

Beyond Posttraumatic Stress: Other Adverse Mental Health Outcomes of Psychological Trauma in Animals

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POSTTRAUMATIC PSYCHOPATHOLOGY

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Toward an animal model of posttraumatic stress disorder

Anja Siegmund, Carsten T. Wotjak
2006

Recently, *PTSD model* has become a somewhat fashionable term used in animal studies for almost every stress-induced behavioral alteration. Only a few cases, however, reflect the human disorder closely enough to deserve this term.

cases, however, reflect the human disorder closely enough to deserve this term. Systematic research requires valid animal modeling with clearly defined criteria. This article outlines and discusses criteria for prospective PTSD models, based on a theoretical framework that emphasizes the involvement of both associative and nonassociative memory processes in the development and maintenance of PTSD.



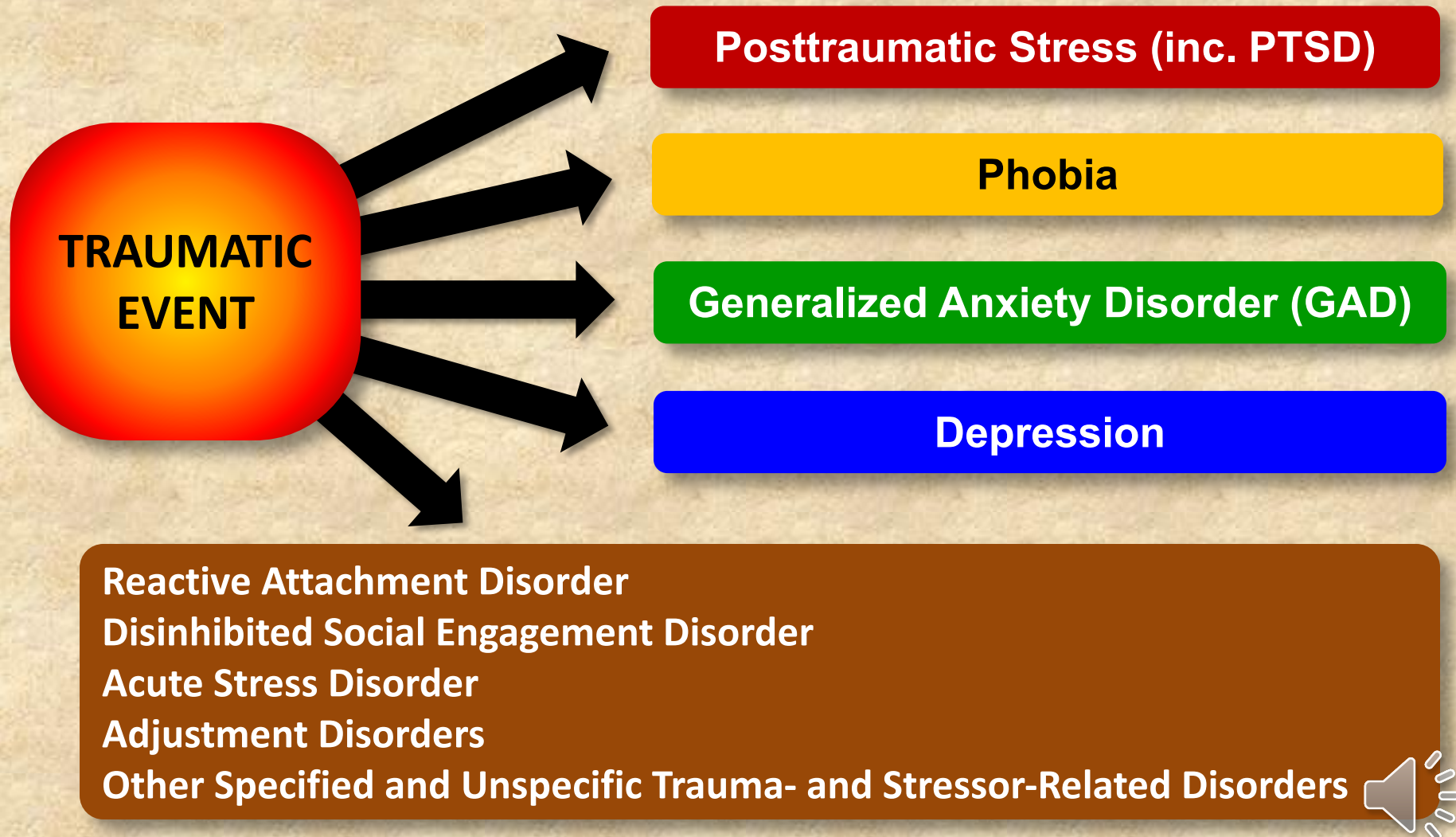
POSTTRAUMATIC PSYCHOPATHOLOGY

Studies in humans have shown that PTSD is not the only, and not even the most likely, form of posttraumatic reaction

