



Understanding canine anxiety and stress: Causes and Impacts on our dogs

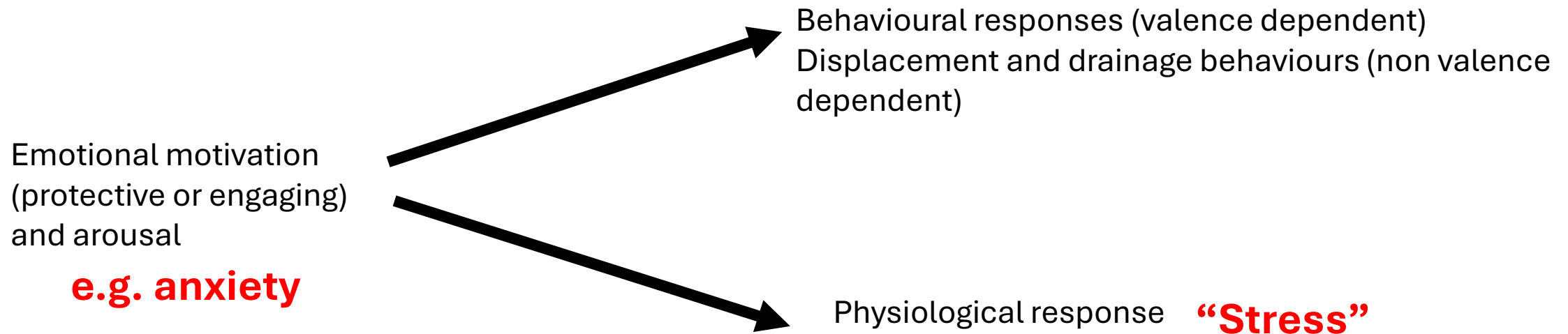
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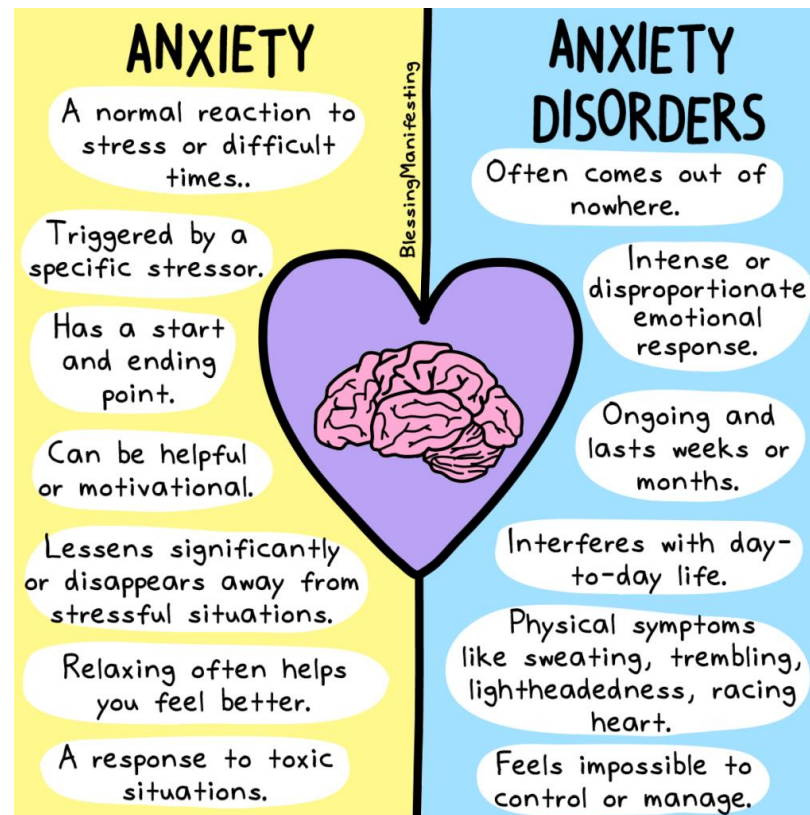
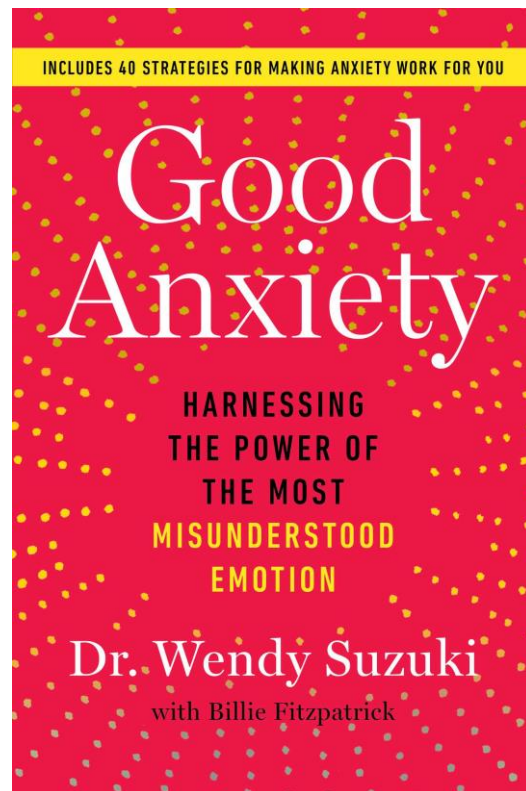


Introduction

- ❖ Anxiety and stress both relate to **normal biological responses**, emotional, and physiological, which have the **ultimate aim of ensuring the survival of the individual**.
- ❖ They are distinct but related



- ❖ It is important to differentiate between anxiety when it is **justified and appropriately responded** to, with the aim of achieving resolution and the emotional response when it is **either unjustified or unresolvable or sometimes both**.



Normal Anxiety



Brief episodes triggered by specific stressors.



Mild to moderate feelings of unease or worry.



Mild physical symptoms like tension, restlessness, or a racing heart.



Occasional feelings of nervousness or apprehension.



Temporary concerns about specific events or situations.



Minor changes in behavior in response to stressors.

Duration

Intensity


Physical Symptoms

Emotional Response


Cognitive Patterns

Behavioral Changes

Chronic Anxiety


Persistent anxiety lasting for months or years, even without an obvious cause. 

Intense, overwhelming anxiety that interferes with daily life. 

Severe physical symptoms such as chronic fatigue, muscle tension, headaches. 

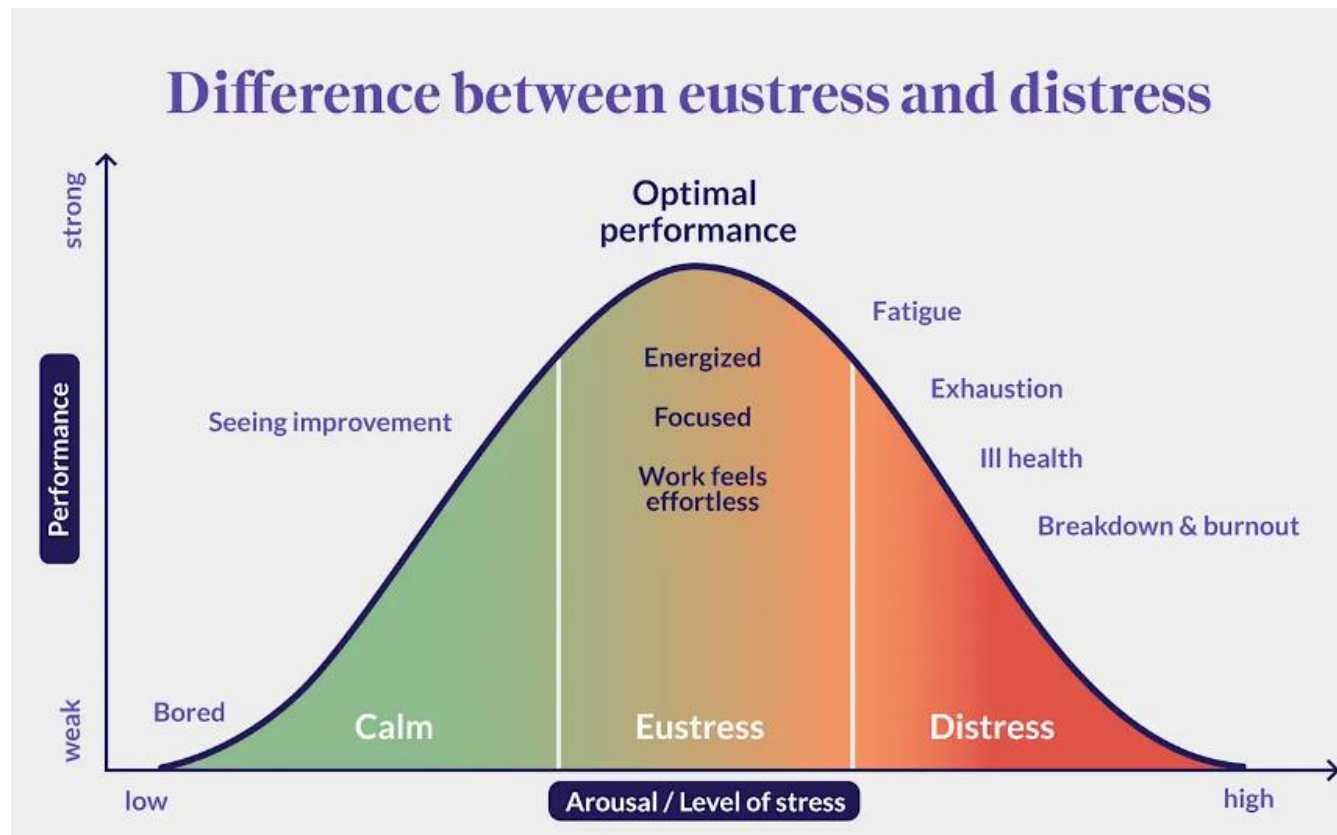
Persistent feelings of dread, fear, or impending doom. 

