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CALMING CARE SYMPOSIUM 2026
The Gut–Brain Axis in Practice

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symposium

Recognizing and diagnosing stress and anxiety in dogs

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Plan of the presentation

- General principles
- Difficulties
- Recognizing and diagnosing acute stress
- Recognizing and diagnosing chronic stress
- Summary and conclusions

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Stress: concept and assessment

Stress stimulus

Challenge / threat

Stress response

- Physiological changes
- Behavioural changes

- Can be real or perceived
- Can be a threat to survival or to homeostasis

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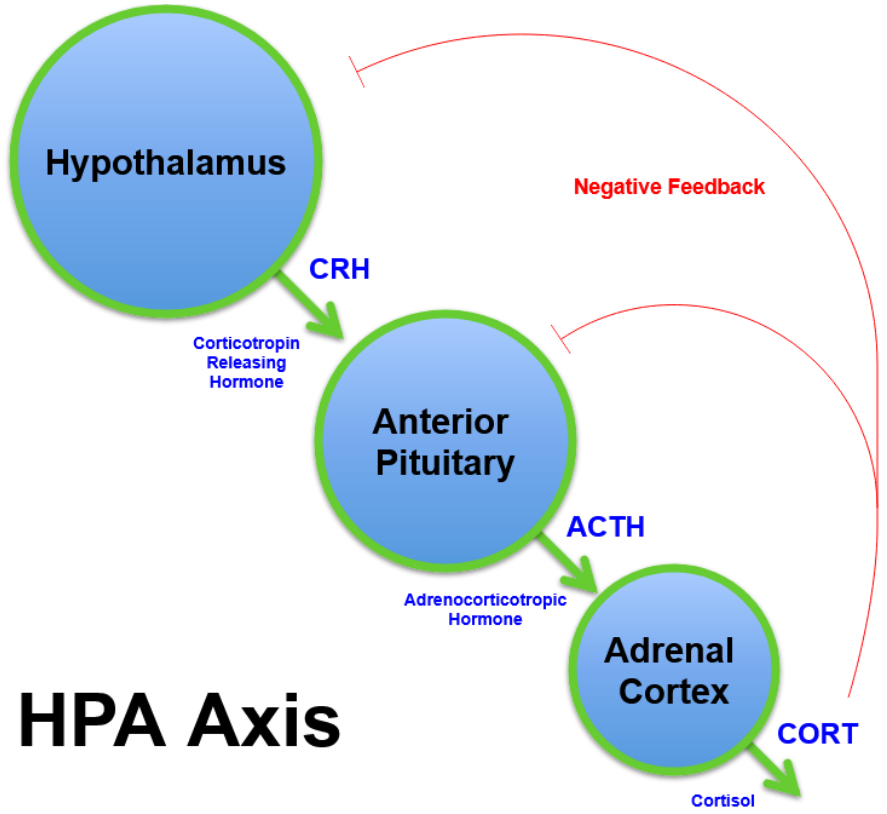
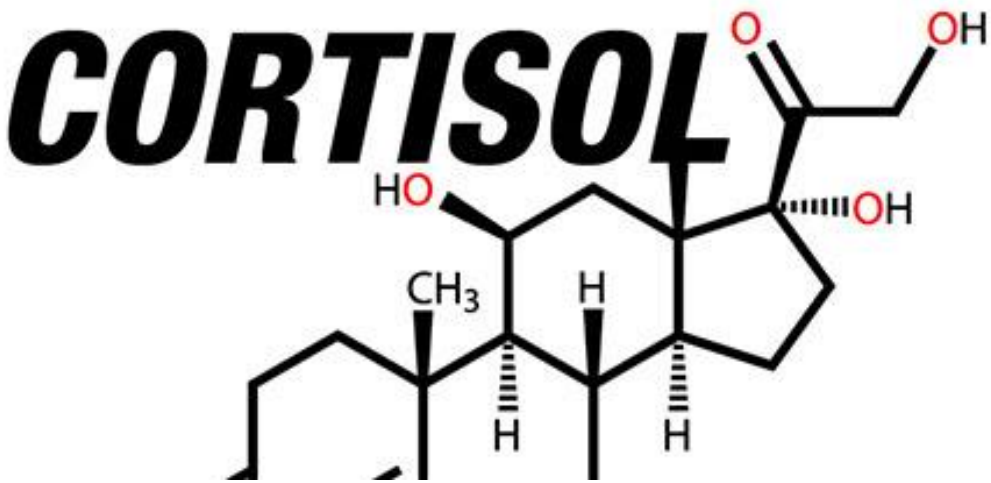
Stress: concept and assessment





