



Best Friends
ANIMAL SOCIETY

SOCIAL PAIN IN DOGS

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Best Friends Animal Society

Kanab, Utah, USA

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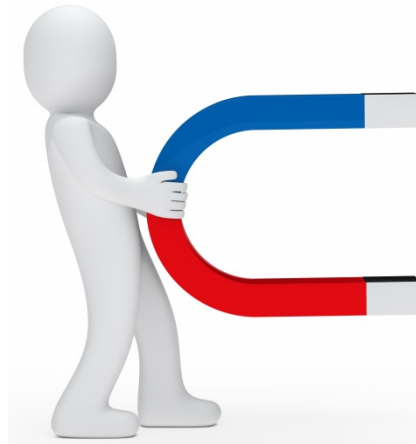
Natural forces of attraction in nature

PHYSICS

Gravity
Electromagnetism
Nuclear forces

BIOLOGY

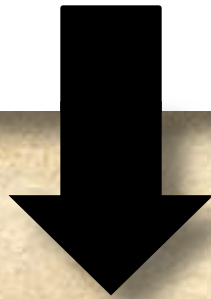
Social



Why did sociality evolve?

Adaptiveness of sociality and social connectedness

1. Benefits of group living
Safety, parental care, food acquisition, and mate procurement



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For social animals, being socially separated greatly increased the chances of starvation and predation death.



Result: strong selection pressure favoring those who were motivated to be socially connected.

Why did sociality evolve?

Adaptiveness of sociality and social connectedness

1. Benefits of group living
Safety, parental care, food acquisition, and mate procurement
2. Health and longevity



[Water photo created by wirestock - www.freepik.com](https://www.freepik.com/photos/water)

Evolutionary mechanisms

There are only a few possibilities to motivate social togetherness:

REWARD

Pleasant feelings to reward physical closeness

Current evidence: social affiliation and attachment activates reward mechanisms in the brain

PUNISHMENT

Unpleasant feelings to punish physical separation

SOCIAL PAIN



SOCIAL PAIN

Recent research indicates that social pain is:

- One type of *emotional pain*
- Social pain is a basic emotional response of mammalian brains and evolved as a signal that one's connections to others are weakening or lost and to motivate the repair and maintenance of the connections to others that are needed for the individual's health and well-being and for the survival of one's genes.

Causes of social pain include:

- being isolated
- being excluded
- being rejected
- being ostracized
- unwanted separation from a social partner
- grief associated with the death of a close companion

A MAJOR STRESSOR

Social isolation

- has been shown to be one of the most reliable and potent stimuli for producing a stress response in social mammals
- is widely used as an experimental model for inducing stress



THIS FEELINGS-BASED MECHANISM IS USED AS PUNISHMENT BY ANIMALS IN NATURE

**Evidence of shunning and ostracism used for social
transgressions in nonhuman social species**



DUAL MECHANISM

**for forming and maintaining
social affiliation/connectedness**

REWARD

PLEASANT FEELINGS

**Pleasure
Security
Comfort**

PUNISHMENT

**UNPLEASANT
FEELINGS
(SOCIAL PAIN)
Loneliness
Insecurity/fear**

COMPARING PHYSICAL PAIN AND EMOTIONAL PAIN



Is social pain
"real" pain?



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Recent research in the neurosciences has revealed that unpleasant social emotions are a form of pain

3 lines of evidence:

1.

**Shared
neuroanatomy and
neurophysiological
mechanisms**

2.

**Shared sensitivity
to both types of
pain**

3.

**Methods for
alleviating one type
of pain alleviate the
other**

1. Shared neuroanatomy and neurophysiological mechanisms

Humans: the same brain regions where physical pain is processed are activated by social pain.



Does Rejection Hurt? An fMRI Study of Social Exclusion

Naomi I. Eisenberger,^{1*} Matthew D. Lieberman,¹
Kipling D. Williams²

A neuroimaging study examined the neural correlates of social exclusion and tested the hypothesis that the brain bases of social pain are similar to those of physical pain. Participants were scanned while playing a virtual ball-tossing game in which they were ultimately excluded. Paralleling results from physical pain studies, the anterior cingulate cortex (ACC) was more

Animals: Manipulating the physical pain-processing regions of the brain also alter expressions of social pain.