Constant rumination, worry, and catastrophic thinking. 

Avoidance behaviors, compulsions, or disruptions in daily routines. 

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- ❖ Stress, both physiological and psychological, can also be beneficial to the individual
- ❖ When it is chronic in nature and cannot be resolved it can have considerable detrimental impact.
- ❖ The terms **distress** and **eustress** are sometimes used to distinguish between the two.

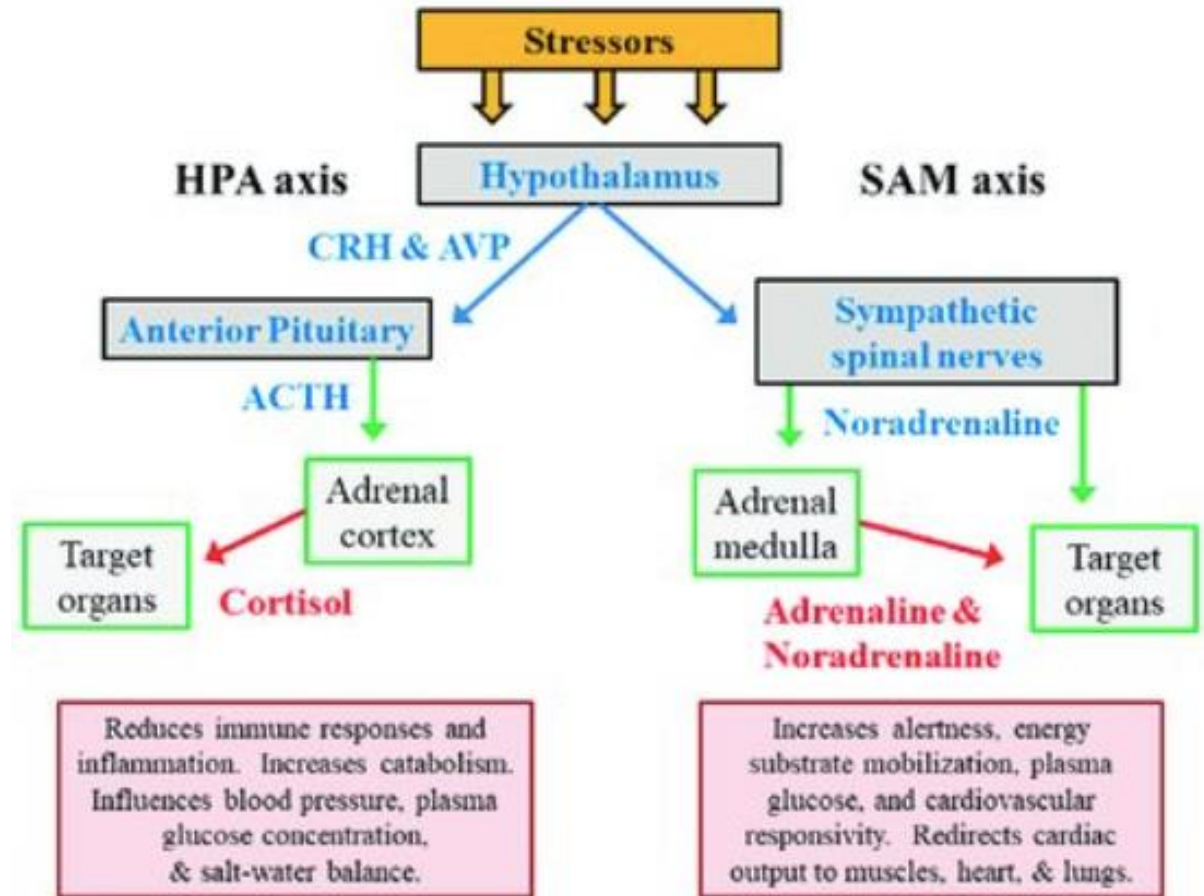
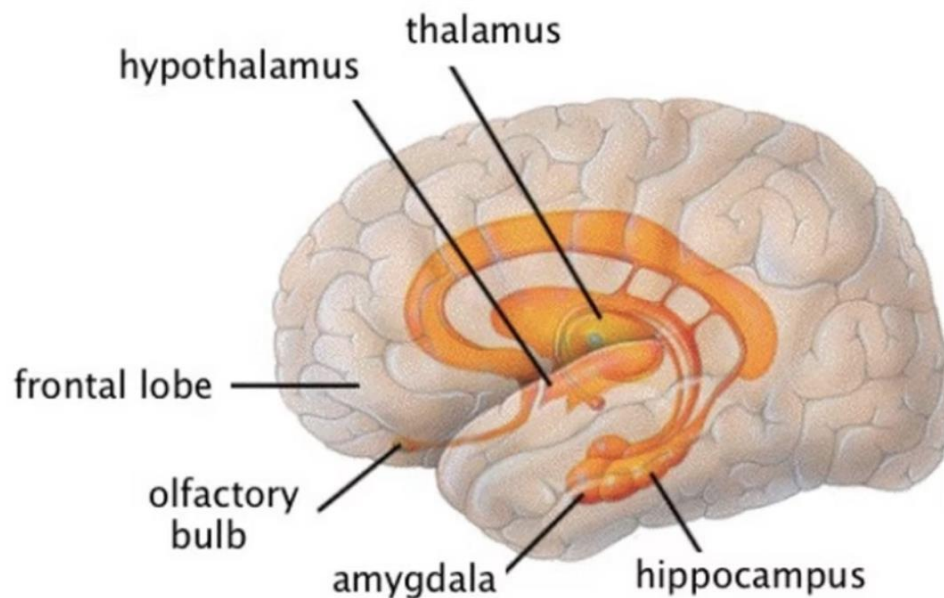


What causes “anxiety and stress” in dogs?

- ❖ Adaptive anxiety and resulting physiological stress are triggered by situations of **uncertainty or exposure to contexts in which there have been previous experiences related to potential for danger and threats to survival**



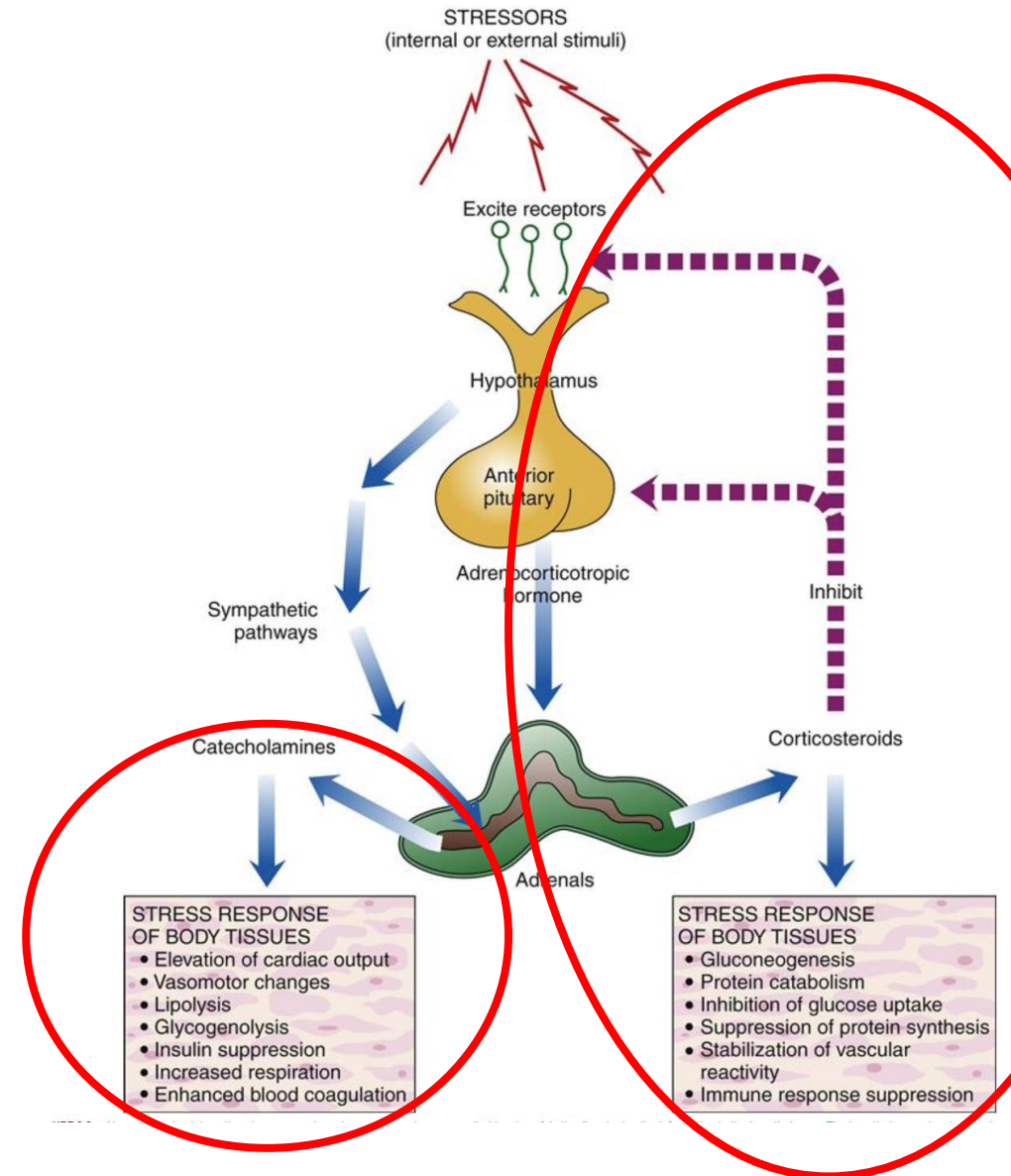
- ❖ Limbic system activation
- ❖ Amygdala alerts the hypothalamus
- ❖ SAM axis activation
- ❖ HPA axis activation



