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Current perspectives on attachment and bonding in the dog–human dyad

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Abstract: This article reviews recent research concerning dog–human relationships and how attributes that arise from them can be measured. It highlights the influence of human characteristics on dog behavior, and consequently, the dog–human bond. Of particular importance are the influences of human attitudes and personality. These themes have received surprisingly little attention from researchers. Identifying human attributes that contribute to successful dog–human relationships could assist in the development of a behavioral template to ensure dyadic potential is optimized. Additionally, this article reveals how dyadic functionality and working performance may not necessarily be mutually inclusive. Potential underpinnings of various dog–human relationships and how these may influence dogs’ perceptions of their handlers are also discussed. The article considers attachment bonds between humans and dogs, how these may potentially clash with or complement each other, and the effects of different bonds on the dog–human dyad as a whole. We review existing tools designed to measure the dog–human bond and offer potential refinements to improve their accuracy. Positive attitudes and affiliative interactions seem to contribute to the enhanced well-being of both species, as reflected in resultant physiological changes. Thus, promoting positive dog–human relationships would capitalize on these benefits, thereby improving animal welfare. Finally, this article proposes future research directions that may assist in disambiguating what constitutes successful bonding between dogs and the humans in their lives.

Keywords: human–animal bond, personality, attitudes, social learning, affective state, dog

Introduction

Symbiotic relationships between dogs and humans are thought to date back at least 18,000 years.¹ Although it has been argued that the tendency for dogs to form close relationships with humans can be attributed to social dominance, with dogs seeing humans as surrogate pack leaders,² social and associative learning appear highly relevant to dog–human interactions.^{3–5} Dogs seem to possess an ability to interpret and respond to human signaling that exceeds that of chimpanzees.^{6–8} The proficiency of dogs and extensively socialized wolves at such tasks is thought to reflect their adeptness at social scavenging or cooperation and associating certain human gestures with the provision of food, both of which can facilitate rapid learning.^{9,10} These days, dogs are used in various contexts that exploit their responsiveness to human direction, such as security work, moving livestock, and assisting humans with disabilities. It may be argued that working dog–human relationships are unidirectional, as they depend only on the function the dog performs. However, given that relational factors can affect dog performance,¹¹ it is likely that, as with companion dog–owner relationships,

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these relationships are bidirectional.¹² In light of this, the current article will discuss dog–human relationships on a general level, with particular emphasis on companion dogs and their owners.

An attachment bond is a close, emotional relationship between two individuals.¹³ The dog–human dyad is believed to involve attachment bonds similar to those that characterize human caregiver–infant relationships.¹⁴ Dogs have shown behaviors indicative of an attachment relationship, defined according to Bowlby.¹³ One such behavior is proximity seeking, where the animal will seek out the attachment figure as a means of coping with stress.¹⁵ Conversely, the absence of an attachment figure can trigger behaviors indicative of separation-related distress in dogs.¹⁶ The presence of a human can also attenuate the effect of a stressful event, thereby constituting the so-called safe haven effect of attachment theory.¹⁷ Dogs have also demonstrated the so-called secure base effect, where the presence of an attachment figure allows dogs to more freely investigate novel objects.¹⁸ Therefore, the dog–human attachment bond is characterized by all four features of attachment bonds that arise in human caregiver–infant relationships. Moreover, there is some evidence of interactions between owner and dog attachment patterns,¹⁹ although this is disputed.²⁰ What remains unknown are the factors that influence the nature of attachment bonds dogs develop with their human handlers or owners. If certain attachment styles are beneficial in different working dog contexts, human behaviors could be tailored accordingly to produce more functional dyads.