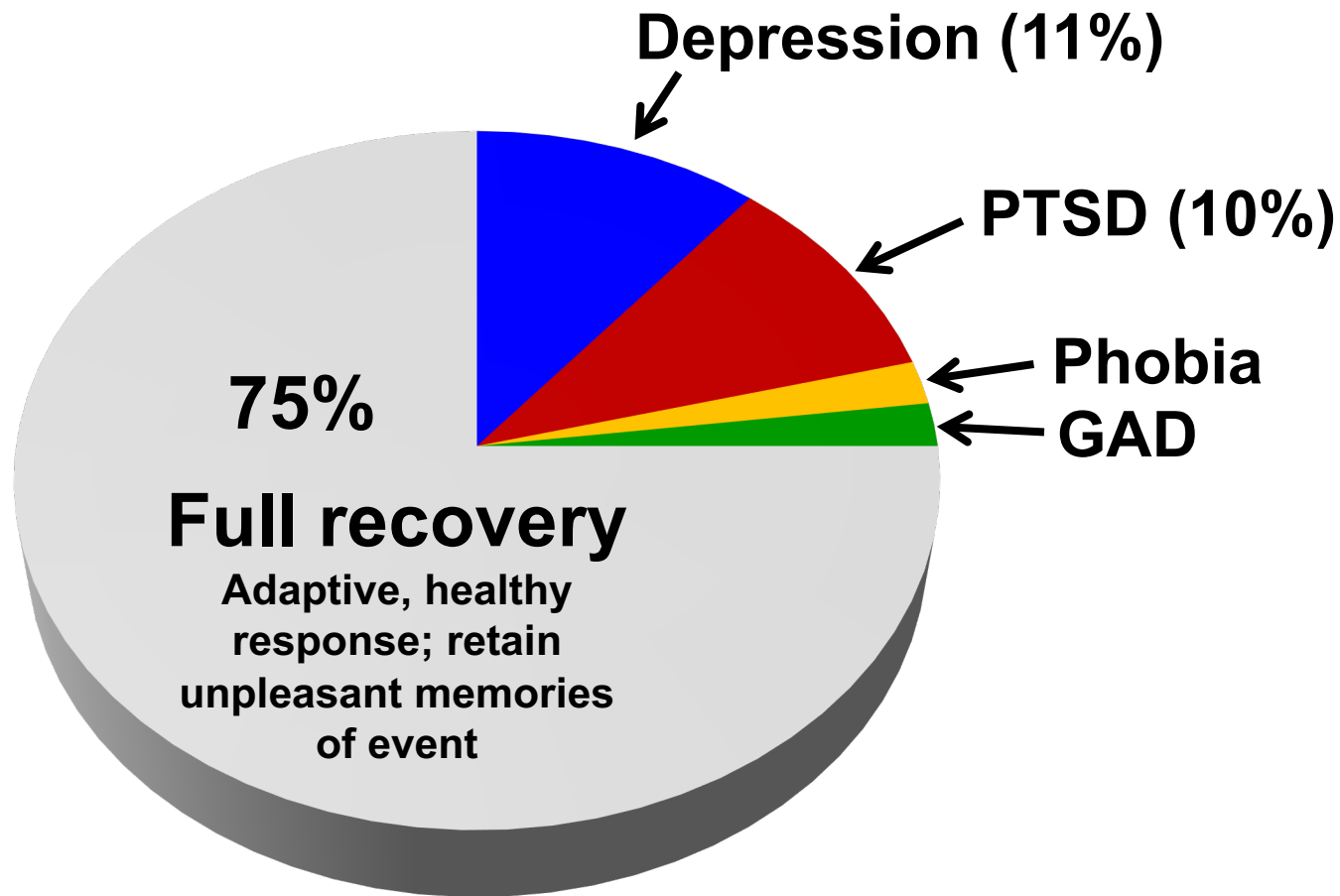
Responses to traumatic events make up an ARRAY OF DIFFERENT CONDITIONS rather than a single disorder 



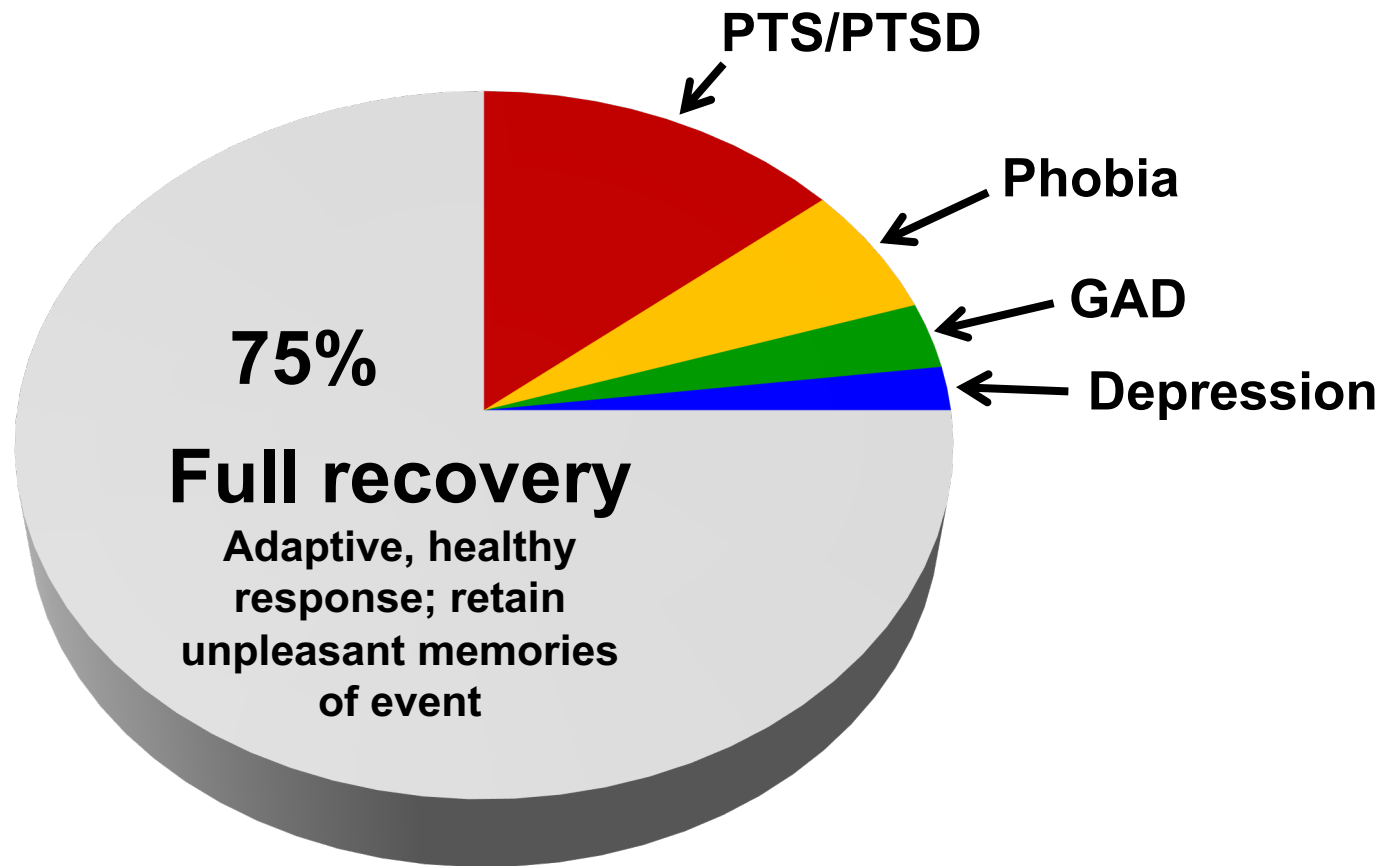
Responses to traumatic events in humans: an ARRAY of conditions rather than a single disorder