❖ Adaptive response

❖ Physiological responses

- ❖ increased heart rate and blood pressure and increased availability of glucose, enhance the physical ability of the individual to resolve the problematic situation
- ❖ metabolism changes followed by negative feedback via the hippocampus and glucocorticoid receptors return the individual to baseline and a state of resolution



❖ Adaptive response

- ❖ Behavioural responses designed to ensure survival through
 - ❖ increasing distance and decreasing interaction with the trigger
 - ❖ finding out more about it in order to limit the damage it can cause

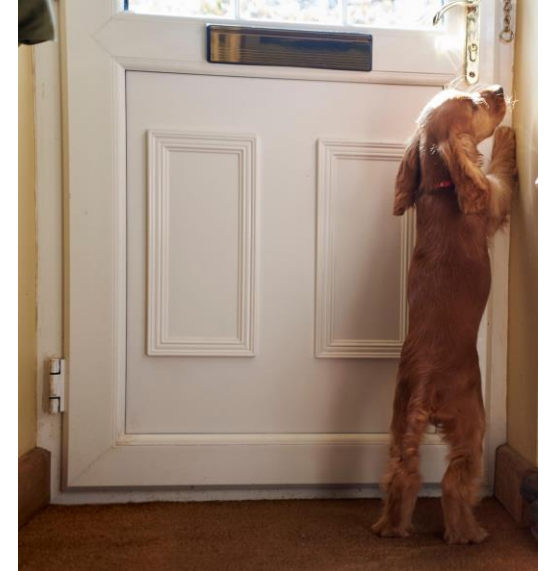


❖ When do anxiety and stress become maladaptive?

- ❖ exposure to the problematic stimulus or context is prolonged or repeated
- ❖ the individual is unable to successfully use natural behavioural responses to provide a sense of safety and security



❖ For domestic dogs the challenges of living in a human dictated environment can be a risk factor for development of anxiety and stress responses that become detrimental rather than beneficial



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Individual variation in impact

- ❖ Many domestic dogs live within human directed society very successfully
- ❖ A range of factors influence the impact of social and physical stressors on the individual
 - ❖ genetics
 - ❖ in utero environment
 - ❖ maternal and early environmental influences



Individual variation in impact

- ❖ A range of factors influence the impact of social and physical stressors on the individual
 - ❖ genetics
 - ❖ in utero environment
 - ❖ maternal and early environmental influences
 - ❖ post-natal experiences
 - ❖ availability of predictability and control within their environment
 - ❖ ability to express natural behavioural responses in ways that support emotional recovery



Creating emotional stability

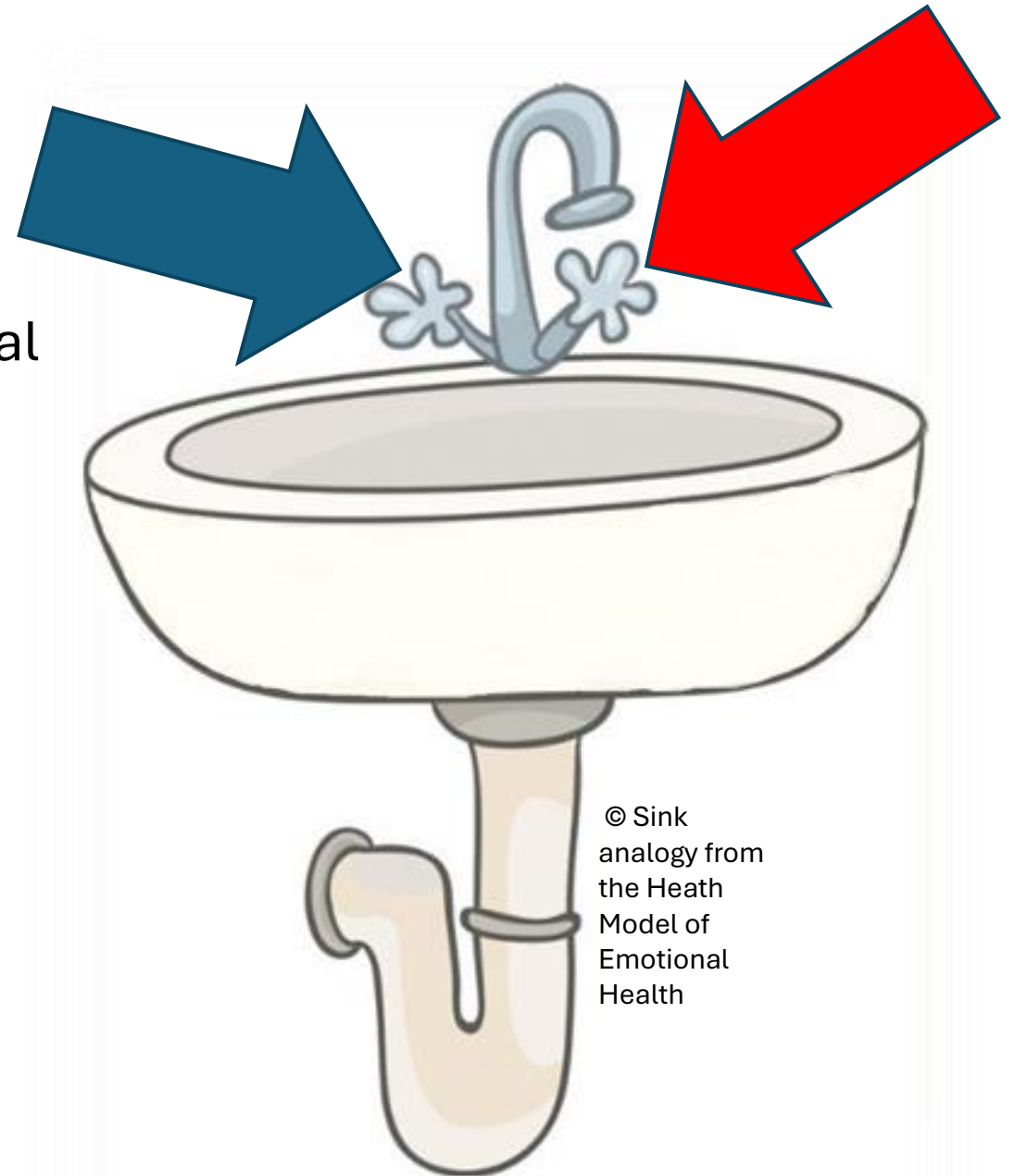
- ❖ In the Heath model the concept of emotional stability is represented by the sink
- ❖ 1. Sink size influenced by
 - ❖ genetics
 - ❖ in utero environment
 - ❖ maternal and early environmental influences
 - ❖ post-natal experiences



© Sink analogy from the Heath Model of Emotional Health

Creating emotional stability

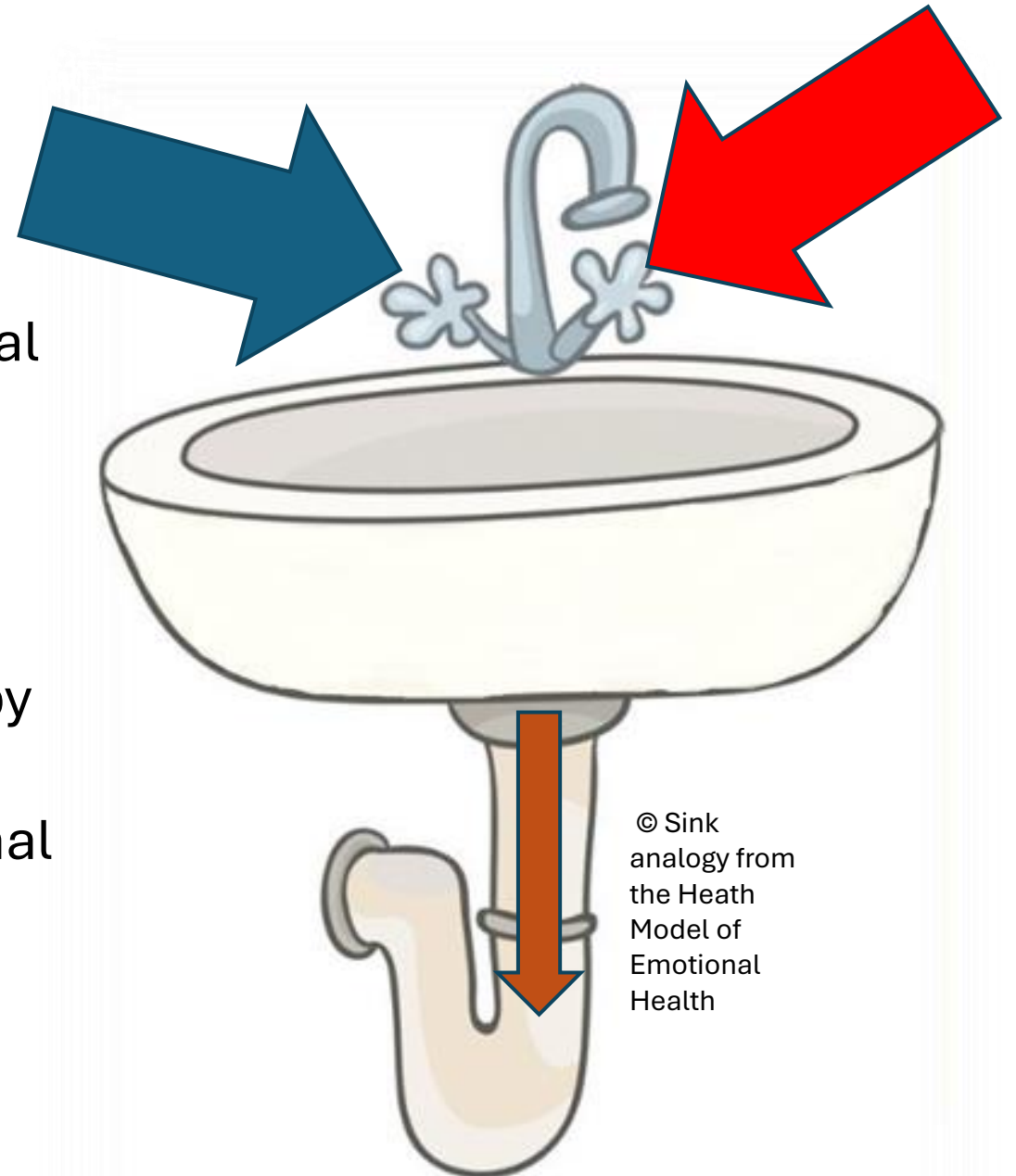
- ❖ In the Heath model the concept of emotional stability is represented by the sink
- ❖ 1. Sink size
- ❖ 2. Emotional input – valence and amount which are influenced by
 - ❖ post-natal experiences
 - ❖ availability of predictability and control within their environment