Human factors that contribute to dog behavior and training outcomes are the focus of a growing body of research. Several of these factors are likely to influence dogs' affective, or emotional, states and thereby influence their behavioral output. Many human interventions, such as use of positive reinforcement²¹ and affiliative interactions,²² are likely to produce a positive affective state in a dog, leading to more favorable behavioral responses, such as obedience during training. However, it is important to note that expert timing of these interventions is essential for training success.²³ Hence, the expert application of such attributes is suitable for encouraging certain behaviors in dogs and likely contributes to a positive emotional bond. Focusing on improving these characteristics offers a promising solution for dog owners with relatively suboptimal dog-handling ability, or dogmanship, defined as an individual's ability to interact with and train dogs. However, the influence of human psychological characteristics, such as personality and attitudes, on dogmanship and the dog–human relationship remains unclear.

Thus far, the tantalizing notion that certain personality dimensions may predispose an individual to interact skillfully with dogs remains unconfirmed.

The physiological and emotional benefits that ensue from a positive dog–human relationship extend to both members of the dyad. For dogs, humans seem to represent a social partner that, in addition to providing information pertinent to food acquisition, can be a source of emotional fulfillment and attachment.¹⁶ Similarly, forming relationships with, or simply interacting with, dogs has been associated with several emotional and psychological health benefits for humans.^{24,25} Hence, fostering secure, positive emotional bonds between humans and dogs generally promotes well-being. This article aims to review current literature on the dog–human relationship, especially that regarding attachment and bonding. Assessing dog–human relationships through the use of a scientifically validated tool may reveal which dyads successfully capitalize on mutual benefits and those that may require intervention. This article will review existing tools designed to measure the dog–human bond. Including all possible measures of dog–human relationships, especially those that focus only on a singular aspect of these relationships, such as dog–human attachment, is well beyond the scope of this article (for reviews see Wilson and Netting²⁶ and Anderson²⁷). So, we will attempt to focus primarily on those measures that reflect a significant portion of the dog–human relationship.

A greater understanding of the mechanisms of well-matched dog–human dyads may foster the promotion of successful dyads through the skillful application of certain behaviors on the part of the human. Moreover, this may reduce the incidence of dysfunctional dog–human relationships, which can be harmful to both dyadic members,^{28,29} as well as the broader community.³⁰

Perceptions and attitudes of dog owners towards dogs

The influence of owner attitudes to or viewpoints on dog behavior and welfare represents a relatively recent avenue of research. Dogs belonging to those who regard their animals as social partners or meaningful companions have been shown to have relatively low salivary cortisol concentrations.¹⁵ This suggests that positive owner attitudes may moderate stress in canine companions. Furthermore, Norwegian dog owners with more positive attitudes towards their dogs also had higher animal empathy scores, which correlated with how they rated pain in dogs.³¹ Hence, empathetic dog owners with positive attitudes may be more

aware of pain in their animal and readily respond to it, thus minimizing stress. Such handlers may have what Blouin described as humanistic views of their animals, regarding them as surrogate humans that offer affective benefits, or protectionistic views of their animals, regarding them as valuable companions with their own interests.³² Blouin also identified a third perspective, dominionistic, whereby animals are viewed with low regard and valued only for their usefulness.³² One would predict that dominionistic handlers would have less positive attitudes towards their pets, and consequently, the affective benefits to either dog or human may be limited.

Some sheepdog handlers reportedly regard dogs dominionistically, as tools that will eagerly please the pack leader (the human) by driving stock towards them.³³ More plausibly, the dogs in question drive stock chiefly because this is a self-rewarding behavior.²³ Similarly, it has been reported that dog handlers often misinterpret several aspects of their dog's behavior or temperament, such as trainability,³⁴ play signals,³⁵ emotional arousal,³⁶ and acute stress.³⁷ A survey of 565 dog owners revealed that most participants overestimated the cognitive capabilities of dogs,³⁸ reflecting how widespread unrealistic expectations of companion animals can be. Such misunderstandings, in the absence of psychological evidence, such as believing certain dog behaviors to be indicative of the animal's guilt, may be responsible for instances of conflict in dog–human relationships and contribute to relationship breakdowns.³⁹ These studies appear to be indicative of a general lack of understanding of dog behavior among dog owners and handlers that, if rectified, could improve dog handling, or dogmanship, on a broader scale.