2. Shared sensitivity to both types of pain



Pain 126 (2006) 132–138

PAIN

www.elsevier.com/locate/pain

An experimental study of shared sensitivity to physical pain and social rejection

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Matthew D. Lieberman ^b, Bruce D. Naliboff ^{c,d}

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Conclusion: Those who were more sensitive to physical pain were also more sensitive to the pain of social rejection.

Recent evidence points to a possible overlap in the neural systems underlying the distressing experience that accompanies physical pain and social rejection (Eisenberger et al., 2003). The present study tested two hypotheses that stem from this suggested overlap, namely: (1) that baseline sensitivity to physical pain will predict sensitivity to social rejection and (2) that experiences that heighten social distress will heighten sensitivity to physical pain as well. In the current study, participants' baseline cutaneous heat pain unpleasantness thresholds were assessed prior to the completion of a task that manipulated feelings of social distress. During this task, participants played a virtual ball-tossing game, allegedly with two other individuals, in which they were either continuously included (social inclusion condition) or they were left out of the game by either never being included or by being overtly excluded (social rejection conditions). At the end of the game, three pain stimuli were delivered and participants rated the unpleasantness of



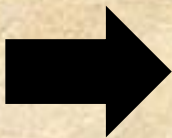
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3. Methods for alleviating one type of pain alleviate the other

1. SOCIAL SUPPORT




2. PHARMACOLOGIC TREATMENTS



Acetaminophen Reduces Social Pain: Behavioral and Neural Evidence

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Carrie L. Masten⁴, Roy F. Baumeister⁵, Caitlin Powell⁶,
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Dianne M. Tice⁵, and Naomi I. Eisenberger⁴

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⁵Florida State University; and ⁶Georgia College & State University

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<http://pss.sagepub.com>
 SAGE

Abstract

Pain, whether caused by physical injury or social rejection, is an inevitable part of life. These two types of pain—physical and social—may rely on some of the same behavioral and neural mechanisms that register pain-related affect. To the extent that these pain processes overlap, acetaminophen, a physical pain suppressant that acts through central (rather than peripheral) neural mechanisms, may also reduce behavioral and neural responses to social rejection. In two experiments, participants took acetaminophen or placebo daily for 3 weeks. Doses of acetaminophen reduced reports of social pain on a daily basis (Experiment 1). We used functional magnetic resonance imaging to measure participants' brain activity (Experiment 2), and found that acetaminophen reduced neural responses to social rejection in brain regions previously associated with distress caused by social pain and the affective component of physical pain (dorsal anterior cingulate cortex, anterior insula). Thus, acetaminophen reduces behavioral and neural responses associated with the pain of social rejection, demonstrating substantial overlap between social and physical pain.



**PHYSICAL vs EMOTIONAL PAIN:
WHICH HURTS MORE?**

PHYSICAL vs EMOTIONAL PAIN: WHICH HURTS MORE?

ELICITING A STRESS RESPONSE

Two types of aversive stimuli shown to initiate stress responses:

PHYSICAL

heat, cold, pain, disease, injury,
pruritus, electric shock, etc

PSYCHOLOGICAL

anxiety, fear, conflict, social
isolation, lack of control,
unpredictability

Of the two, **PSYCHOLOGICAL** factors have been demonstrated to be the **MOST POTENT STIMULI** for eliciting stress response

PHYSICAL vs EMOTIONAL PAIN: WHICH HURTS MORE?

In one study an electrified grid was placed between puppies and persons to whom they had formed a social attachment. The puppies crossed the grid, receiving shocks the entire way, to reestablish contact with the person.



In another study, infant rats were removed from their mothers and placed on the opposite side of an electrified grid. The mother rats could hear their pups' distress vocalizations, but to reach them required walking across the active grid. The mother rats crossed the grid, picked up the pups, and carried them back across the grid to their nest, receiving constant electric shocks in both directions.