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Stress: concept and assessment

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Stress: concept and assessment

(Mendl et al., 2010, *Proceedings of the Royal Society B: Biological Sciences 7, 277*)

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Stress: concept and assessment

Stress stimulus

Situation which is unpleasant or that overtaxes the animal's coping capacity

Stress response

Emotional response with

- High arousal
- Negative valence

(Pfaff et al., 2007, *Stress 10, 314*)

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Fear & anxiety

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Situation which is unpleasant or that overtaxes the animal's coping capacity

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Emotional response with

- High arousal ≠ activity
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(Pfaff et al., 2007, *Stress 10, 314*)

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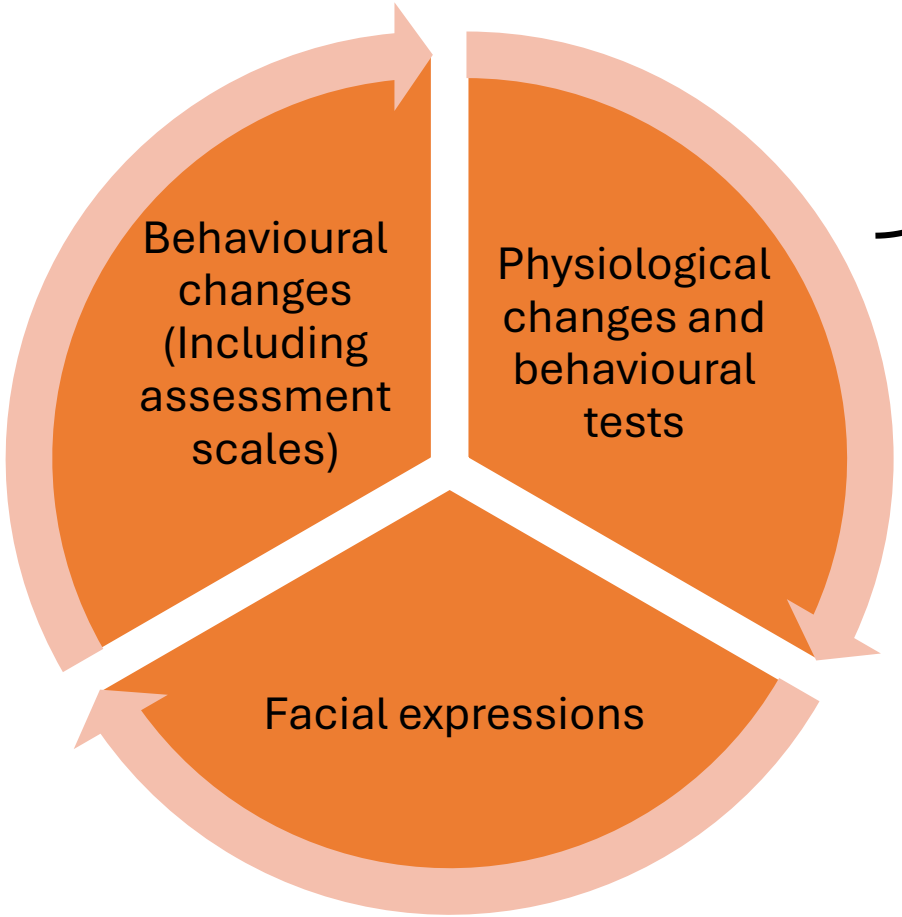
Stress: concept and assessment



Used mainly in research:

- Changes in hormone levels in various samples
- HR variability
- Thermography
- .....
- Cognitive bias tests
- .....