Owner factors affecting dog–human relationships

The operant conditioning quadrant that a dog handler tends to use when training a dog can influence the dog's affective state, relative arousal, and ultimately, its behavioral output.⁴⁰ Generally, producing a positive affective state and moderate arousal in a dog maximizes the probability of that dog demonstrating the desired behavior.⁴⁰ In a broader sense, human behavior can likewise influence dog behavior by changing emotional valence and arousal. In the literature, human behaviors that likely contribute to a more positive affective state and consequently more positive expectations in dogs are often those that provide the dog with resources of emotional value, such as affiliation,²² human attention,⁴¹ and safety.¹⁷ However, the influence of human attachment on dog behavior remains ambiguous. An owner with an avoidant

attachment to their dog is reported to have more negative expectations regarding the behavior of their dog.⁴²

As owner attitudes have been connected to dog behavior and stress,¹⁵ insecure human–dog relationships may be related to poor stress coping in dogs, thereby compromising welfare and contributing to relinquishment. Aligning with this, owners relinquishing their dogs at animal shelters tend to score lower on companion animal attachment compared with existing dog owners.⁴³ Additionally, owners who are predisposed to view their interactions with their dog as negative may be more likely to fall victim to such miscommunication and then consider relinquishment.

A study investigating the influence of certain owner factors on the dog–human relationship found a significant negative correlation between owners using the dog for 'company only' and emotional closeness.⁴⁴ The authors defined 'company only' as non-participation in herding, hunting, agility, dog shows, or working dog training. Time spent as a dyad may have a critical influence on this observation, as the activities cited by Meyer and Forkman⁴⁴ would arguably require more owner engagement with the dog, an attribute that has been reported as critical in the dog–human relationship.^{11,45} Additionally, humans using their dogs for company alone may arguably have a dominionistic viewpoint of their dogs and hence may be more likely to experience relationship dysfunction than those who are more willing to engage in activities with their animal.

Investigating the effect of human personality on dog–human relationships is of particular relevance when conceptualizing dogmanship as it holds promise of identifying specific characteristics of individuals who are outstanding with their dogs. More specifically, current research suggests the Big Five personality dimension of neuroticism may provide some preliminary indication of the dogmanship of an individual dog owner. High neuroticism scores in dog owners have been associated with poor canine performance in operational tasks,^{15,46} handlers' use of excessive signaling during training,⁴⁷ and delayed responses to owner commands.⁴⁷ Taken together, these results suggest that high neuroticism in dog owners contributes to poor dyadic functionality and that individuals with good dogmanship are likely to score low on this trait. Nevertheless, owners with high neuroticism have been observed to be more socially attractive to their dogs,⁴⁸ with these dyads being rated as being more friendly than other dyads by experimental observers⁴⁶ and having lower salivary cortisol concentrations in dogs.¹⁵ Additionally, owners in these dyads were more likely to consider their dogs as social supporters or partners.¹⁵ These observations suggest

that quality of life for both members of the dog–human dyad does not necessarily relate to performance in practical tasks. Future analyses should focus on examining various dog–human interactions with owners of different personality types and dog training experience levels, to clarify whether high neuroticism correlates with canine welfare and the implications this has for dog training.

Accounting for dog and human personalities when matching dogs with humans has potential to reduce behavioral conflict in the dog–human dyad by preventing mismatches. Significant correlations have been observed between the personality facets of openness and agreeableness and owner satisfaction with the dog–human relationship.⁴⁹ Similarly, Curb et al⁵⁰ reported that owner satisfaction correlated with dog-and-owner matching on certain behavioral traits, such as having an active lifestyle and creativity, which correlate with extraversion⁵¹ and openness,⁵² respectively. To further investigate dog–owner personality matching, future studies should use validated personality dimensions in their assessment, accompanied by direct behavioral observations of dog personality to prevent owner bias.