PHYSICAL vs EMOTIONAL PAIN: WHICH HURTS MORE? SCARLETT'S ANSWER

Scarlett Saves Her Family

Brooklyn, New York: mother cat was nursing a litter of 4-week-old kittens in an abandoned building that caught fire. The mother cat re-entered the blazing building five times to rescue each of her five kittens one at a time. In the process, she suffered severe burns to her face and head, so damaging that her eyes were swollen tightly shut, her whiskers and facial hair were burned off, and her face was badly disfigured from the burned skin.



Heroic Feline Mother Dies

Scarlett, the cat that survived a Brooklyn, N.Y., garage fire in 1996 after running into the flames to save her five 4-week-old kittens, died of multiple illnesses this past October. She lived with her adoptive



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PHYSICAL vs EMOTIONAL PAIN: WHICH HURTS MORE?



Determining the Value of Social Companionship to Captive Tufted Capuchin Monkeys (*Cebus apella*)

SOCIAL PAIN vs HUNGER

Capuchin monkeys separated from their social companion and given a choice between food and companionship.

Result: most monkeys (4/7) chose social companionship over food even after lengthy periods (22 hr) of food deprivation, suggesting that social deprivation was more aversive than food deprivation to most of the monkeys.

even after several hours of food deprivation. In addition, subjects' preferences shifted from 1 commodity to the other with manipulation of social and food deprivation lev-



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PHYSICAL vs EMOTIONAL PAIN: WHICH HURTS MORE?

Egeland & Sroufe 1981

Compared the effects of emotional neglect alone to emotional neglect accompanied by physical abuse in children



WHY?

Postulated: the attention provided by the physical abuse, though unpleasant, has a positive effect which makes the whole experience better than emotional deprivation alone

Emotional pain as torture

EDITED BY ALMERINDO E. OJEDA
**THE TRAUMA OF
PSYCHOLOGICAL**

It has become obvious that the main objective of torture is not to inflict physical wounds or injuries; on the contrary, the objective is to leave psychological wounds. Indeed, even the real purpose of physical torture, which does bear physical scars, is to have a major impact on the long-term psyche of an individual...

"Everyone should read this book: former prisoners, future prisoners, and those who will never be prisoners, because everyone can and should join the struggle against the criminal use of science by state terrorism."
- Jacobo Timerman

The

Categories of Psychological Torture

Isolation: solitary or quasi-solitary confinement.

Debilitation: food, water, and sleep deprivation; extreme temperatures.

Spatiotemporal disorientation: confinement in small places, natural light denial.

Sensory deprivation: hoods, goggles, gloves, deodorizing masks.

Sensory assault: shouting, loud music, bright lights.

Desperation: indefinite detention, sense of futility.

Threats: of death or violence, to self or others, mock executions, witness torture.

Degradation: verbal, nudity, personal hygiene denial, overcrowding, contact with pests, or excrement, sexual, ethnic, religious.

Pharmacological manipulation: tranquilizers, hallucinogens.



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THE UNIQUENESS OF CANINE SOCIAL PAIN



DOGS: A HIGHLY SOCIAL SPECIES

Strong need for canine companionship



ATTACHMENT WITH HUMANS

**Widely accepted:
One of the most
important effects of
domestication of the
dog has been a
strengthening of the
attachment to humans.**



<https://www.freepik.com/photos/woman>>Woman photo created by cookie_studio - www.freepik.com

Evidence supports: Domestication strengthened the dog's social attachments with humans



ANIMAL BEHAVIOUR, 2005, 70, 1367–1375
doi:10.1016/j.anbehav.2005.03.025

Available online at www.sciencedirect.com

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Attachment to humans: a comparative study on hand-reared wolves and differently socialized dog puppies

JÓZSEF TOPÁL*, MÁRTA GÁCSI*, ÁDÁM MIKLÓSI†, ZSÓFIA VILKÓ
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Copyright 2001 by the American Psychological Association, Inc.
0735-7036/01/\$5.00 DOI: 10.1037/0735-7036.115.4.423

Topál *et al* (2005) investigated whether dog and wolf differences in the ability to form attachments with humans was a result of environment or genetics.