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- **Difficulties**
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Difficulties

- Some signs of stress / fear / anxiety can be very subtle
- Some are unspecific, i.e. can appear in other contexts
- People differ in their ability to identify stress signals
  - Knowledge of stress physiology, even if theoretical
  - Pet ownership

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(Menor-Campos et al., 2022, *Journal of Veterinary Behavior 50, 46)*

Difficulties

- Some signs of stress / fear / anxiety can be very subtle
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Familiarity with dog behaviour

Empathy

(Menor-Campos et al., 2022, *Journal of Veterinary Behavior 50, 46)*

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Difficulties

- Signs of stress / fear / anxiety can vary depending on
  - Dog's age
  - Dog's temperament
  - Context, particularly social context
  - Dog's previous experience with the situation

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THE SPECTRUM OF FEAR, ANXIETY & STRESS

RED: SEVERE SIGNS - FIGHT/AGGRESSION (FAS 5)

- Offensive aggression: lunging forward, ears forward, tail up, hair may be up on the shoulders, rump, and tail, showing only the front teeth, lip pucker - lips pulled forward, tongue tight and thin, pupils possibly dilated or constricted.
- Defensive aggression: hair may be up on the back and rump, dilated pupils, direct eye contact, showing all teeth including molars, body crouched and retreating, tail tucked, ears back.

RED: SEVERE SIGNS - FLIGHT/FREEZE/FRET (FAS 4)

- Flight: ears back, tail tucked, actively trying to escape - slinking away or running, mouth closed or excessive panting - tongue tight instead of loose out of mouth, showing whites of eyes, brow furrowed, pupils dilated.
- Freeze/Fret: tonic immobility, pupils dilated, increased respiratory rate, trembling, tense closed mouth, ears back, tail tucked, body hunched.

YELLOW: MODERATE SIGNS (FAS 3)

- Similar to FAS 2 but turning head away, may refuse treats for brief moments or take treats roughly, may be hesitant to interact but not completely avoiding interaction.

YELLOW: MODERATE SIGNS (FAS 2)

- Ears slightly back or to the side, tail down but not necessarily completely tucked, furrowed brow, slow movements or unable to settle, fidgeting, attention seeking to owner, panting with a tighter mouth, moderate pupil dilation.

GREEN: MILD/SUBTLE SIGNS (FAS 1)

- Lip licking, avoids eye contact, turns head away without moving away, lifts paw, partially dilated pupils, slight panting but commissures of lips are relaxed.

GREEN: ALERT/EXCITED/ANXIOUS? (FAS 0-1)

- Tail up higher, looking directly, mouth closed, eyes more intense, more pupil dilation, brow tense, hair may be just slightly up on the back and tail, may be expectant and excited or highly aroused.

GREEN: PERKED/INTERESTED/ANXIOUS? (FAS 0-1)

- Looking directly but not intensely, tail up slightly, mouth open slightly but loose lips, ears perked forward, slight pupil dilation.

GREEN: RELAXED (FAS 0)

- Sleeping.
- Neutral: ears in neutral position, not perked forward, brow soft, eyes soft, mouth closed but lips relaxed, body loose, tail carriage neutral, pupils normal dilation.
- Friendly greeting: slow back and forth tail and butt wag, ears just slightly back, relaxed brow and eyes, may have mouth slightly open with relaxed lips and loose tongue.