Posttrauma outcomes – Humans



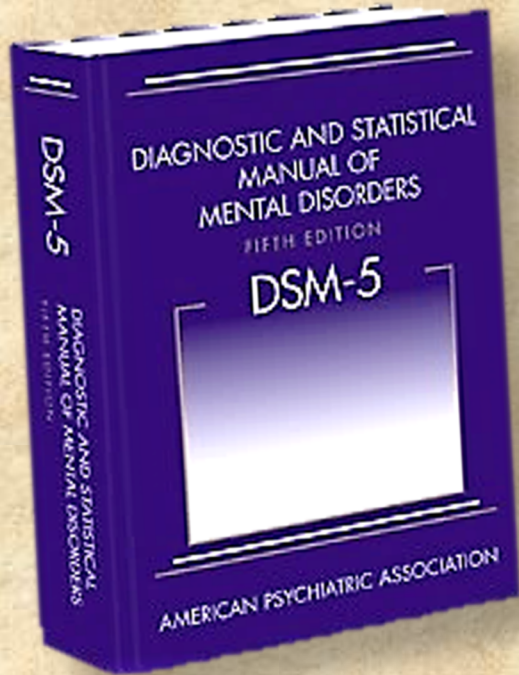
Posttrauma outcomes – Animals



Posttraumatic Phobias (Specific Phobia)



Posttraumatic Phobias (Specific Phobia)



Specific phobia sometimes develops following a traumatic event (e.g., being attacked by an animal or stuck in an elevator)... However, many individuals are unable to recall the specific reason for the onset of their phobia.

...it is possible for specific phobia to develop at any age, **often** as a result of experiences that are traumatic.



FEAR DEVELOPMENT FOLLOWING SEVERE STRESS/TRAUMA: CONTINUUM OF OUTCOMES

**ADAPTIVE,
HEALTHY
FEAR**

**NONADAPTIVE,
PATHOLOGICAL
FEAR**

Believed to be dysregulation of fear pathways involving alterations in the activity of a number of neurotransmitters, including serotonin, norepinephrine, and gamma-aminobutyric acid (GABA).



Phobia

(non-trauma-related and trauma-related)

A profound, excessive, abnormal fear response that occurs out of proportion to the actual danger posed. While fear is a generally a highly adaptive response, phobias are maladaptive, cause clinically significant distress or impairment in normal functioning (social and pleasurable activities) when the fearful stimulus is present or anticipated.



Posttraumatic Phobias (Specific Phobia)

The importance of a sense of control

- A sense of control: the individual has the perception that they can
leave the environment if necessary. This is a key factor in the development of posttraumatic phobias.
- Many animals, particularly dogs, have a strong sense of control over their environment. This is often demonstrated by their ability to retreat to a safe place when they feel threatened.
- It may be that the additional element of *(un)controllability* of the stimulus plays a crucial role in the development of posttraumatic phobias in companion animals.

Examples



Posttraumatic Phobias (Specific Phobia)

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Behavioral and Psychological Characteristics of Canine Victims of Abuse

Franklin D. McMillan,¹ Deborah L. Duffy,² Stephen L. Zawistowski,³
and James A. Serpell²

¹Best Friends Animal Society, Kanab, Utah

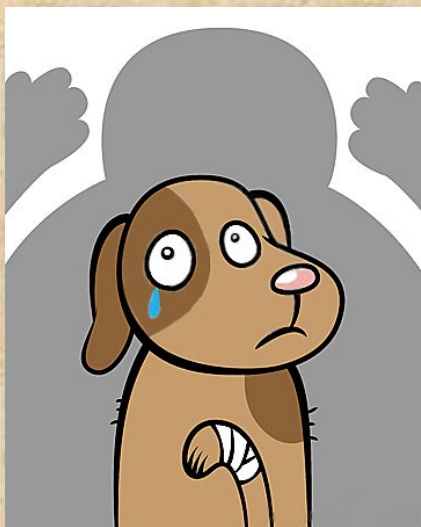
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University of Pennsylvania
³Prevention of Cruelty to Animals, New York, New York

**Abuse:
Dog left chained outside alone
in severe thunderstorm – now
has severe storm phobia**

causes harm to an individual. Dogs (*Canis familiaris*) with a history of abuse were solicited for the study. A panel of 5 experts in canine behavior judged as having a certain or near certain history of being abused. Behavioral evaluations of the dogs were obtained using the Canine Behavior Checklist and Research Questionnaire, which utilizes ordinal scales to rate the frequency of the dog's behaviors. Sixty-nine dogs ultimately met the criteria for inclusion in the study. When compared with a convenience sample of 5,239 companion dogs, abused dogs were reported as displaying significantly higher rates of aggression and fear directed toward unfamiliar humans and dogs, excitability, hyperactivity, attachment and attention-seeking behaviors, persistent barking, and miscellaneous strange or repetitive behaviors. Delineating the behavioral and psychological characteristics of abused dogs provides the first step in identifying and distinguishing the risk factors and sequelae associated with abuse, which may inform the



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Abuse is an intentional act that causes harm to an individual. Dogs (*Canis familiaris*) with known or suspected history of abuse were solicited for the study. A panel of 5 experts in dog behavior and abuse selected the dogs judged as having a certain or near certain history of abuse for inclusion in the study. Behavioral evaluations of the dogs were obtained using the Canine Behavioral Assessment and Research Questionnaire, which utilizes ordinal scales to rate either the intensity or frequency of the dog's behaviors. Sixty-nine dogs ultimately were included in the study. When compared with a convenience sample of 5,239 dogs, the abused dogs were reported as displaying significantly higher rates of aggression toward unfamiliar humans and dogs, excitability, hyperactivity, attachment and separation anxiety behaviors, persistent barking, and miscellaneous strange or repetitive behaviors. Delineating the behavioral and psychological characteristics of abused dogs provides the first step in identifying and distinguishing the risk factors and sequelae associated with abuse, which may inform the

"He is afraid of shovels and yard equipment. He howls and cowers... He was beaten with a shovel so we are sensitive to this."



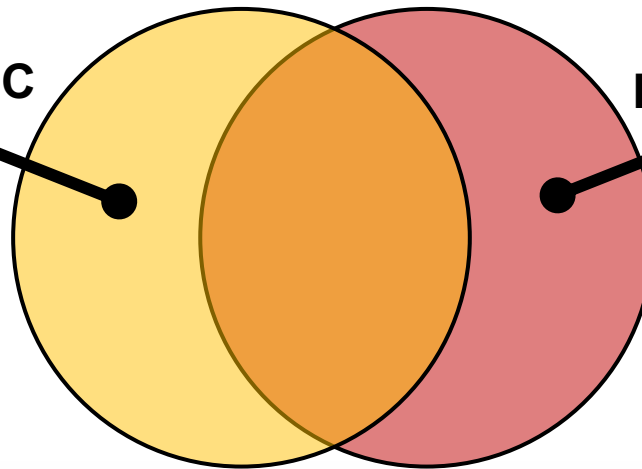
OVERLAP WITH OTHER POSTTRAUMATIC PSYCHOPATHOLOGY

FEAR plays such a central role in numerous posttraumatic conditions, it can be difficult to distinguish phobia from other conditions

POSTTRAUMATIC
PHOBIA

PTS/PTSD

NOTE: This shows only
posttraumatic phobias, not
all phobias



NOTE: This demonstrates the diagnostic overlap – the size of the circles does not represent the incidence of the post-trauma conditions.