Results: Even after extensive socialization, wolves do not show patterns of attachment to humans comparable to those observed in pet dogs.

Conclusion: The most plausible hypothesis is that dogs have evolved a capacity for attachment to humans that is functionally analogous to that present in human infants.

BRIEF COMMUNICATIONS

Attachment Behavior of Adult Dogs (*Canis familiaris*) Living at Rescue Centers: Forming New Bonds

Gácsi *et al* (2001) studied the propensity with which dogs in shelters form attachment relationships with people.

Conclusion: Dogs show “a remarkable readiness to form attachment relationships.” Results support that dogs living in rescue centers have a high need for social contact with humans and that this need can lead to relatively rapid formation of attachment to a potential attachment figure.

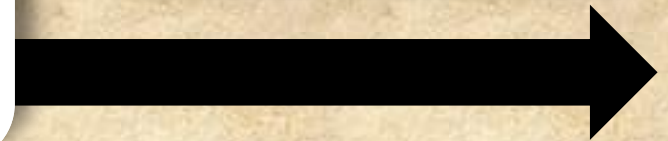
Domestication is generally viewed as an evolutionary process controlled by human influence (Price 1984). The Topál *et al.* 1997; Naderi & Kubinyi *et al.* 2003; Pong

the described that presu object of adaptational significance of social attachment may be supplying cators of parent-infant attachment in humans as well, though the

Evidence supports: Domestication strengthened the dog's social attachments with humans



Now generally accepted that the dog's need for human companionship is *at least equal* to the need for fellow canine companionship.



AT LEAST EQUAL... However, some recent evidence suggests that the strength of the dog-to-human social bond has actually surpassed that of the dog-to-dog bond.



“dogs prefer humans over conspecifics as social partners” (Topál *et al* 2005; Gácsi *et al* 2005; Miklósi 2007; Horowitz 2011; Prato Previde & Valsecchi 2007)

“The most important social interaction for dogs is human contact rather than contact with conspecifics.”
(Magnan *et al* 2009)

“dogs’ attachment to people is often *more* intense than attachment to individuals of their own species” (Bradshaw 2011)



EVIDENCE THAT DOGS FORM STRONGER BONDS WITH HUMANS

BEHAVIOURAL AND HORMONAL INDICATORS OF ENDURING ENVIRONMENTAL STRESS IN DOGS

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[†] Contact for correspondence and requests for reprints

Dogs housed alone showed high stress levels that were lowered by 90 minutes per day of human companionship (walks), but not by housing the dogs in pairs.

(GII, GIII and GIV) were kept under conditions of low to relatively urinary ratios of cortisol to creatinine, adrenaline to creatinine noradrenaline to creatinine, that varied from low to high, respectively (P < 0.05) were found in cortisol to creatinine ratios when compared and when GII was compared to GIV. Statistical analyses indicated that the creatinine ratio in GI differed from that in the remaining groups, which differed from that in GIII. Noradrenaline to creatinine ratios differed significantly between groups. When dogs were not disturbed, the most austere conditions typically had high levels of locomotor activity and paw lifting. After mild disturbance by a slamming door or in the presence of animals reacted actively, with increased locomotor activity, circling

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Behavioral and Glucocorticoid Responses of Adult Domestic Dogs (*Canis familiaris*) to Companionship and Social Separation

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Michael B. Hennessy
Wright State University

Suzanne Sanders
Ohio State University, Columbus

Julia A. Miller
Ohio State University, Mansfield

Removal of 1 member of a long-standing pair of adult domestic dog (*Canis familiaris*) kennel mates from the home run for 4 hr had no effect on the behavior or plasma glucocorticoid levels of the remaining dog. When tested in a novel environment, dogs showed increased activity and elevated glucocorticoid levels at the end of the session, but these responses were as large when the dogs were with their kennel mates as when they were alone. However,

Physiologic stress levels in dogs were alleviated in the presence of a familiar human but not in the presence of a familiar canine companion.