© Sink analogy from the Heath Model of Emotional Health

Creating emotional stability

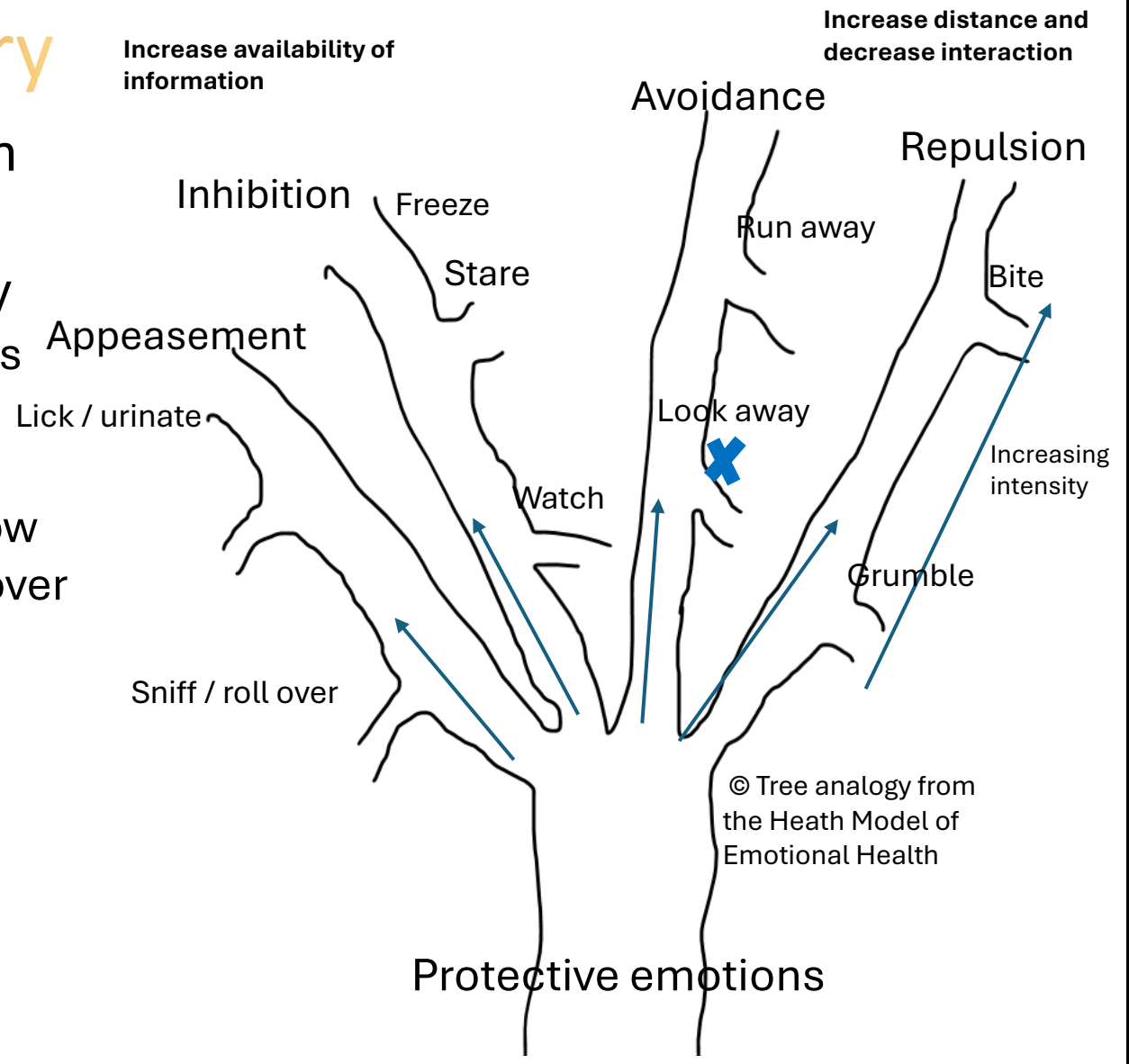
- ❖ In the Heath model the concept of emotional stability is represented by the sink
- ❖ 1. Sink size
- ❖ 2. Emotional input
- ❖ 3. Emotional drainage which is influenced by
 - ❖ ability to express natural behavioural responses in ways that support emotional recovery



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Facilitating appropriate behavioural responses in ways that support emotional recovery

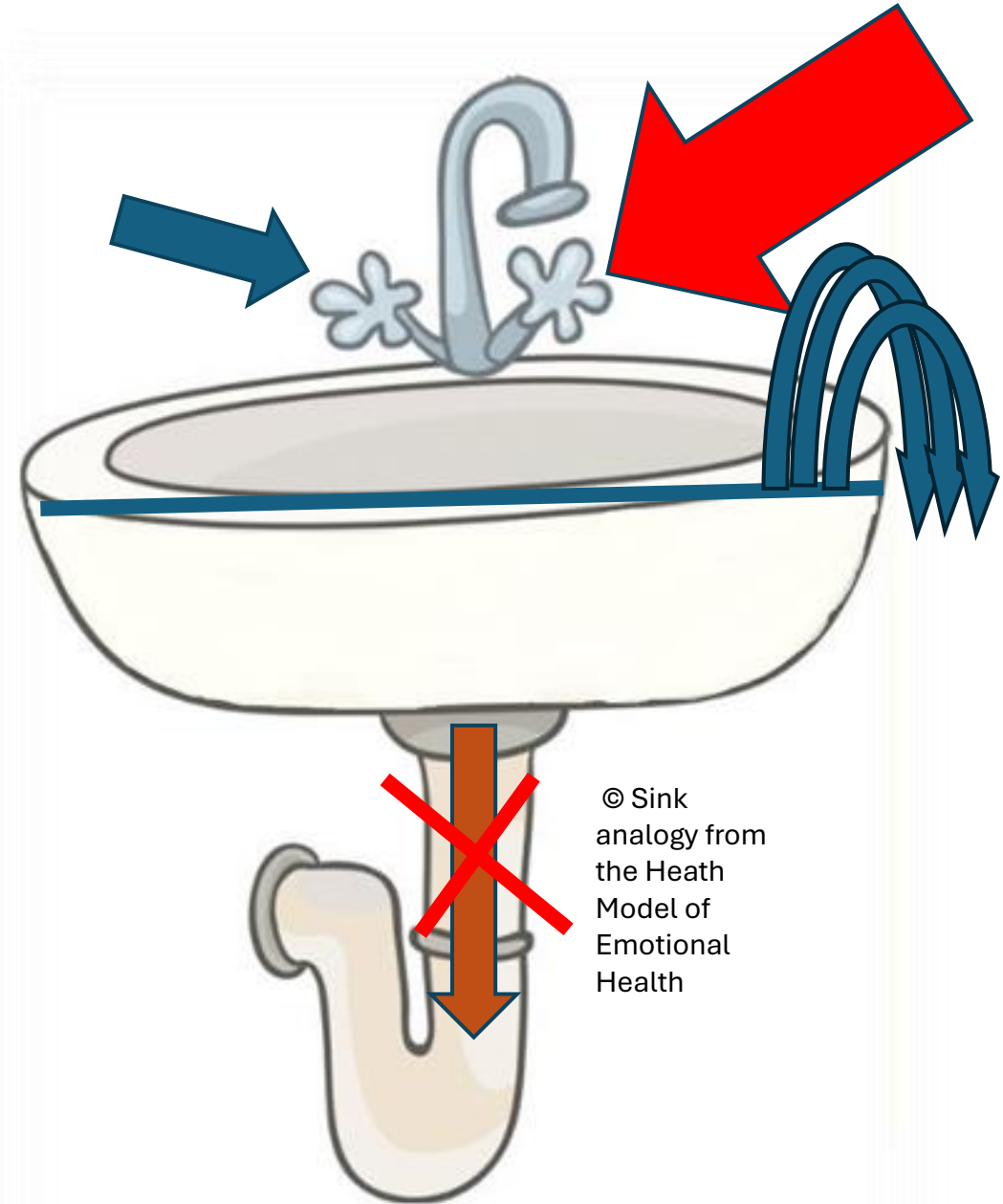
- ❖ In the Heath model the concept of selection of behavioural responses to protective emotions is represented by the tree analogy
 - ❖ The aim is to reach a place that offers security as soon as possible
 - ❖ There are four available branches
 - ❖ Reaching a safe spot on the most appropriate low side branch allows the individual to start to recover
 - ❖ If this cannot be found it is necessary to climb higher



© Tree analogy from the Heath Model of Emotional Health

Compromised emotional stability

- ❖ When sink size, input or output are compromised the level of emotional arousal increases and emotional stability is threatened



Compromised emotional stability

- ❖ Anxiety can become triggered in contexts where potential for harm is either not present at all or is mild and should be easily resolvable.
- ❖ The unresolved emotional state is associated with chronic and potentially detrimental physiological stress as well as psychological stress



What are the impacts of maladaptive “anxiety and stress” in dogs?