FEAR FREE HAPPY HOMES

www.fearfreehappyhomes.com

(Fear Free©, 2022, *The Spectrum of Fear, Anxiety and Stress*)

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Spectrum of Fear, Anxiety and Stress

- Excellent inter-rater reliability
- Very good intra-rater reliability
- Strong correlation with Lincoln Canine Anxiety Scale
- *It is a valid and reliable tool for evaluating acute stress in dogs visiting the veterinary practice*

(Gatehouse et al., 2025, *Journal of Veterinary Behaviour 81, 58*)

Lincoln Canine Anxiety Scale

Behavior	Indicator for Score 0	Indicator for Score 1	Indicator for Score 5
Running around	Not present	Small amount—occasional burst of activity	Extensive amount—continuously running around
Drooling Saliva	Not present	Small amount—damp around mouth	Extensive amount—pools of saliva
Hiding (e.g., under furniture, behind owner, etc.)	Not present	Small amount—retreats work to get dog from hiding area	Extensive amount—will not be removed from hiding area
Destructiveness (e.g., furniture, doors, carpets, ...)	Not present	Small amount—small item, e.g., pens	Extensive amount—e.g., holes in the wall
Cowering (e.g., tucks tail, flattens ears, etc.)	Not present	Small amount—uneasy	Extensive amount—petrified
Restlessness/Pacing	Not present	Small amount—occasional burst of activity	Extensive amount—fixed route continuously traced
Aggressive behavior (e.g., growling, snapping, or biting)	Not present	Small amount—occasional growl	Extensive amount—severe biting attempts made
"Freezing to the spot"	Not present	Occurs sporadically within an event	Most of the time
Barking/Whining/Howling	Not present	Small amount	Extensive amount
Panting	Not present	Small amount—occurs sporadically within an event	Most of the time
Vomiting, Defecating, Urinating, and/or Diarrhea	Not present	Small amount	Extensive amount
Owner seeking behavior	Not present	Seeks out owner occasionally during the event	Will not leave owner in any circumstance
Vigilance/Scanning of the environment	Not present	Occurs sporadically within an event	Most of the time
Bolts	Not present	Occurs occasionally, in response to certain noises	Occurs always, in response to a wide range of sounds
Shaking or trembling	Not present	Occurs occasionally, in response to certain noises	Occurs always, in response to a wide range of sounds
Self-harm	Not present	Small amount—e.g., licking feet	Extensive amount—e.g., broken teeth or nails

(Mills et al., 2020, *Frontiers in Veterinary Science* 7, 171)

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Lincoln Canine Anxiety Scale

- Good internal consistency (PCA and correlation of individual items with overall score)
- Good stimulus sensitivity
- Could be reduced to 11 items

(Mills et al., 2020, *Frontiers in Veterinary Science* 7, 171)

Displacement behaviours

- Behavioural patterns displayed without an apparent function related to the ongoing situation
- Indicators of motivational conflict
- Potential by-products of stress
- Self- or environment-directed

(Pedretti et al., 2023, *Animal Cognition 26, 943*)

Displacement behaviours

Displacement behaviours of dogs reported in the literature
Lip licking – experimental studies in several species
Nose licking
Paw lifting
Yawning – experimental studies in several species
Head turning
Stretching
Sniffing
Self-grooming and scratching – often considered as a single behaviour
Shaking
Blinking – not reported as displacement behaviour, but as a stress indicator

(Pedretti et al., 2023, *Animal Cognition 26, 943*)

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Displacement behaviours: lip-licking

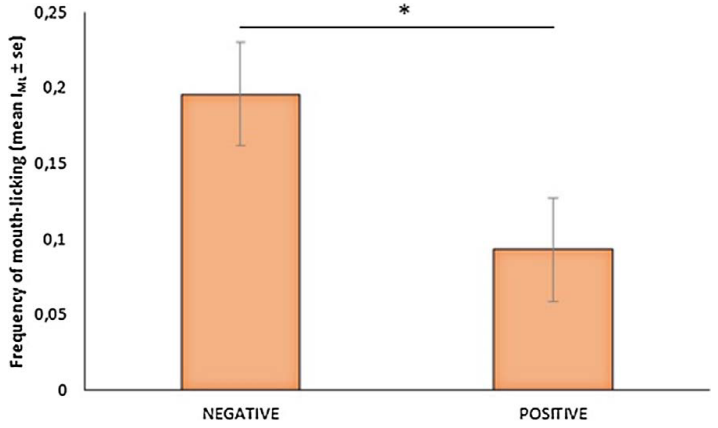
- Puppies (< 6 months of age)
- Fear reaction towards non-social stimuli
- Behaviours that occurred more frequently in trials with a fear response:
  - Lowered posture and tail
  - Freezing
  - Paw lifting
  - Barking