Behavioral and physiological reactions (Mineka & Suomi, 1978; Reite & Field, 1985; Richey & Hennessy, 1987). These effects are most readily apparent when the young of various species are separated from their mothers. During brief maternal separation, young primates and guinea pigs exhibit so-called "protest" behaviors, most notably vocalizing, as well as physiological changes, including activation of the stress-response system (Mineka & Suomi, 1978; Reite & Field, 1985; Richey & Hennessy, 1987).

(Mendoza & Mason, 1986b; Mendoza, Smotherman, Wittig, Kaplan, & Levine, 1978), whereas brief separation of adult male-female pairs elevates the plasma cortisol levels of both male and female titis but neither male nor female squirrel monkeys (Mendoza & Mason, 1986a, 1986b). These differences can be understood in the context of behavioral findings suggesting that the squirrel monkey mother, but not the titi monkey mother, displays robust



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EVIDENCE THAT DOGS FORM STRONGER BONDS WITH HUMANS



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Intraspecific attachment in adult domestic dogs (*Canis familiaris*): Preliminary results



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ABSTRACT

Canis familiaris is a social animal, a particular social structure was to assess the effect of the presence of a cohabitant dog on the attachment of the dog to the human.

Forty-two couples of dogs living in the same household participated in the study. Each couple was tested through a modified version of the Ainsworth strange situation test, in which one dog (11 males and 11 females) was tested and the other one acted as the pre-attachment figure; the stranger was played by a 25 year old woman. As females and males behaved virtually in the same way, their data was combined.

Results were found to show less signs of stress (whining and behaviours towards the door) of the cohabitant dog than alone; and dogs appeared less stressed in the presence of the stranger (shorter duration of whining, close to the door and behaviours towards the stranger) than in isolation. Dogs also showed a higher contact maintenance effect towards the human, especially after reunion with her, compared to affiliative behaviours towards the dog.

Our results suggest that an attachment bond between adult dogs was not fully supported by our data. The presence of a cohabitant dog strongly diminishes dog stress response towards the human. Surprisingly, a human stranger has a strong ameliorative effect. Further studies are needed to better understand this important aspect of canine social behaviour.

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Dogs showed more contact seeking behavior toward an unfamiliar human than toward a housemate dog.

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Species-Specific Differences and Similarities in the Behavior of Hand-Raised Dog and Wolf Pups in Social Situations with Humans

Given a choice between canine and human companionship, dog puppies chose the human over the canine, whereas the wolf puppies made the opposite choice.

the caregiver in three tests; conspecific Pup-Caregiver and Experimenter-Caregiver at the age of 4 weeks and dog-caregiver at the age of 5. Compared to wolves, dogs tended to display more communicative signals that could potentially facilitate



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So what did domestication do to the dog?



Opinion

TRENDS in Cognitive Sciences Vol.8 No.7 July 2004

Full text provided by www.sciencedirect.com



Why rejection hurts: a common neural alarm system for physical and social pain

“evolution's solution to ensured nurturance might have unintentionally produced a lifelong need for social connection and a corresponding sense of distress when social connections are broken.”

ings resulting from social estrangement, with words typically reserved for describing physical pain ('broken heart', 'broken bones') and perhaps for good reason. It has been suggested that, in mammalian species, the

Because of the prolonged period of immaturity and the critical need for maternal care in mammalian infants, it has been suggested that the pain mechanisms involved in detecting and preventing physical danger were co-opted by

Current evidence suggests that this development was greatly amplified in the domestic dog

processes. We review evidence suggesting that the anterior cingulate cortex plays a key role in the physical-social pain overlap. We also suggest that the physical-social pain circuitry might share components of a broader

ior, and motivates action aimed at regaining safety and mitigating painful experience [3]. If the need to maintain close contact with the mother for nurturance and protection is crucial to mammalian survival, experiencing pain



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HOW WOULD EVOLUTION CREATE A STRONGER BOND?

***MAKE THE
REWARD
BIGGER:
INTENSIFY THE
PLEASURABLE
FEELINGS FOR BEING
SOCIALLY CONNECTED***

***MAKE IT FEEL
BETTER TO BE
TOGETHER***



***MAKE THE
PUNISHMENT
WORSE:
INTENSIFY THE
UNPLEASURABLE
FEELINGS FOR BEING
SOCIALLY SEPARATED***

***MAKE IT
HURT MORE
TO BE APART***



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The uniqueness of canine social pain

Dogs appear to be the only species with a highly enhanced predisposition to form bonds with two different species: their own kind and humans.



