment efficacy, shortens recovery time, and improves the animal's quality of life. It is also essential that veterinarians receive adequate training in animal mental health, enabling more accurate diagnoses and more effective treatment outcomes. Despite notable progress in PTSD research in dogs, several areas require further investigation. First, larger and more representative studies are needed to improve the understanding of the pathology of PTSD in dogs. This includes exploring both the etiology of the disorder and the underlying neuropsychological mechanisms.

Second, diagnostic and treatment methods for canine PTSD must be standardized to enable the development of unified protocols for veterinary practice. The creation of international guidelines and standards will reduce variability in treatment approaches and support evidence-based therapeutic interventions.

Third, it is important to focus on the development of new pharmacological treatments and the evaluation of their efficacy in the context of PTSD. With advances in neuropsychopharmacology and genetics, novel therapeutic approaches – particularly those involving cannabinoids and other psychotropic molecules – hold significant promise for managing PTSD in dogs.

PTSD in dogs is a complex and multifactorial disorder that requires an individualized and integrated approach to both diagnosis and therapy. The primary areas of focus in managing this condition include accurate diagnosis, combined pharmacological and behavioral treatment, and the use of innovative therapeutic modalities such as animal-assisted interventions. A multidisciplinary approach is key to achieving optimal therapeutic outcomes in dogs with PTSD. However, to further advance this field, extensive research, method standardization, and the development of new treatment strategies are imperative.

Conclusions

Post-traumatic stress disorder in dogs is a complex and under-researched clinical condition that requires a distinct approach within veterinary medicine. Its investigation is highly relevant for the advancement of veterinary psychiatry and for ensuring animal welfare. The diagnosis of canine PTSD is complicated by several factors, including the non-specific nature of clinical signs, symptom overlap with other disorders (such as anxiety, phobias, or aggression), and the lack of standardized diagnostic criteria. Effective diagnosis is achievable only through thorough anamnesis, the use of behavioral assessment tools, and the exclusion of somatic pathologies.The most effective treatment strategy for canine PTSD combines pharmacotherapy with behavioral modification techniques. Selective serotonin reuptake inhibitors (SSRIs), tricyclic antidepressants (TCAs), and other psychotropic agents may alleviate clinical symptoms, but stable, long-term outcomes depend on the implementation of behavioral methods such as desensitization, counterconditioning, and positive reinforcement. A multi-

disciplinary approach to the treatment of canine PTSD is a key factor for successful therapy, requiring collaboration among veterinarians, animal behavior specialists, psychologists, and pet owners. Such an approach allows the development of comprehensive treatment strategies that address both the medical and psycho-emotional needs of the animal. The standardization of diagnostic and therapeutic protocols at the international level is a necessary step for further progress in this field. Unified clinical guidelines will enable more consistent treatment outcomes, facilitate scientific collaboration, and promote evidence-based practices in veterinary behavioral medicine. Promising research directions include the development of new psychotropic drugs for veterinary use, exploration of the neuropsychological mechanisms underlying PTSD in dogs, and the assessment of innovative treatment methods, such as animal-assisted interventions and the application of cannabinoids.

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