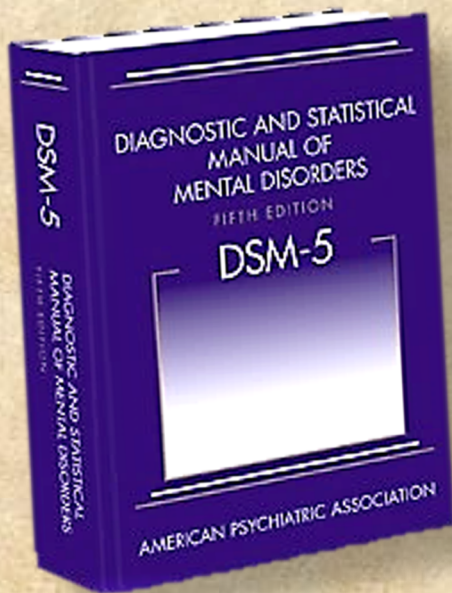
POSTTRAUMATIC FEAR

**ADAPTIVE,
HEALTHY
FEAR**

**NONADAPTIVE,
PATHOLOGICAL
FEAR**

PHOBIA

PTSD



In cases of posttraumatic fear or anxiety:

- “it may challenge the clinician’s diagnostic skills to distinguish between presentations of phobic reactions and PTSD”
- “it is important to not reflexively apply the diagnosis of PTSD”



HOW CAN POSTRAUMATIC PHOBIAS BE DISTINGUISHED FROM POSTRAUMATIC STRESS?

Compared to PTS, posttraumatic phobias show:

less generalization

In both humans and animals the fear of specific phobia may generalize, but:

In humans – Individuals with PTSD fear avoid a wider range of cues than do people with phobias

In animals – The fear of specific stimuli – such as a noise (like loud bangs), place (like the veterinary clinic), or person (like the elderly next door neighbor man who uses a walker) – may generalize to many similar stimuli, but will rarely equal the wide range of fear associated with PTS.



GENERALIZATION IN A CASE OF POSTTRAUMATIC STRESS



Samson

Samson, a 6 year old male golden retriever mix – friendly, outgoing

1994 Los Angeles earthquake:

Samson was upstairs at the time – in his panic to escape the shaking, he fell down a flight of stairs and had a seizure at the bottom

Per his owner: From that day onward, Samson was a different dog. He was now terrified of the slightest shaking—as when a large truck rumbled by—and even of the faintest noises. "For example, he even trembles with fear just hearing the sound of a penny drop on the ground." Samson was now a dog constantly "on edge."



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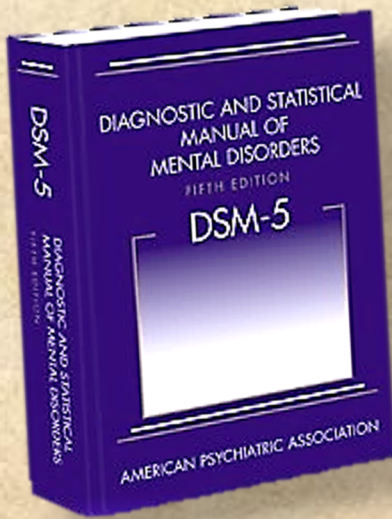
less persistent state of hyperarousal

Individuals with phobia become aroused only when exposed or in anticipation of exposure to the fearful stimulus or situation, whereas individuals with PTSD typically experience a more persistent state of hyperarousal.



HOW CAN POSTRAUMATIC PHOBIAS BE DISTINGUISHED FROM POSTRAUMATIC STRESS?

MANAGEMENT CONSIDERATIONS: AVOIDANCE



Many individuals with specific phobias have...changed their living circumstances in ways designed to avoid the phobic object or situation as much as possible (e.g., an individual diagnosed with specific phobia, animal, who moves to reside in an area devoid of the particular feared animal). Therefore, they no longer experience fear or anxiety in their daily life.

Animal phobias

Noise (thunderstorms, fireworks), strangers, children, other dogs, car rides, stairs, vet clinic, being alone

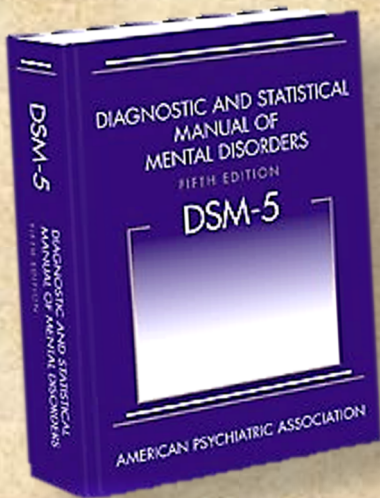
**IN CONTRAST:
AVOIDANCE IS RARELY
AN EFFECTIVE
TREATMENT FOR
PTS/PTSD**



Generalized Anxiety Disorder



Generalized Anxiety Disorder



- In humans, GAD is a disorder consisting of excessive anxiety and worry about multiple events or activities, with the sense that the worry is difficult to control.
- People with GAD report a variety of symptoms, including restlessness, being easily fatigued, difficulty concentrating, irritability, muscle tension, disturbed sleep, cold or clammy hands, dry mouth, sweating, nausea or diarrhea, frequent urination, and trouble swallowing.
- Causes clinically significant distress or impairment in important areas of functioning.
- The hallmark feature of GAD is *excessive, uncontrollable worry*.

Links to psychological trauma

It is not unusual for people to develop the disorder in reaction to chronic stress or anxiety-producing situations.

Human studies:

- ◆ Study 1: Oklahoma City Bombing – 4% of people diagnosed with GAD afterward
- ◆ Study 2: Traumatic injury – 11% of survivors developed GAD



Generalized Anxiety Disorder in Animals

GAD

- Companion animals can exhibit signs that are analogous to symptoms of GAD in humans: The typical presentation involves constant or near constant signs of fear and anxiety, regardless of the context or the stimuli to which the animal is exposed.
- Specific behaviors vary among individual animals and can include increased vigilance, pacing, and vocalizing.
- Signs often occur at low levels relatively persistently but may become more severe in particular situations.
- Comments from the pets' owners often describe the animal as always "miserable" or "frightened", or that the pet is "never happy".
- The major criterion for identifying a pet as having GAD is the persistence and frequency of behaviors indicative of anxiety, even low levels of anxiety, over long periods of time.