So... what does canine loneliness feel like?



The uniqueness of canine social pain is that it may be, as a result of domestication, the most intense social pain of all animals – including humans.



Social pain as a cause of problem behavior in dogs

SEPARATION ANXIETY



Email:

It was 2 years ago today that Josie came to live with us.

I had to share the picture of what I came home to one day after being gone for about 1 hour. The chair that is in front of the TV is usually where I'm standing to take the photo. And yes, that's her you see in the bottom of the picture. Let's just say it's been an eventful 2 years! LOL!!

DUAL MECHANISM

for forming and maintaining
social affiliation/connectedness

REWARD

PLEASANT FEELINGS

Pleasure
Security
Comfort

PUNISHMENT

UNPLEASANT FEELINGS (SOCIAL PAIN)

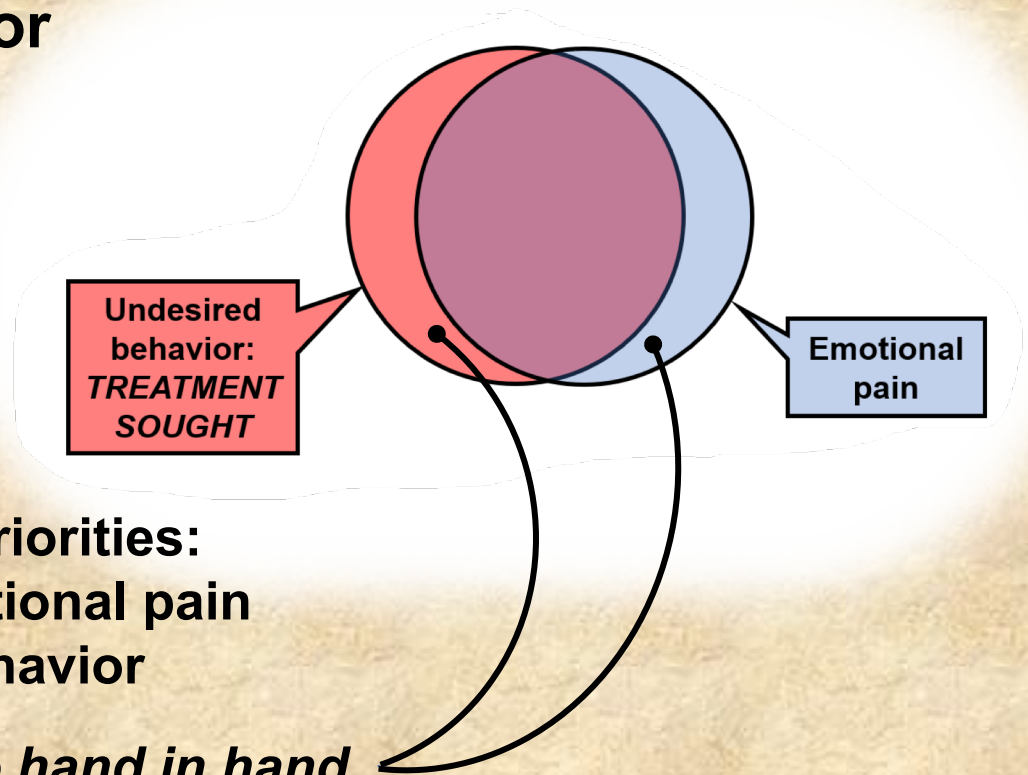
Loneliness
Insecurity/fear



PRIORITIES IN RESOLVING PROBLEM BEHAVIOR CAUSED BY SOCIAL PAIN

Emotional pain is frequently, but not always, seen as a change in behavior

When it is, the behavior is often undesired by the pet owner and, hence, treatment is sought



Treatment involves two priorities:
(1) Alleviation of emotional pain
(2) Modification of behavior

The two do not always go hand in hand

PRIORITIES IN RESOLVING PROBLEM BEHAVIOR CAUSED BY SOCIAL PAIN

By focusing too much on the behavior...