Dog perceptions of the dog–human relationship

To effectively assess dog–human relationships, canine factors must be considered. It has been hypothesized that dogs have been selected for increased deference to humans and that the dog–human relationship has a defined social hierarchy.^{12,53} Although intraspecific dominance relationships have been observed in dogs, evidence suggests that dogs do not generally view humans as surrogate dogs; thus, social dominance may not apply in the dog–human dyad.⁵⁴ Despite engaging in interactions with other dogs, intraspecific play does not suppress the motivation for dogs to interact with owners,⁵⁵ suggesting each interaction fulfils a different role. Furthermore, unlike the presence of a familiar dog, the presence of a familiar human has been shown to reduce plasma cortisol concentrations in dogs in a novel environment.⁵⁶ As such, it is likely dog–dog and dog–human interactions are motivationally as well as functionally distinct, and thus, it is unlikely that dog–human interactions operate as part of a dominance hierarchy. It may be that, rather than deference to humans, reduced fear of humans may have had a selection advantage, with these animals being more likely to scavenge from humans.

There are several hypotheses regarding the domestication of the dog and the particular behavioral traits that had a selection advantage. It has been argued that dogs have

been selected for their ability to perceive human signals and cooperate with humans.¹⁰ Dogs have been shown to outperform wolves in establishing eye contact with humans and adapting their behavior to human attitudes.^{57,58} However, given that socialized wolves do seem to interact with their human raisers as social partners, this cooperation may be more due to environment and ontogenic events than human-directed selection.⁹ Additionally, wolves can outperform dogs in social-learning tasks with a conspecific demonstrator.⁵⁹ This suggests that wolves may be more cooperative with conspecifics than dogs. Consequently, it has been suggested that dog–human cooperation has evolved on the foundation of wolf–wolf cooperation, and during the domestication process, dogs have become less cooperative with each other.¹² This canine cooperation theory aligns with current research. However, given that existing dog–wolf comparisons compare companion dogs to wolves with limited socialization⁷ or wolves that have been clicker-trained,⁹ there is a need for more balanced comparisons.⁶⁰ Future studies should incorporate bigger, more diverse sample sizes of dogs and wolves to assess whether these variations exist between breeds and entire versus desexed animals. Moreover, the modern wolf is genetically distinct from the ancestor of the modern dog.⁶¹ As such, given that modern wolves may not resemble their ancient counterparts, using dog–wolf comparisons to investigate the domestication of the dog may be of limited relevance.

There are early reports that social learning in the form of Do As I Do (DAID) training can be as successful as shaping and clicker-training methods in the training of simple commands and superior to them in the training of complex or sequential commands.⁶² These results highlight that imitation can occur in dog–human dyads. However, it is important to note that the authors did not measure the behavior of the human; thus, it is possible that demonstrators may have inadvertently reinforced certain actions. That said, the protocol did involve control conditions, such as the ‘do it’ command being given by an individual who was unfamiliar with the demonstration, thus preventing a Clever Hans effect. However, to the authors’ knowledge, there is no documented evidence of imitation occurring naturally in dog–human relationships; thus, its relevance is questionable. Despite this, the ability of dogs to demonstrate social referencing, adapting their behavior according to human emotional signals,^{57,63} further reinforces the relevance of social learning in the dog–human relationship. Therefore, it is reasonable to postulate that dogs view humans as peers who often provide salient information about the surrounding environment but are distinct from conspecifics.

In addition to using humans as a social reference point, dogs have been shown to develop attachment bonds with humans.^{14,16} This relationship allows them to interact securely with their environment in the presence of the owner¹⁸ and show less distress in response to threatening events.¹⁷ Interestingly, the secure base effect seems to operate regardless of whether the owner is encouraging or passive.¹⁸ This suggests that social referencing does not always operate in the dog–human dyad. Indeed, dogs seem to struggle to distinguish between fearful and neutral emotional messages about certain objects and to respond appropriately to emotional messages given by a stranger.⁶³ As such, relational factors and attachment dimensions probably influence the degree of social referencing between dogs and owners.