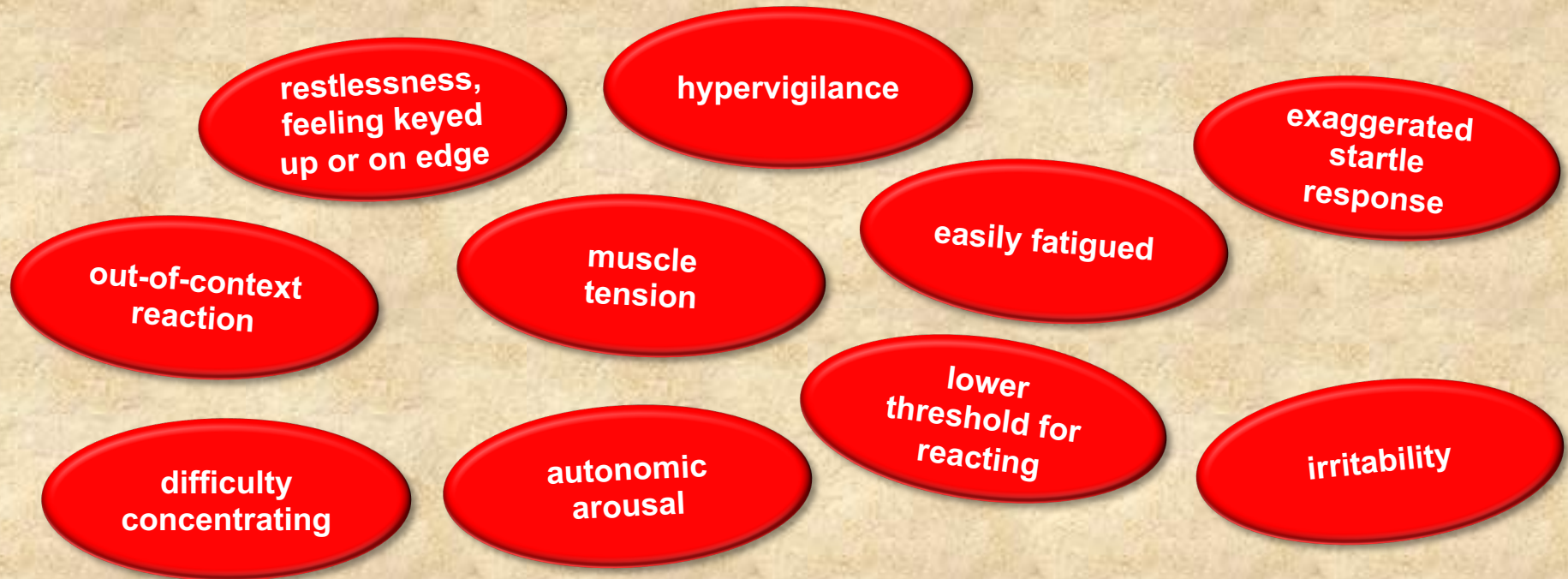


Posttraumatic GAD

- Posttraumatic GAD has been reported in sanctuary-living chimpanzees with previous histories of experimentation, orphanage, illegal seizure, or violent human conflict.
- The researchers compared chimpanzees living in wild sites in Africa with those in sanctuaries and found that 18% of the sanctuary chimpanzees met the DSM diagnostic criteria for GAD, compared with 0.5% of those in the wild.
- The results suggested to the researchers that chimpanzees can exhibit behavioral clusters similar to GAD as a result of potentially traumatic experiences.

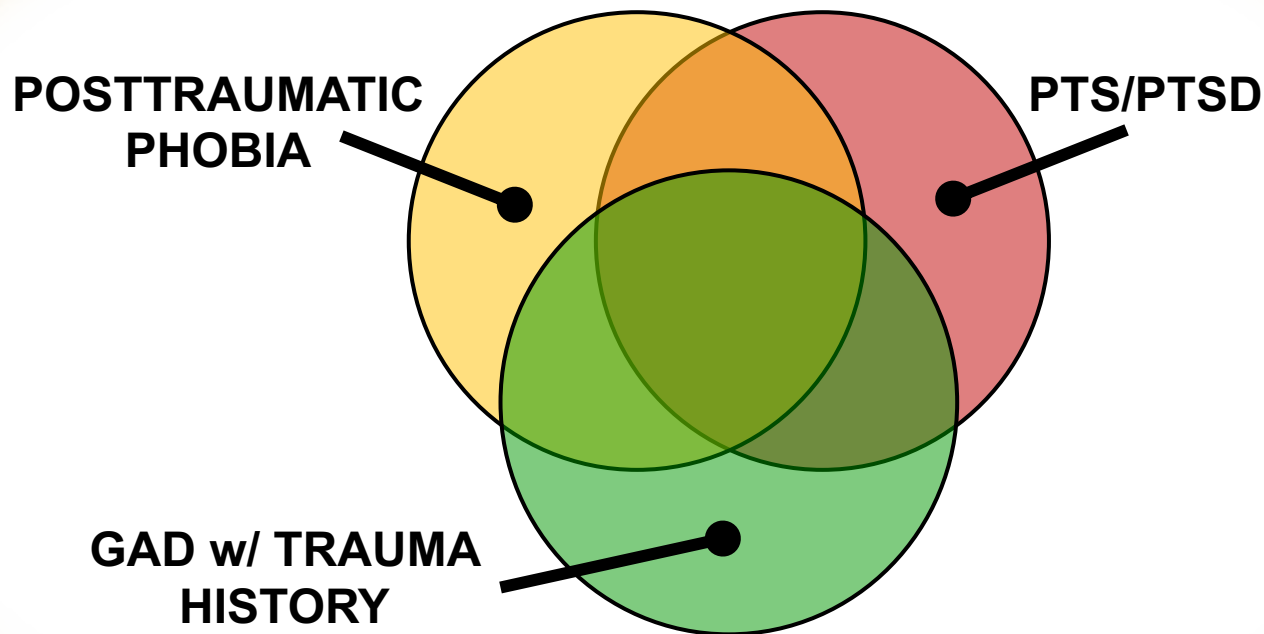


OVERLAP WITH OTHER POSTTRAUMATIC PSYCHOPATHOLOGY



OVERLAP WITH OTHER POSTTRAUMATIC PSYCHOPATHOLOGY

FEAR/ANXIETY-BASED POSTTRAUMA DISORDERS



NOTE: This demonstrates the diagnostic overlap – the size of the circles does not represent the incidence of the post-trauma conditions.