- ❖ psychological stress

- ❖ the “**emotional and cognitive response** that occurs when an individual perceives a situation as threatening, unpredictable, uncontrollable, or exceeding their coping resources — even in the absence of immediate physical danger”.

- ❖ physiological stress

- ❖ the **physical response** to a challenge or demand that is excessive, prolonged, or poorly regulated, resulting in harmful effects rather than helping the organism adapt to the stressor.

What are the impacts of “anxiety and stress” on the emotional health domain?

- ❖ Both avoidance and repulsion responses can be classed by caregivers, veterinary professions and even wider society as undesirable and problematic.
- ❖ They can also be detrimental to the individual
 - ❖ increase risk of injury, through confrontational interactions
 - ❖ avoidance responses which put them in danger such as bolting leading to road traffic accidents.



- ❖ Anxiety can also be associated with behavioural responses which aim to acquire more information about the potential threat
 - ❖ inhibition and appeasement are common responses in a socially obligate species like a dog, particularly in the context of potential social threat
 - ❖ misunderstanding of these responses can lead to miscommunication which runs the risk of exacerbating anxiety and inducing frustration

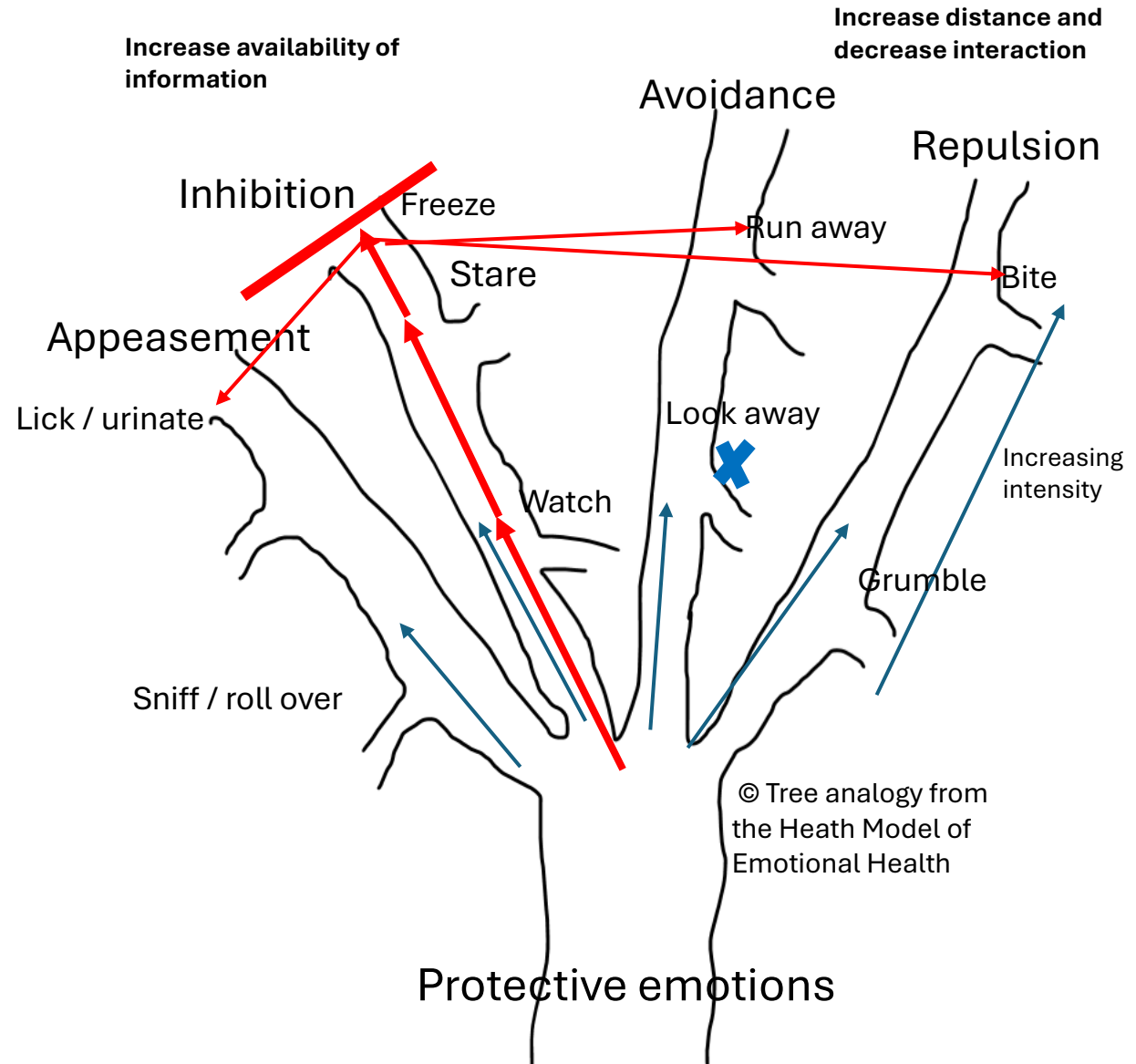


What are the impacts of maladaptive “anxiety and stress” in dogs?

- ❖ In situations where the anxiety is unjustified or out of proportion to the context it is possible that the behavioural responses can have more complex consequences for the individual but also for others



- ❖ If the behavioural responses are not successful in achieving recovery from the anxious state the individual may move between protective responses
- ❖ In addition, the emotion of frustration can be triggered leading in intensification and acceleration of responses and an increase in confrontational interactions.
- ❖ All of this can increase the impact for those involved.



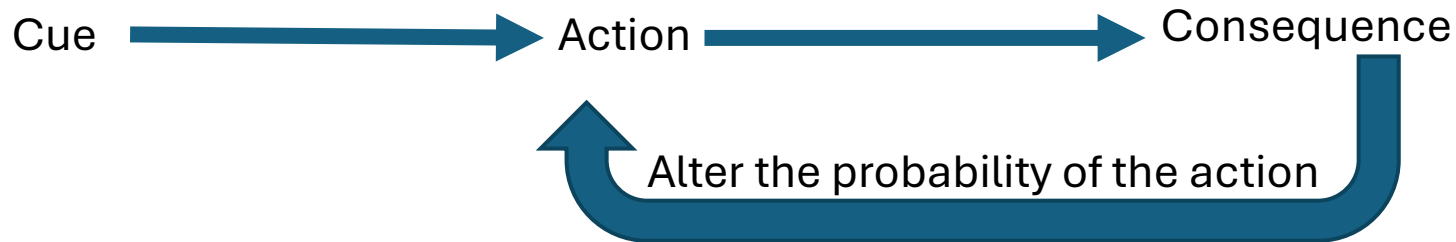
What are the impacts of “anxiety and stress” on the cognitive health domain?

- ❖ Through classical conditioning associations between the protective emotional bias and particular contexts can become established.
 - ❖ For example protective emotional bias can become associated with the veterinary environment as well as with veterinary personnel.



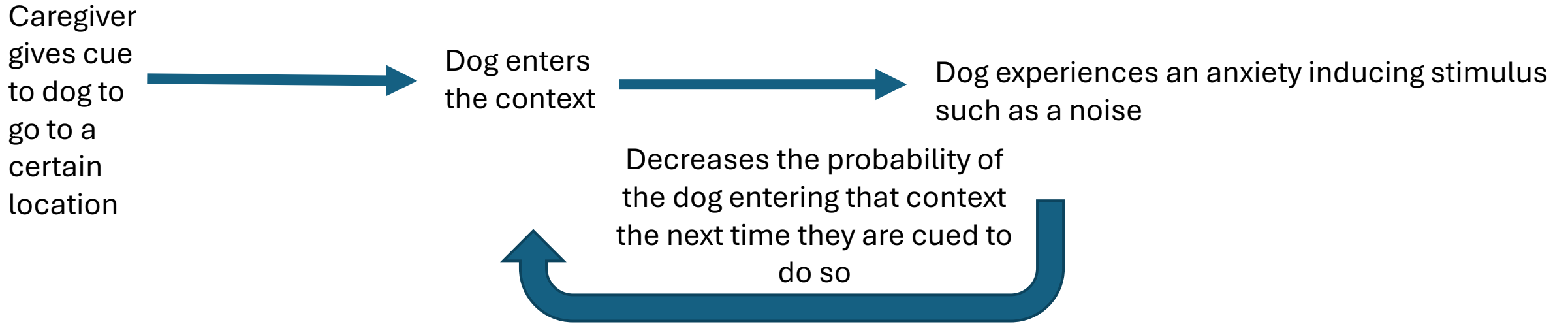
What are the impacts of “anxiety and stress” on the cognitive health domain?

- ❖ Learning through operant conditioning also needs to be considered.
- ❖ When a dog experiences a consequence following an action this can alter the probability that the action will be performed in the future.



- ❖ The presence of anxiety and resulting stress can have a direct impact on the individual’s perception of such a consequence
- ❖ In turn this can increase or decrease the likelihood of them responding to a cue with a particular action in the future.

What are the impacts of maladaptive “anxiety and stress” on the cognitive health domain?