The learning history of a dog may also be relevant to the attachment relationships it forms and its social referencing capabilities. For example, trained water rescue dogs have more difficulty than companion dogs in responding to the emotional messages of a stranger.⁶⁴ It remains unclear whether these results reflect habituation to strangers giving emotional cues in their training or the dogs' strong attachment to their handlers. Further studies of dogs in various working and companion contexts may disambiguate the relevance of attachment and learning history in the ability of dogs to respond to human social cues.

Potential interactions between human and dog attachment patterns require clarification. Rehn et al²⁰ found no evidence of an interaction between perceived emotional closeness, assessed via the Monash Dog Owner Relationship Scale (MDORS), and dog attachment behaviors, assessed using the Strange Situation Procedure (SSP). In contrast, Siniscalchi et al¹⁹ reported a relationship in which owner attachment (confident vs unconfident) was measured using the 9 Attachment Profile (9AP) and dog attachment was measured using the SSP. These authors reported that dogs of confident owners displayed more proximity-seeking behaviors and were more likely to interact with the owner when a stranger was present compared with dogs of owners lacking in confidence. Further studies using both the 9AP and the MDORS, in conjunction with standardized behavioral observations of both dogs and handlers, may assist in clarifying the existence of such an interaction.

Tools and methods to measure the dog–human relationship

Identification of high-risk pairings of dogs and humans offers a means of preventing dysfunction in the dog–human dyad. Additionally, outstanding dyads can provide models

of dogmanship strategies that could then be applied in those dyads that tend to struggle. Therefore, a means of measuring the dog–human relationship has great potential for reducing disharmony. Although scales of this nature have been created,²⁶ there is no generally accepted tool to measure the dog–human bond. One questionnaire designed to measure the dog–human relationship was not given a name by researchers.⁴⁶ Accordingly, for convenience, the authors of the current review will refer to it as the Modified Person–Animal Wellness Scale (MPAWS).

Some dog–human relationship assessment tools tend to focus on the human factors of a dog–human relationship, particularly attachment. One such measure, the Dog Attachment Questionnaire (DAQ), was developed to measure human attachment to their canine companions.⁶⁵ Given that human factors generally have more influence on the dog–human bond than canine factors,⁴⁴ using measures such as the DAQ seems appropriate. However, such approaches may be overly simplistic, as attachment dimensions alone may fail to capture the influence of specific human behaviors, such as affiliation, and perceptions on the dog–human relationship. Furthermore, as we are defining the human–animal bond (HAB) as a symbiotic relationship, affective benefits to the dog, through attachment or otherwise, should be considered.

There are existing measures of the dog–human bond that consider canine factors. Schneider et al⁶⁶ created an internally consistent measure of the HAB that embraced human attachment and its potential to bias dog health ratings. While this measure did consider canine attachment, only one scale within it was devoted to it, while the remaining five related to human perceptions of the relationship. When testing the measure, the authors used a relatively homogenous sample. Hence, the results are not representative of the general population. Therefore, the researchers may have failed to capture some aspects of dog–human relationships. Moreover, given that the HAB has yet to be used in other studies, its overall applicability to examine dog–human relationships in general remains unclear.

The MPAWS⁴² was developed from the Person–Animal Wellness Scale (PAWS)⁶⁷ and the Questionnaire for Anthropomorphic Attitudes.⁶⁸ This questionnaire features items concerning dog attachment and the owner–dog relationship, with four separate subscales for each of these sections. Additionally, the MPAWS asks owners about their attitude toward their dog. Significant associations have been observed within owner opinion items as well as the shared activities subscale. For example, neurotic owners reported less engagement in shared activities with their dogs.⁴⁶ Moreover, the MPAWS has been

used in subsequent studies, identifying significant correlations between stress hormone concentrations¹⁵ and proximity-seeking behaviors.⁴⁸ However, aside from a principal component analysis, the authors reported no further statistical validation. Furthermore, the sample sizes for these studies were relatively small ($n=22$), such that any assumptions or generalizations from their results must be made with caution as they may not be applicable to dog–human dyads in general. Furthermore, many subscales had no significant relationship with dog or owner factors. Therefore, further refinement and validation of this questionnaire are required.