OVERLAP WITH OTHER POSTTRAUMATIC PSYCHOPATHOLOGY

CAN WE DISTINGUISH POSTTRAUMATIC GAD FROM PTS/PTSD?

ONE POTENTIAL METHOD:

the avoidance, irritability, and anxiety are associated with a specific traumatic event

YES

PTSD

NO

GAD

restlessness,
feeling keyed
up or on edge

hypervigilance

exaggerated
startle
response

easily fatigued

muscle
tension

out-of-context
reaction

difficulty
concentrating

arousal

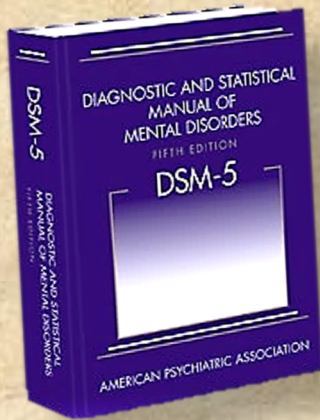
irritability



Depression and 'learned helplessness'



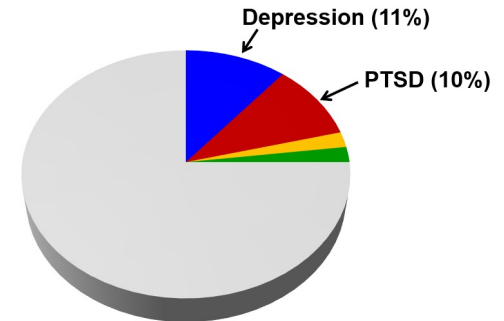
Depression and 'learned helplessness'



Stressful life events are well-recognized as precipitants of depression, which may be seen independently of or in conjunction with PTS.

There is evidence in humans that major depression is the most common form of posttraumatic psychopathology, even more prevalent than PTSD.

Posttrauma outcomes – Humans



Human studies:

- ◆ **Study 1: Oklahoma City Bombing – 22% of people diagnosed with depression afterward**
- ◆ **Study 2: Traumatic injury – 16% of survivors developed depression (compared to 9% reporting PTSD)**



Depression and ‘learned helplessness’

ANIMALS IN AN EXPERIMENTAL SETTING

- In an experimental setting, stress-induced depression has been one of the most common research paradigms using animal models over the past five decades.
- Thousands of experiments reported in the literature involve exposing animals to severe stress until they exhibited signs of anhedonia, social withdrawal, decreases in investigative behaviors and locomotor activity, and learning deficits – signs interpreted today as analogous to human depression.
- Stress-induced behavioral models of depression have used acute, single-exposure stress as well as chronic stress.
- Much of the work in this field has involved the use of uncontrollable and/or unpredictable stress to induce a state termed “*learned helplessness*”, which is essentially a “giving up” of the individual upon learning that their actions are futile in reducing the psychological impact of an aversive stimulus and has been regarded as an analog of human depression.



Depression and 'learned helplessness'

ANIMALS IN A CLINICAL SETTING

- Some veterinary behaviorists have reported a condition in dogs and cats termed *reactive depression*, which occurs after an intensely stressful event such as accidents, violent punishment, painful stimuli, relinquishment, abandonment, re-homing, or death of a close human or another pet.
- Signs include a loss of interest in the environment, withdrawal from social stimuli and activities that were previously engaging and enjoyable, a generalized state of inhibition and immobility, decreased appetite, increased or disturbed sleeping, and increased whining (dogs).



Depression and 'learned helplessness'

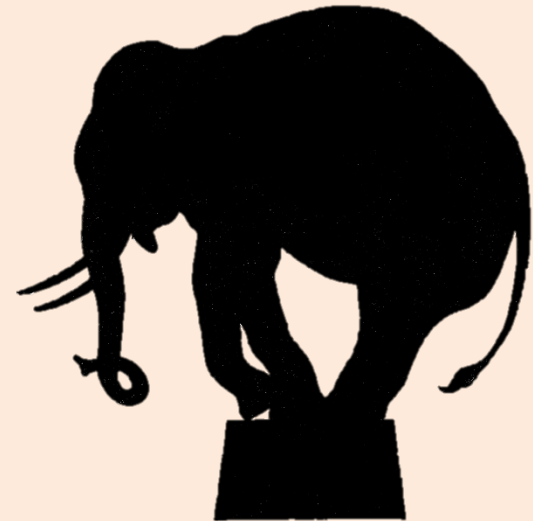
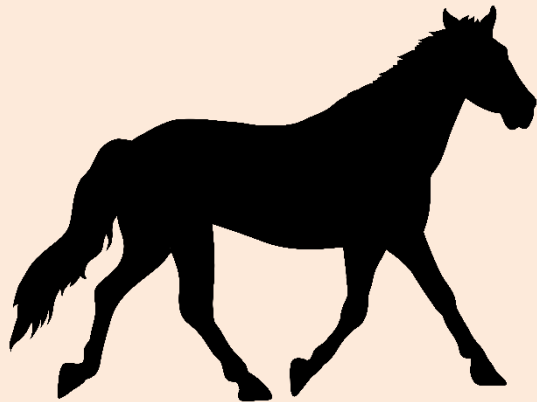
- In a review of literature on chimpanzees who had been reportedly subjected to traumatic events, Ferdowsian and colleagues (2011) evaluated the prevalence of signs of depression among 20 cases included in 12 published reports.
- Using criteria similar to those used for nonverbal infants and children, the authors found that 58% of chimpanzees in sanctuaries met the diagnostic criteria for depression, compared with 3% of chimpanzees in the wild.