- Lip-licking: no significant differences between trials with and without a fear response

(Flint et al., 2018, *Journal of Veterinary Behavior 28, 17*)

Displacement behaviours: lip-licking

- More frequent in response to “negative” faces
- Response mainly to human negative faces more than dog negative faces
- Did not increase in response to negative auditory stimuli
- Mouth-licking is not simply a response to stressful stimuli



(Albuquerque et al., 2028, *Behavioural Processes* 146, 42)

Displacement behaviours: lip-licking

- Dogs exposed to an unfamiliar human approaching them in either a neutral or a threatening way
- Dogs' response categorized as "reactive" or "non-reactive"
- Lip-licking associated to a "non-reactive" attitude independently of the test condition

(Pedretti et al., 2033, *Animal Cognition 26, 943*)

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Displacement behaviours: contagious yawning

- Motivation poorly understood
- Empathy? Oxytocin?
- Arousal / stress?
- Communication signal?
- Individual differences

(Buttner and Strasser, 2013, *Animal Cognition 17, 95*)

Facial expressions

- Widely recognized to reflect emotions
- Facial expression of fear:
  - Ears towards the rear with the pinna towards the body
  - Deflected gaze
  - Raised eyebrows

(Mota-Rojas et al., 2021, *Animals* 11, 3334)

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Recognizing and diagnosing chronic stress

- Chronic stress has a major effect on welfare and many welfare problems are associated with chronic stress
- Animal welfare assessment tools can provide useful information on chronic stress
- They should include input- and output-based indicators covering all the domains of animal welfare

Recognizing and diagnosing chronic stress

Principle	Criteria
Good feeding	Absence of prolonged hunger
	Absence of prolonged thirst
Good housing	Comfort around resting
	Thermal comfort
	Ease of movement
Good health	Absence of injuries
	Absence of disease
	Absence of pain induced by management procedures
Appropriate behaviour	Expression of social behaviours
	Expression of other behaviours
	Good human-animal relationship
	Positive emotional state

(Boutreau et al., 2007, *Animal Welfare*, 16, 225)

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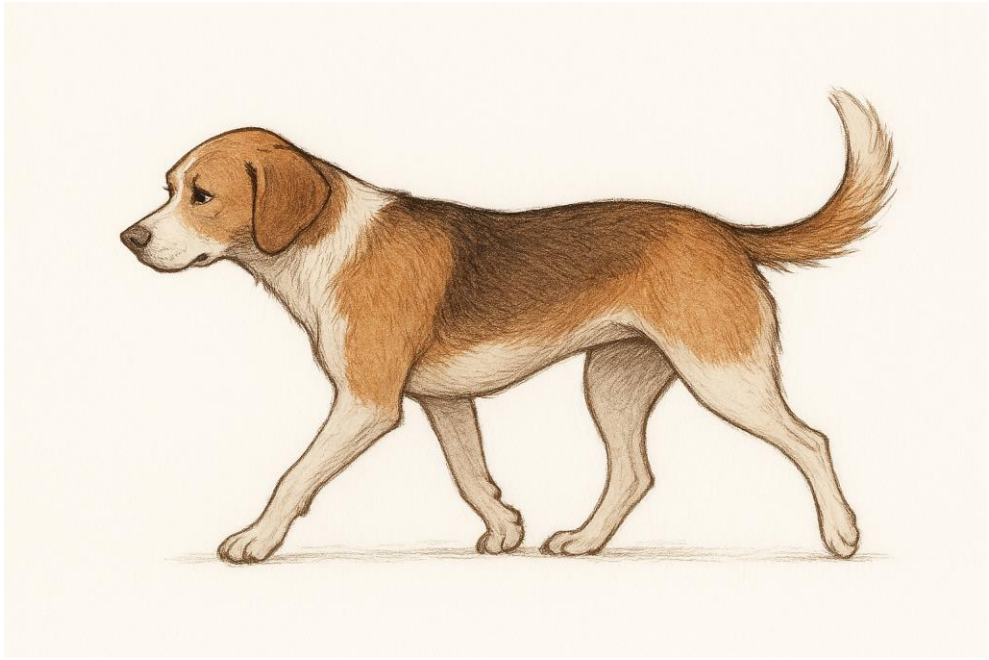
Recognizing and diagnosing chronic stress: ARBs