If the motivation for an unwanted behavior is an unpleasant feeling – such as fear, anxiety, separation distress, loneliness, or boredom – then punishing or blocking the behavior may stop the behavior, but any untreated underlying emotional distress will allow suffering to continue, and possibly worsen.

When we care about a suffering person or a person in pain we are not really interested in this person's behaviour. Our aim is not to eradicate the behaviour; instead our aim is to eradicate the awful thing that [elicits] the behavior.

Lennart Nordenfelt, PhD
Animal and Human Health and Welfare: A Comparative Analysis
(2006)



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PRIORITIES IN RESOLVING PROBLEM BEHAVIOR CAUSED BY SOCIAL PAIN

By focusing too much on the behavior...

If the motivation for an unwanted behavior is an unpleasant feeling – such as fear, anxiety, separation distress, loneliness, or boredom – then punishing or blocking the behavior may stop the behavior, but any untreated underlying emotional distress will allow suffering to continue, and possibly worsen.

By focusing too much on the emotional pain...

May not address the pet owner's concern fully, or quickly enough.

Implications of social pain for dogs

1. Housing

2. What constitutes abuse and neglect – Actions/inactions causing emotional pain

3. Training and discipline – “no physical punishment” – punishment in training that uses emotional pain, e.g., rejection or isolation

4. Emotional pain may involve health and obesity issues

5. The domestic dog’s enhanced potential to experience social pain should be approached as would be expected for caring for an animal with an enhanced sensitivity to physical pain

6. Breeding for human bonding – increased capacity to suffer



Physiology & Behavior



Review

The psychobiology of social pain: Evidence for a neurocognitive overlap with physical pain and welfare implications for social animals with special attention to the domestic dog (*Canis familiaris*)

Franklin D. McMillan

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"...a sense of separation is a condition that makes being a mammal so painful."

Paul MacLean [1]

The natural forces of attraction constitute a basic foundation within the field of physics. Each of the four known forces—gravitational, electromagnetic, and the strong and weak nuclear forces—act invisibly to draw physical structures together and maintain their proximity. In the field of biology, another force acts in a very similar way. This force, exerting its effect on the brains and biology of social animals, draws living organisms together to form social organizations connecting animals in simple and complex ways. Like the other attractive forces of nature, this force operating between living beings cannot be observed directly but is open to scientific inquiry by studying the effects on the interactions between individuals.

The social attractive force bears a fundamental difference from nature's other forces of attraction in that evidence indicates the social force to be a product of an evolutionary process. The behavioral, neural, hormonal, cellular, and genetic mechanisms underlying social bonds evolved to elicit social behaviors which would help organisms survive, reproduce, and care for offspring sufficiently long that they too

1.1. Safety, parental care, food acquisition, and mate procurement

According to behavioral ecology theory, sociality evolved to reduce individuals' risk from predation, increase individuals' ability to find and defend food, and procure mates [7]. As infants, mammals are completely dependent on caregivers for nourishment, care, and protection; ineffective bonds greatly endanger survival of the young [8]. Individuals of any age who lack controls from wandering off would very likely succumb on their own to predation, starvation, or simple exposure to the elements [9]. Social adhesion creates a cohesive, protective group with lessened demands on individuals' energy expenditure and skills [10]. In nonhuman social species, being shunned or ostracized is associated with high rates of mortality [4].

Studies in numerous species, including mice, rats, horses, baboons, and bottlenose dolphins (reviewed by [11]), have demonstrated that higher longevity and offspring survival is found in individuals with strong, enduring same-sex bonds as compared to individuals with weaker bonds. Lesioning the amygdala and other brain sites caused vervets and rhesus monkeys to show low interest in social contact after rerelease to the wild, which led to these individuals' exclusion

**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**

THE ENDS



**Happiness and Personality
in Animals**

Suffering

What Is Distress?



Biological Trauma

Disorders in the Aging Pet

Animals

is

for Animals

ive Birds

**Development of Emotional
Distress and Disorders**

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