Depression and 'learned helplessness'

“BREAKING”

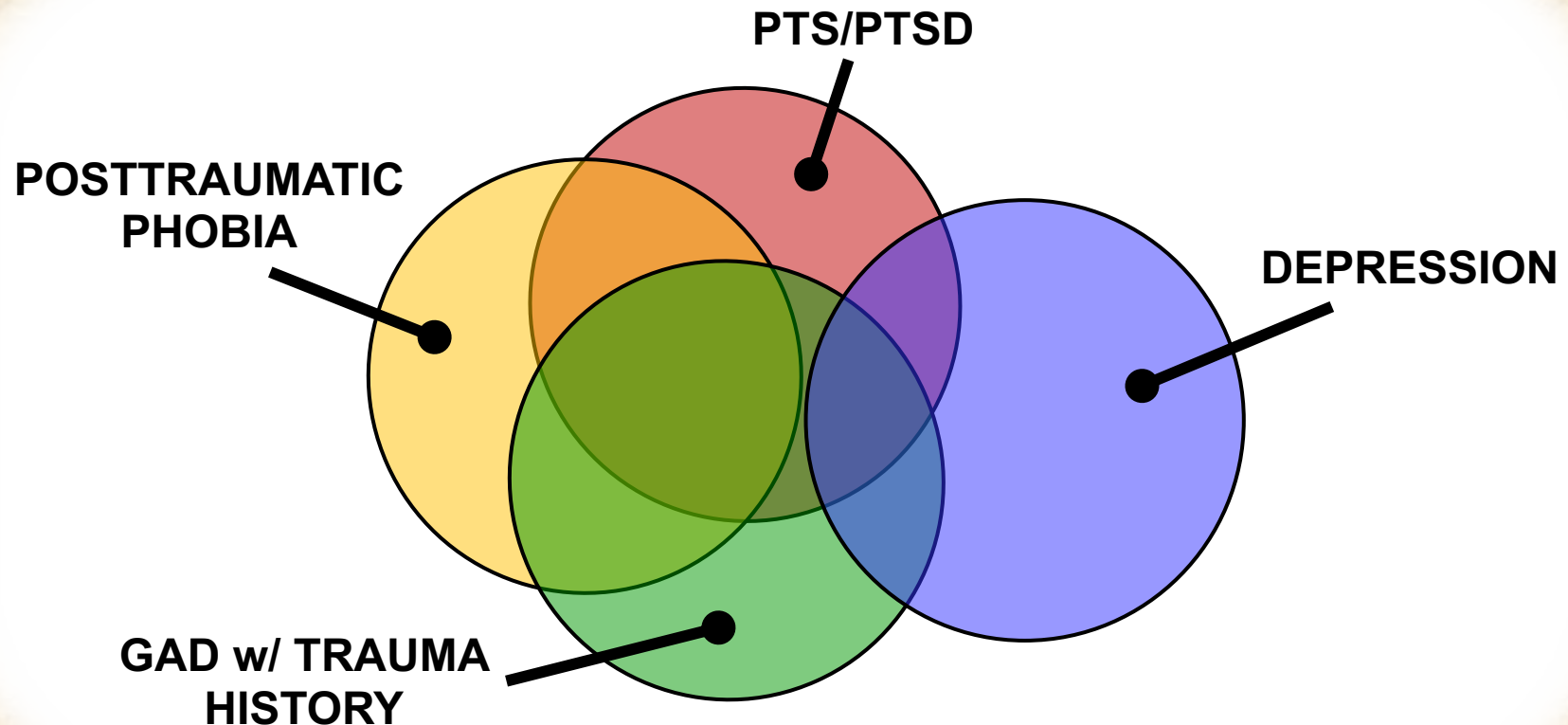
May involve extreme forms of restraint such as hobbles and ties to prevent the animal from escaping from maltreatment that was being carried out.



The animal is deemed to be ready to ride or work once it had ceased to resist and learned helplessness has been achieved.



OVERLAP WITH OTHER POSTTRAUMATIC PSYCHOPATHOLOGY



NOTE: This demonstrates the diagnostic overlap – the size of the circles does not represent the incidence of the post-trauma conditions.

Trauma-related compulsive behaviors (OCD, stereotypies)



Trauma-related compulsive behaviors (OCD, stereotypies)



- Research: Prevalence of obsessive-compulsive disorder (OCD) among individuals
 - ◆ with a traumatic history: 30-82%
 - ◆ in the general population: 1-2%
- PTSD and **OCD** are both anxiety disorders and commonly co-occur in people with a history of trauma: approximately 4-22% of people with PTSD also have a diagnosis of OCD. This figure is around 1% in the general population.



Trauma-related compulsive behaviors (OCD, stereotypies)

ANIMALS

Two accounts of compulsive behaviors in animals subsequent to extreme stress have been reported.

- Pageat and Fatjo (2013) describe a *dissociative syndrome* in dogs which may appear spontaneously or in response to a highly stressful event.
- The disorder is characterized by repetitive behaviors not attributable to underlying medical pathology nor in response to an identifiable stimulus and include snapping at the air, circling, clicking jaws, jumping, and looking upward.



- Sanctuary-housed chimpanzees with previous histories of experimentation, orphanage, illegal seizure, or violent human conflict were compared to chimpanzees living wild in Africa.
- 19% of chimpanzees in sanctuaries met the criteria for OCD, compared with 0% of those in the wild.



**Psychological conditions that
may resemble and/or coexist
with psychological trauma**



Psychological conditions that may resemble and/or coexist with psychological trauma

- 1. Stress-induced dishabituation**
- 2. Inadequate/inappropriate/mismatched early social and environmental experiences (“poor socialization”)**



Psychological conditions that may resemble and/or coexist with psychological trauma

1. Stress-induced dishabituation

- **Stress (chronic) later in life may result in the loss of early-life socialization learning and the emergence of a fear response to stimuli to which the animal was previous habituated (socialized to).**
- **Examples: fear of noises (e.g., fireworks or thunderstorms) and social contacts with humans or other animals**
- **Signs: avoidance behaviors such as freezing, attempting to escape or aggressive behavior when the animal previously appeared well habituated or socialized**
- **Examples of stressful events: a change in household dynamics, such as a divorce, an individual leaving home, or a bereavement**
- **Possibly distinguishable from posttraumatic phobia by phobias being more intense?**



2. Inadequate/inappropriate/mismatched early social and environmental experiences (“poor socialization”)

- Exposure to various social and environmental experiences during early development promotes the formation of neurophysiological structures to become fully compatible with the most likely interactions during the animal’s adult life.
- Thus, “inadequately” socialized animals have a neuropsychological “mismatch” with the environment.
- Abnormally high levels of fear in a mature animal could be from:
 1. previous trauma
 2. early socialization in an environment substantially different than their current environment
 3. Other factors (e.g., genetic, medical)



Psychological conditions that may resemble and/or coexist with psychological trauma

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Psychological conditions that may resemble and/or coexist with psychological trauma

2. Inadequate/inappropriate/mismatched early social and environmental experiences (socialization)

Abnormally high levels of fear in a mature animal could be from:

1. previous trauma

2. early socialization in an environment substantially different than their current environment

**THIS IS NOT
(USUALLY) A
PSYCHOPATHOLOGICAL
CONDITION**

HOWEVER

- Inadequate/mismatched socialization can become a **SOURCE** of severe stress when the environment the animal **IS** socialized to **DOES CHANGE** substantially.
- We *assume* that animals removed from adversity are now in a healing environment – when they may not be, at least at first.