- Pacing is an example of “abnormal repetitive behaviour” (ARB)
- ARBs may indicate chronic stress and most conditions that cause ARB also reduce welfare
- However, the biological meaning of ARBs is rather complex…



(Beerda et al., 2000, *Animal Welfare*, 9, 49; Mason and Latham, 2004, *Animal Welfare*, 13, S57)

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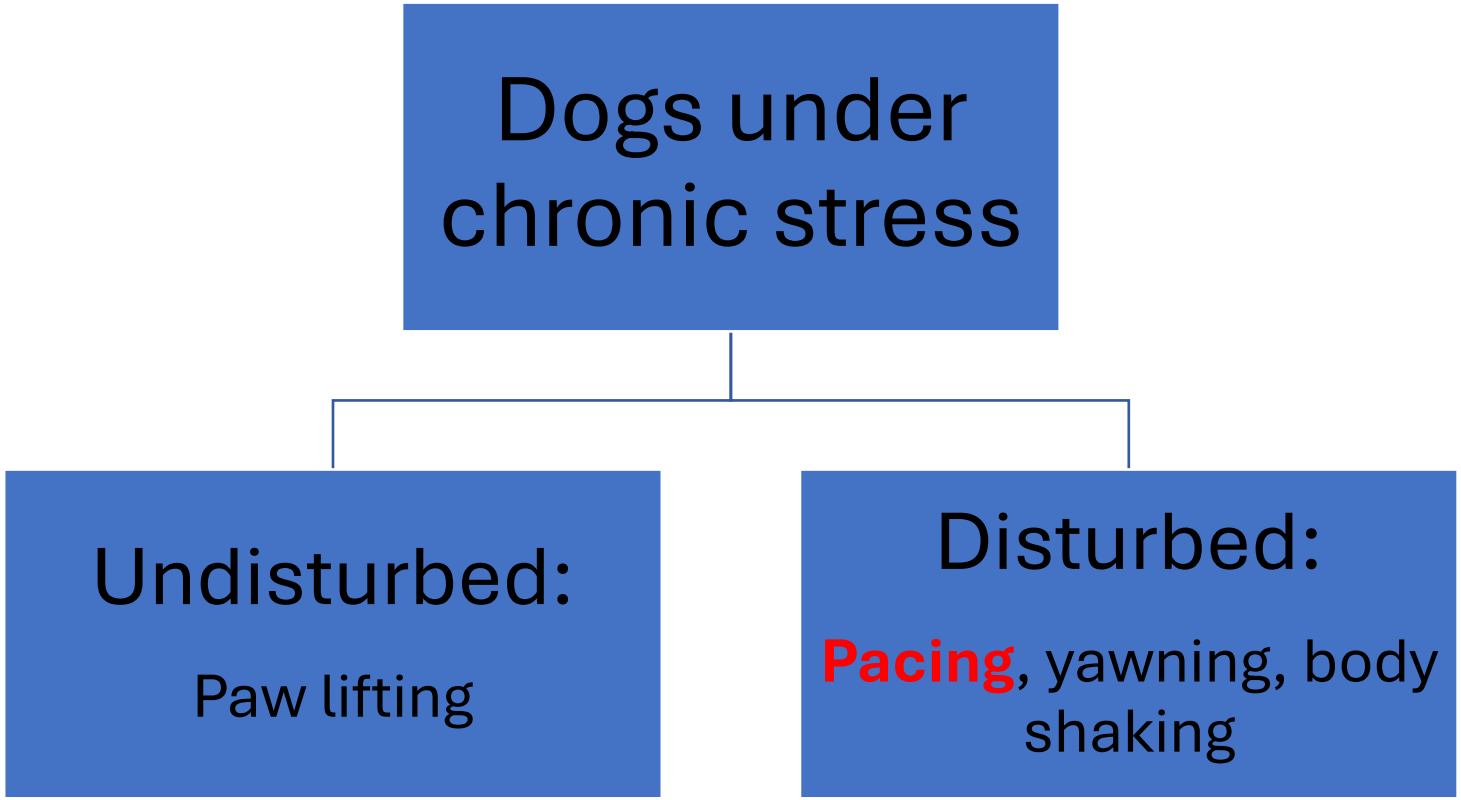
Recognizing and diagnosing chronic stress: ARBs