- ❖ Misinterpretation of this change in behaviour can lead to dogs being considered to be stubborn or “disobedient”
- ❖ This in turn can result in interactions which detrimentally impact the individual and can have implications for their relationship with caregivers or veterinary professionals.

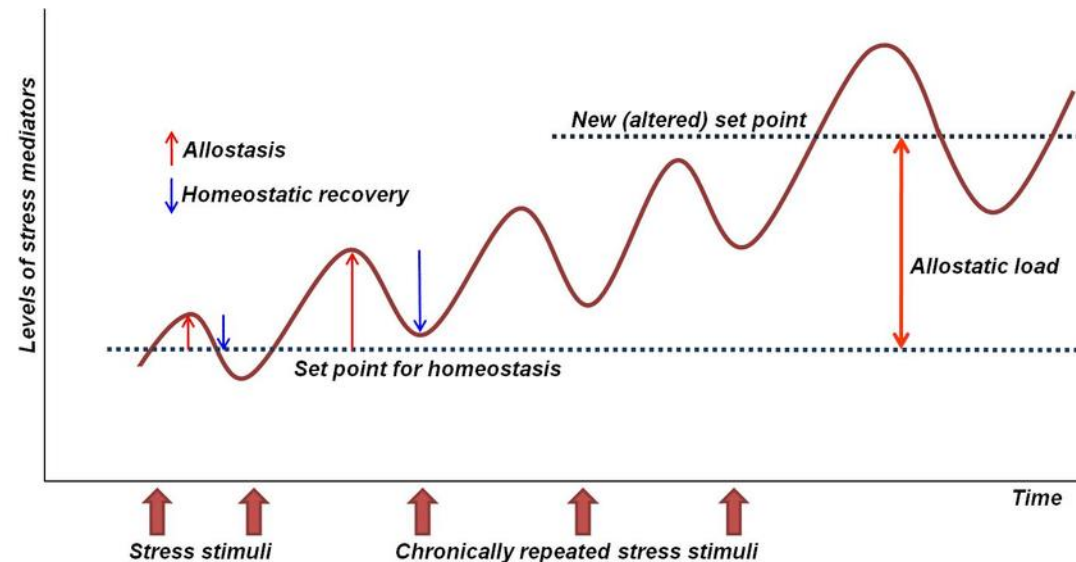
What are the impacts of maladaptive “anxiety and stress” on the physical health domain?

- ❖ Both the behavioural responses and the physiological changes associated with anxiety have the potential to impact on the physical health of the dog.
- ❖ This may happen within the context of justified anxiety and acute stress and impact on physiological parameters which are traditionally used in a veterinary context to assist in diagnosis of disease.
 - ❖ heart rate
 - ❖ respiratory rate
 - ❖ response palpation
 - ❖ biochemical markers



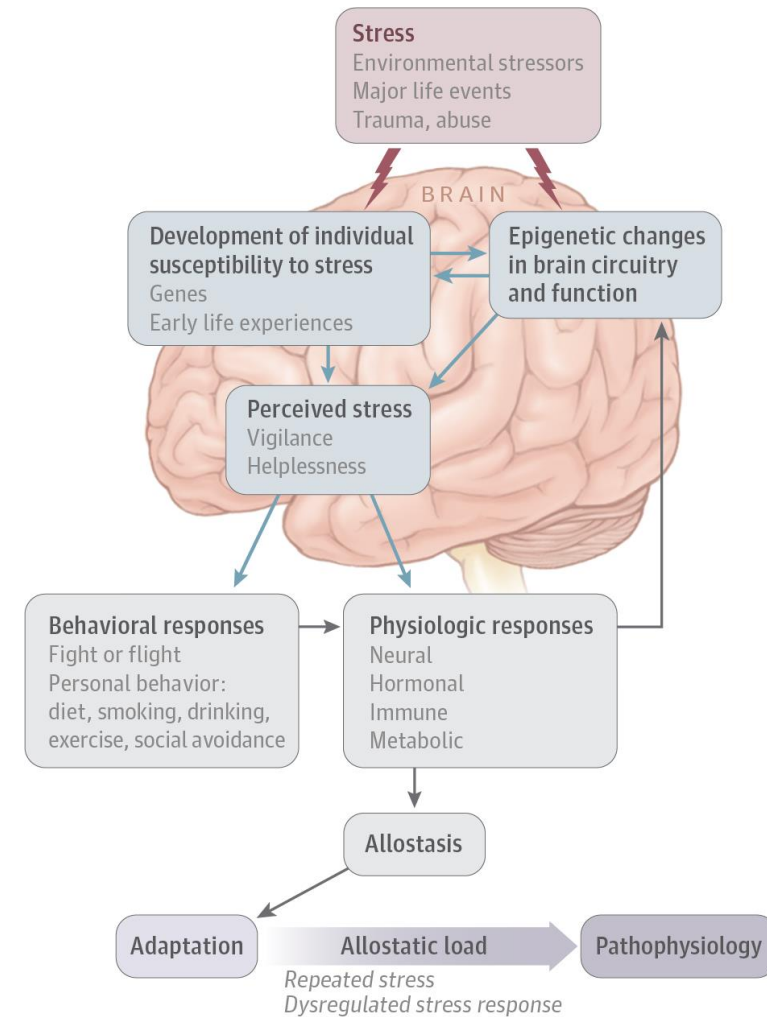
What are the impacts of “anxiety and stress” on the physical health domain?

- ❖ In cases where anxiety is unjustified or ongoing the resulting chronic physiological impact can lead to allostatic load
- ❖ Mediators associated with physiological stress protect the body in the short term and promote adaptation by the process known as allostasis
- ❖ In the long run allostatic load causes changes in the body that can lead to disease



What are the impacts of maladaptive “anxiety and stress” on the physical health domain?

- ❖ Allostatic load is “the cost to the individual of chronic exposure to elevated or fluctuating endocrine or neural responses resulting from chronic or repeated challenges that the individual experiences as stressful”
- ❖ It is the individual interpretation of events which is most important in determining their impact



Impact of allostatic load on physical health

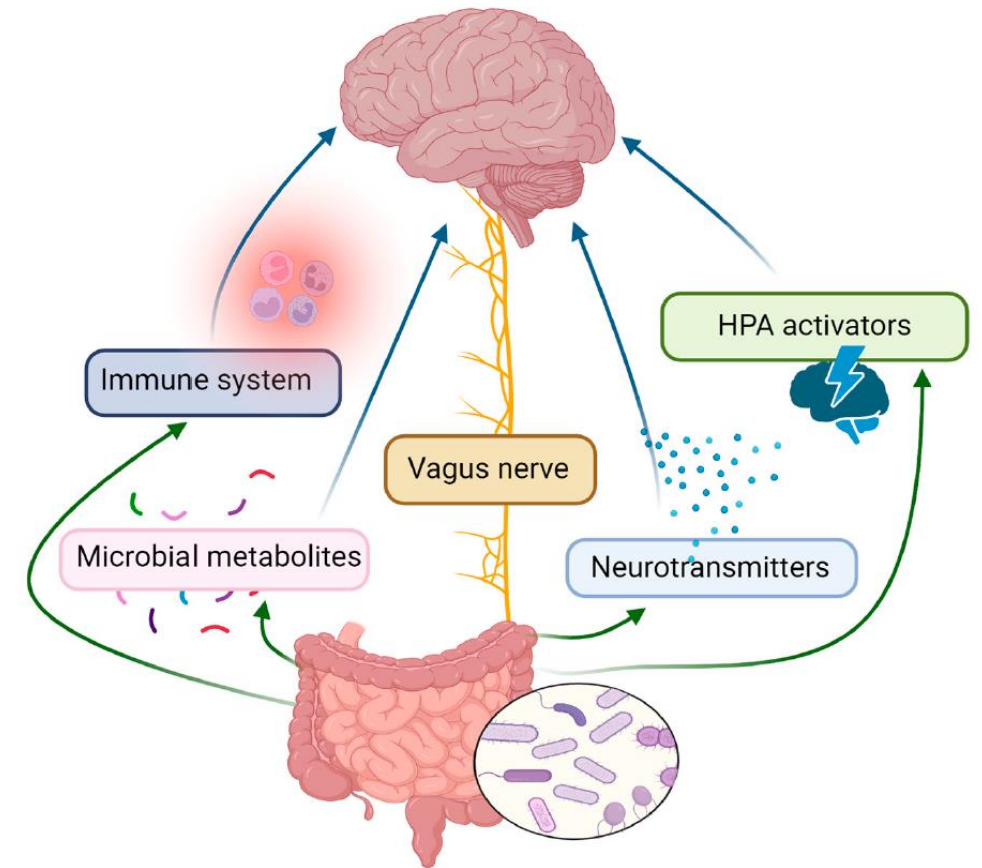
- ❖ Potential physical health impact of chronic physiological stress is vast
- ❖ A common sign of chronic stress is repeated ill health
- ❖ If there is a history of recurrent illness or “flare ups” it is essential to ask questions about potential emotional health factors



Gastrointestinal impact

- ❖ Impact of physiological stress on mucosal integrity
- ❖ Influence of stress related mediators such as cytokines on gut pathways
 - ❖ Kynurenine pathway (KP) - major route of tryptophan catabolism influencing serotonin availability
- ❖ Impact of the microbiome on gut-brain axis function

Impact of Gut Microbiota on the Central Nervous System












- ❖ Kiełbik, P. and Witkowska-Pitaszewicz, O., 2024. The relationship between canine behavioral disorders and gut microbiome and future therapeutic perspectives. *Animals*, 14(14), p.2048.