**WHY ARE THESE
CONDITIONS – AND
ESPECIALLY THEIR
DISTINCTIONS –
IMPORTANT?**



WHY ARE THESE CONDITIONS – AND ESPECIALLY THEIR DISTINCTIONS – IMPORTANT?

2 key questions:

- 1. In dealing with fear/phobia, GAD, OCD, or depression, is it necessary – or even helpful – to know if it is trauma-related versus not?**
- 2. What's the harm in calling all posttraumatic conditions – of “overdiagnosing” – PTSD? And what's the problem of attributing an animal's signs (esp. fear) to trauma when they might not be – such as diagnosing an inadequately socialized dog as traumatized?**

Answers involve 2 main issues:

- 1. Treatment methods**
- 2. Prognosis**



WHY ARE THESE CONDITIONS – AND ESPECIALLY THEIR DISTINCTIONS – IMPORTANT?

Treatment methods

HUMANS

Treatment varies in response to the nature of the traumatic experience.

Effective treatment for major depressive episode may not require, or even be affected by, an exploration of prior trauma. However, in some cases knowledge of trauma is essential for treatment.

Using the benzodiazepine anti-anxiety drugs for treatment of PTSD had poorer outcomes.

Prognosis



WHY ARE THESE CONDITIONS – AND ESPECIALLY THEIR DISTINCTIONS – IMPORTANT?

Treatment methods

ANIMALS

Based on the human studies, the trauma connection is likely to provide a path to more specific and personalized treatments.

Currently, for example, treating fear in animals resembles a one-size-fits-all approach.

Dissociative syndrome of dogs – stress-induced form responds better to a particular treatment protocol.

Prognosis



WHY ARE THESE CONDITIONS – AND ESPECIALLY THEIR DISTINCTIONS – IMPORTANT?

Treatment methods

Prognosis

ANIMALS

Knowing the animal's trauma history can protect animals from unrealistic treatment expectations and under- or over-treatment in a futile effort to achieve what may not be achievable for that animal. Most important: personality, extent of socialization.



WHY ARE THESE CONDITIONS – AND ESPECIALLY THEIR DISTINCTIONS – IMPORTANT?

CURRENT STATUS

At our present level of understanding, the importance of distinguishing the different conditions and recognizing any connection to past trauma is limited, that is, sometimes relevant but in many cases treatments overlap extensively.

We have a long way to go in fully understanding psychological trauma in animals.



**Evolution of Feelings
in Well-being**

**Relationship Between
Mental and Physical
Health**

**Positive Welfare
Experiences**

**Animal Quality of Life
in Veterinary Medicine**

**Benefits of Personal
Control**

**Benefits of Social
Contact**

**Mental Illness in
Animals**

**Happiness and Personality
in Animals**

Suffering

What Is Distress?

Biological Trauma

Disorders in the Aging Pet

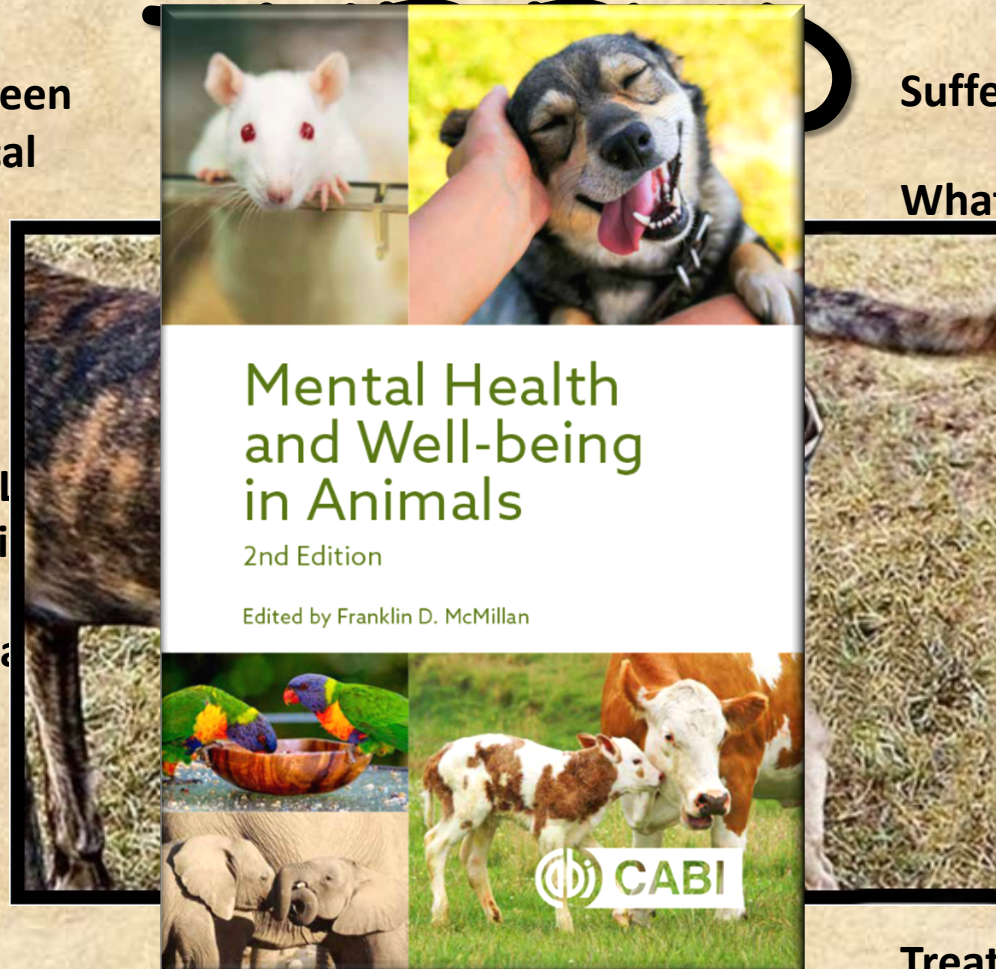
Wild Animals

Domestic

Domestic Animals

Domestic Birds

**Treatment of Emotional
Distress and Disorders**



dr.frank@bestfriends.org