- ARBs can be coping mechanisms
- ARBs can become independent of environmental conditions
- Genetics and early environment modify the likelihood of an animal's developing ARBs when in a sub-optimal environment
- Simple measures of frequency should not be used to compare different ARBs

(Mason and Latham, 2004, *Animal Welfare*, 13, S57)

Recognizing and diagnosing chronic stress: ARBs



(Beerda et al., 2000, *Animal Welfare*, 9, 49)

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Recognizing and diagnosis chronic stress

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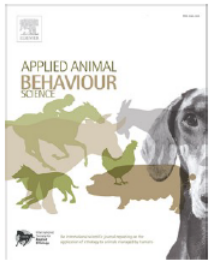

Check for updates

Review of depressive-like behaviours in some group-living mammals

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(Ilmer and Smolen, 2025, *Applied Animal Behaviour Science*, 292, 106753)

Recognizing and diagnosis chronic stress

Table 3
Presence of merged depressive symptoms from DSM-V and own interpretation in non-human primates, domestic horses, elephants and marine mammals.

Depressive symptoms	Group of species			
	Non-human primates	Domestic horses	Elephants	Marine mammals
Anhedonia	Yes	Yes	Apathy	No data*
Weight lose	Yes	No**	No**	Yes
Insomnia or hypersomnia	Yes, Hypersomnia	Yes, Insomnia ***	Yes, Insomnia ***	No data
Psychomotor retardation	Yes	Yes	No data	Yes
Fatigue/Loss of Energy	Yes	Yes	Yes	Yes
Feeling worthless (Negative cognitive biases)	Yes	Yes	No data	Yes
Decreased concentration	No data****	Yes	No data	No data
Thoughts of death/ suicide (self-harming, stereotypes)	Yes	Yes	Yes	Yes

(Xu et al., 2015, *Scientific Reports* 5, 9220)

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Summary and conclusions

- Stress can be defined as an emotional reaction with (usually) high arousal and negative valence
- It can be identified using behavioural changes (including scales), changes in facial expression and physiological changes (mostly used in research settings)
- Identifying stress in dogs is not always easy as some signals are subtle and can vary depending on the context and the characteristics of the individual dog
- Knowledge of stress biology, familiarity with dog behaviour and (perhaps) empathy modify the observer's ability to identify stress

Summary and conclusions

- The Spectrum of Fear, Anxiety and Stress as well as the Lincoln Canine Anxiety Scale are useful tools that have been validated to some extent
- Displacement behaviours such as lip licking and yawning have received much attention, but further research is needed to understand their motivation
- Using welfare assessment protocols based on the Five Domains Model can be useful to identify situations that are likely to cause chronic stress
- Pacing and other abnormal repetitive behaviours are potentially useful indicators of chronic stress
- Chronic stress may cause a depression-like state in many species, including dogs

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Thank you