Weight management impact

- ❖ Obesity
- ❖ Influence of sympathetic/parasympathetic balance on glycogen storage deposits
- ❖ Hypo/Anorexia



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BODY CONDITION SYSTEM

TOO THIN	1	Ribs, lumbar vertebrae, pelvic bones and all bony prominences evident from a distance. No discernible body fat. Obvious loss of muscle mass.	
	2	Ribs, lumbar vertebrae and pelvic bones easily visible. No palpable fat. Some evidence of other bony prominence. Minimal loss of muscle mass.	
	3	Ribs easily palpated and may be visible with no palpable fat. Tops of lumbar vertebrae visible. Pelvic bones becoming prominent. Obvious waist and abdominal tuck.	
IDEAL	4	Ribs easily palpable, with minimal fat covering. Waist easily noted, viewed from above. Abdominal tuck evident.	
	5	Ribs palpable without excess fat covering. Waist observed behind ribs when viewed from above. Abdomen tucked up when viewed from side.	
TOO HEAVY	6	Ribs palpable with slight excess fat covering. Waist is discernible viewed from above but is not prominent. Abdominal tuck apparent.	
	7	Ribs palpable with difficulty; heavy fat cover. Noticeable fat deposits over lumbar area and base of tail. Waist absent or barely visible. Abdominal tuck may be present.	
	8	Ribs not palpable under very heavy fat cover, or palpable only with significant pressure. Heavy fat deposits over lumbar area and base of tail. Waist absent. No abdominal tuck. Obvious abdominal distention may be present.	
	9	Massive fat deposits over thorax, spine and base of tail. Waist and abdominal tuck absent. Fat deposits on neck and limbs. Obvious abdominal distention.	

The BODY CONDITION SYSTEM was developed at the Nestlé Purina Pet Care Center and has been validated as documented in the following publications:
 Newby D, Borges JW, Meyers T, et al. Comparison of body fat estimates by dual-energy x-ray absorptiometry and deuterium oxide dilution in client-owned dogs. *Compendium* 2001, 23 (14): 70
 Lefebvre DF. Development and Validation of a Body Condition Score System for Dogs. *Canine Practice* July/August 1997, 22:10-15
 Koby, et al. Effects of Diet Restriction on Life Span and Age-Related Changes in Dogs. *JAVMA* 2002; 220:1315-1320
 Call 1-800-222-VETS (8387), weekdays, 8:00 a.m. to 4:30 p.m. CT

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Immune function impact

- ❖ Viral / bacterial / protozoan impact
- ❖ Parasitic impact
- ❖ Wound healing



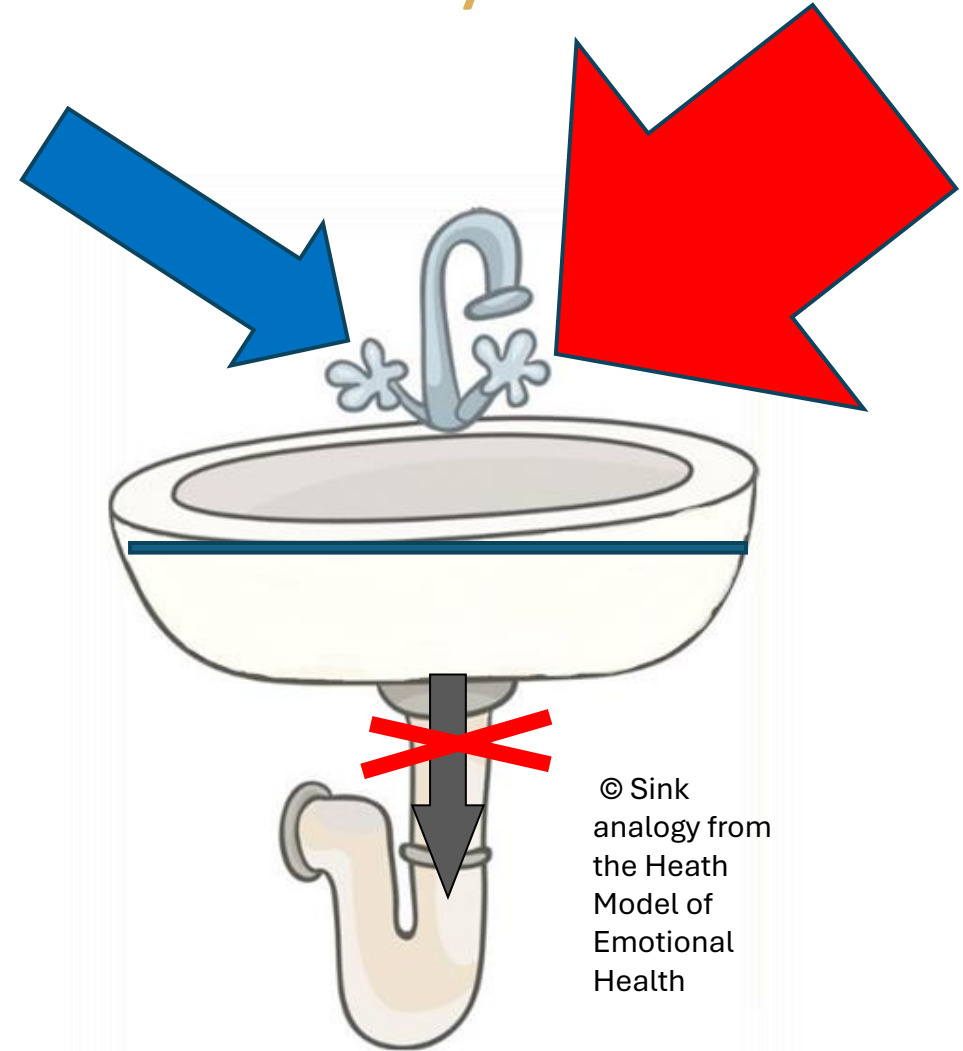
Pain perception impact

- ❖ Acute
 - ❖ Surgical
 - ❖ Accidental
- ❖ Chronic
 - ❖ Inflammatory pain
 - ❖ Neuropathic pain issues



What are the impacts of maladaptive “anxiety and stress” on the physical health domain?

- ❖ Other physical health considerations include dermatological, cardiovascular, endocrine and metabolic conditions as well as reproductive impact
- ❖ Sleep is an important part of emotional regulation and becomes disrupted in duration and quality during periods of maladaptive “anxiety and stress”
- ❖ Any restriction on emotional drainage can also increase the impact of increased protective emotional input



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Emotional disease and sleep disturbance

- ❖ Emotional illness is associated with sleep disturbance in human patients
- ❖ Individuals who get less than 5 hours of sleep a night, on average, have a 2- to 3-fold greater risk of anxiety or depression compared to those who get 7 hours of sleep a night
- ❖ Research in the veterinary field into the relationship between sleep and emotional disturbance is limited
- ❖ A paper published in 2022 highlighted the fact that there is a link between sleep duration and disturbance and caregiver perception of problematic behaviour in their canine companions



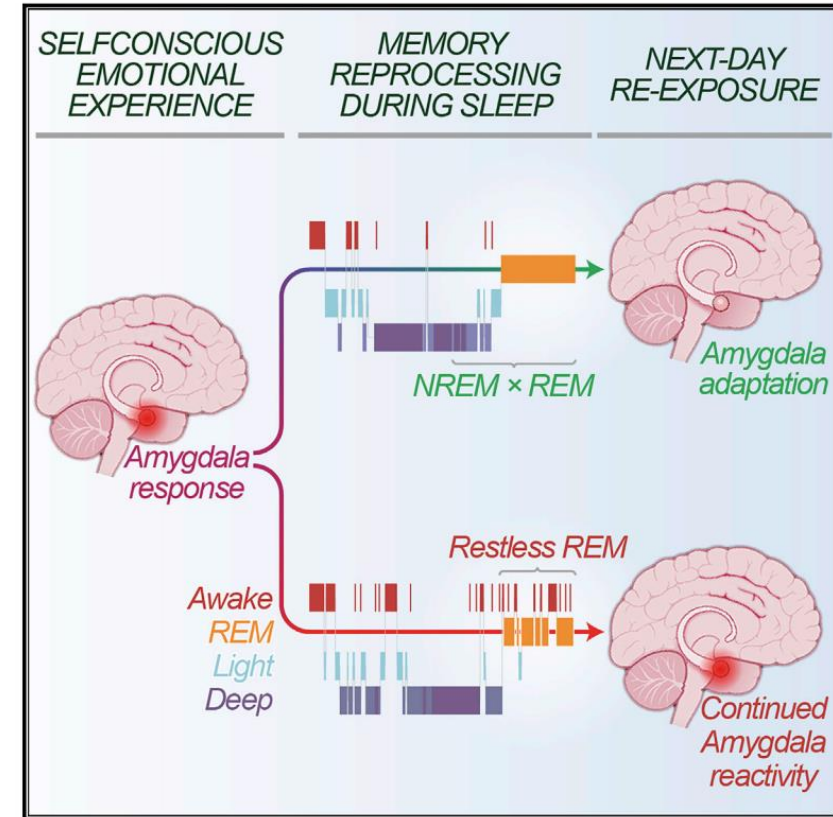
Article

Sleep Characteristics in Dogs; Effect on Caregiver-Reported Problem Behaviours

Carrie Tooley * and Sarah E. Heath

Emotional implications of sleep disturbance

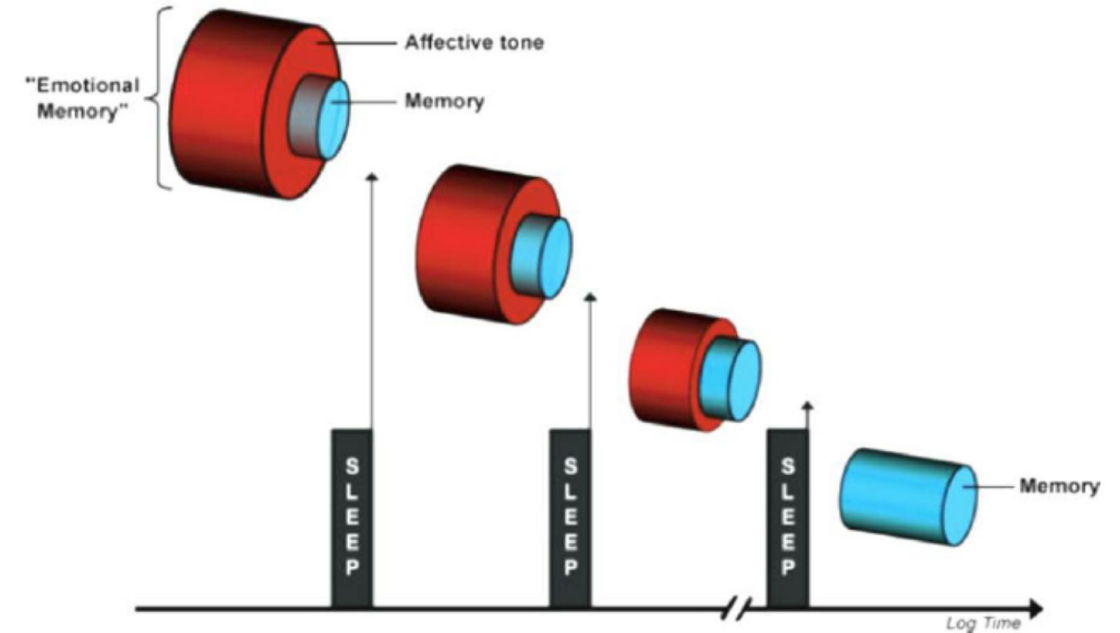
- ❖ REM sleep in humans is thought to modulate emotional arousal via a noradrenaline reduction mechanism
- ❖ An individual has a greater capacity to cope with emotional arousal of any sort (protective or engaging) the day after they achieve sufficient REM sleep during their night-time rest
- ❖ Overnight amygdala adaptation is proportional to the duration of sound REM sleep



Wassing, R., Lakbila-Kamal, O., Ramautar, J.R., Stoffers, D., Schalkwijk, F. and Van Someren, E.J., 2019. Restless REM sleep impedes overnight amygdala adaptation. *Current Biology*, 29(14), pp.2351-2358.

Cognitive implications of sleep disturbance

- ❖ REM sleep also enables emotional memory processing
- ❖ The aim is to retain emotional memories which are important for survival, without retaining the intense emotional experience along with that memory
- ❖ Reduction in REM sleep has the potential to detrimentally influence emotional and cognitive health and thereby influence physical health

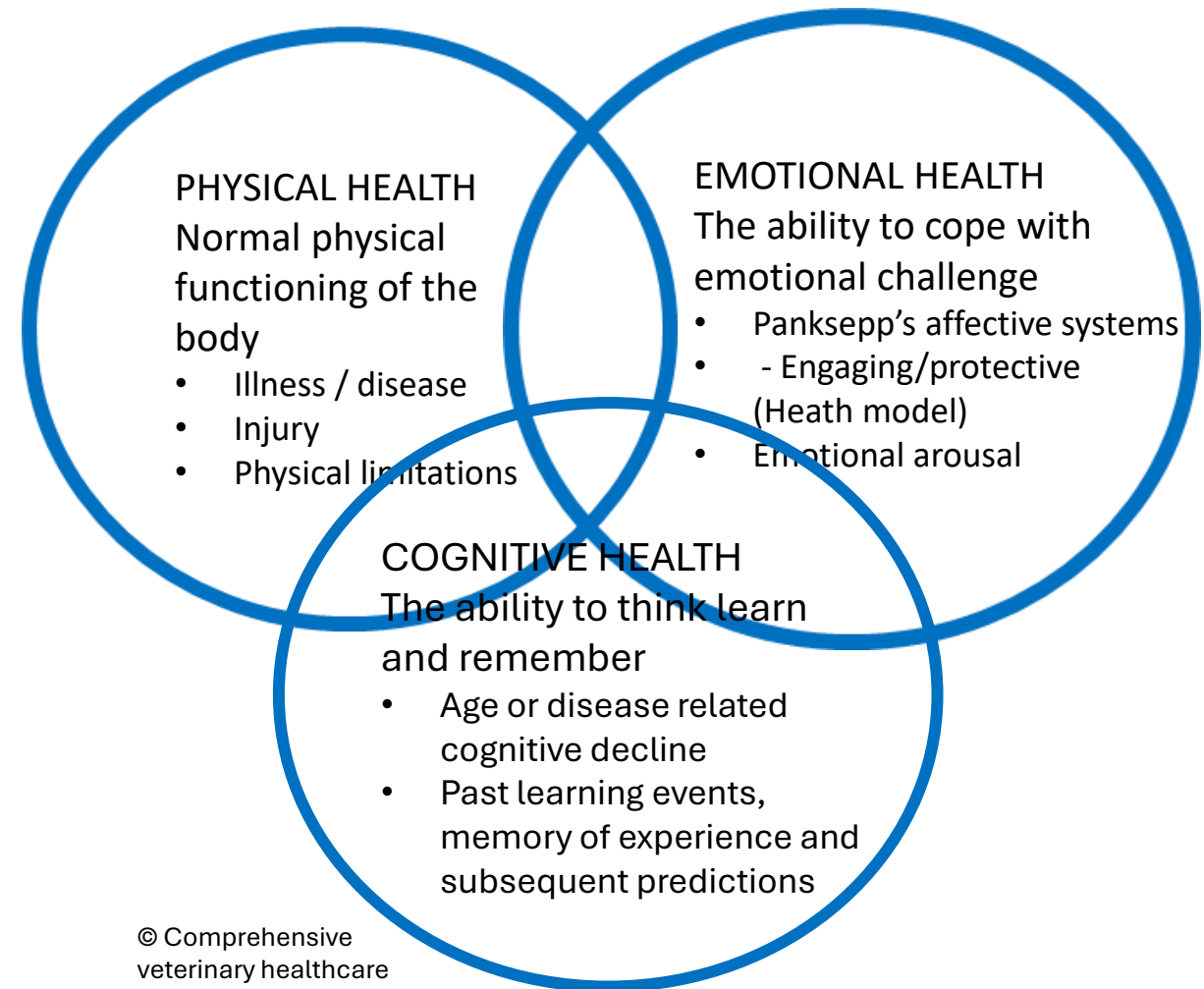


A visual representation of the REM-sleep hypothesis of emotion regulation. When an emotional experience is first encoded it is wrapped in a very strong affective tone that initially helps consolidate the memory. After subsequent nights of sleep including REM, the emotional charge is stripped away until only the memory remains.

Cunningham, T.J., Pardilla-Delgado, E., Alger, S. and Payne, J.D., 2014. The role of REM sleep in emotional memory and affective reactivity in humans. *REM Sleep: Characteristics, Disorders and Physiological Effects*, ed. C. Saylor (New York, NY: Nova Science Publishers), pp.1-28.

Conclusions

- ❖ The role of the veterinary profession is to safeguard the health and welfare of non-human animal species.
- ❖ This requires an understanding of the emotional and cognitive health of patients as well as their physical health



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veterinary healthcare
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of Emotional Health

Conclusions

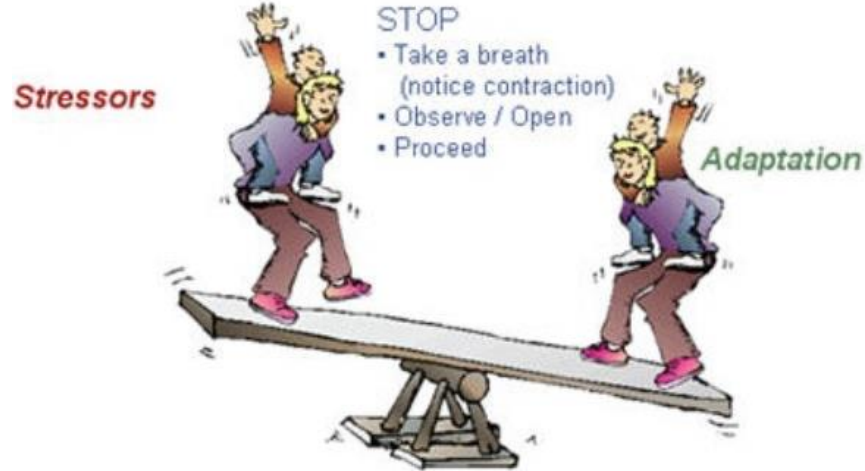
- ❖ The interplay between the protective emotion of anxiety and the physiological response of stress can lead to significant impact on physical health as well as behavioural responses
- ❖ Both can challenge the welfare of the individual



Conclusions

- ❖ Distinguishing physiological or psychological stress which is adaptive and beneficial from chronic and detrimental stress is important

Stress Response:



Allostasis

Some stress can be energizing and toning to the system. Body systems adjust well to stressors without over taxing resources.

Stress Reaction:



Allostatic Load

Body systems achieve a kind of balance, but everything is working too hard and we begin to slowly break down.

1., 2025. The Stress Context-and State-14(24), p.1957.

Conclusions

- ❖ Justified protective emotions can be indicative of sub optimal environments, both social and physical
- ❖ The aim is to
 - ❖ Optimise environments
 - ❖ Improve sensations of safety, autonomy and agency



Conclusions

- ❖ It is equally important to identify situations where anxiety is unjustified or unresolvable
- ❖ In this context appropriate support may be given via
 - ❖ cognitive approaches
 - ❖ nutraceuticals
 - ❖ pheromone products
 - ❖ psychoactive medications
 - ❖ probiotics



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The Gut-Brain Axis in Practice



Thank you



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