The MDORS has had widespread use.^{20,44,69–71} It was also tested using an extensive, heterogeneous sample of participants, which indicates that the initial population was probably representative of dog owners in general. Unlike tools such as the MPAWS, this scale has been tested for both validity and reliability.⁶⁹ Despite this, it has been suggested that the MDORS focuses too much on the human member of the dog–human dyad and, thus, might overlook several aspects of the relationship that are pertinent to the emotional wellness of the dog.²⁰ A recent study⁴⁴ reported that variance in MDORS scores correlated with only one dog personality subscale, as determined by Dog Mentality Assessment (DMA) results. Taken together, these results suggest that, while the MDORS is currently the most reliable measure of the dog–human relationship, it has potential to exclude canine factors. To address this, future studies should combine the MDORS with behavioral test batteries to categorize dog temperament effectively and establish its contribution to the dog–human bond.

Thus far, all tools discussed require owner reports of their behavior, the behavior of their dog, and their attitudes towards the relationship. While owner reports are arguably effective, interobserver reliability has been shown to vary depending on the particular trait being rated.^{72,73} Additionally, physical traits such as ear shape and coat color have been reported to affect ratings of dog behavior and personality.⁷⁴ Gosling discusses several causes for interobserver variation, such as familiarity with the animal and exposure to the species in question.⁷⁵ Furthermore, as previously discussed, there is ample evidence that owners may misinterpret their dog's behavior and cognitive capacity. Taken together, this suggests that owner reports alone may not be a sufficient measure of dog–human relationships. Future studies should seek to combine owner reports with test batteries designed to measure dog–human cooperation and interaction styles. At the very least, studies using questionnaires should collect ratings from more than one individual and examine interobserver agreement.

There are several tools that assess the dog–human relationship from the perspective of dog attachment. The application of Ainsworth's Strange Situation Test (SST), a measure originally designed to assess attachment of human infants to their mothers, has revealed several distinct attachment patterns in dogs.¹⁶ This procedure has been used extensively to gauge canine attachment to humans,^{76,77} with some authors proposing, by extrapolation, that the dog's behavior during the SST is a reflection of the bond it has developed with its owner.¹⁹ Interestingly, human behavior during the SST has been shown to influence dog behavior and cortisol concentrations.⁷⁸ This indicates that owner behavior may bias dog behavioral observations during the SST to the extent that results may not reflect dog attachment alone. Future studies could examine how various owners differ in their behavior during the SST, such as during reunions, and how these variations affect dog behavior. Potentially, the SST may be more useful in assessing the dog–human bond than originally anticipated, if both dog and human behaviors are coded and analyzed simultaneously.

Biochemical and physiological effects of dog–human interactions

Dyadic interactions between humans and dogs can yield both mutual and individual positive effects. The dog–human relationship can be a more influential determinant of canine salivary cortisol concentrations than environmental stressors, such as a threatening stranger.¹⁵ This is likely mediated by the safe haven effect or possible social referencing if the owner is not fearful of the environment. Likewise, human interaction has been demonstrated to reduce plasma cortisol concentrations in shelter dogs,⁷⁹ suggesting human–dog interactions may help dogs to cope with stress, almost regardless of relationship quality. Alternatively, the stressful shelter environment may have facilitated the rapid formation of an attachment bond. The specific nature of the interaction also seems to be relevant. Border guard dogs that had affiliative interactions with their handlers showed a more pronounced reduction in cortisol concentrations than police dogs subjected to authoritative interactions.²² Owners kissing their dogs reportedly have higher oxytocin concentrations, as do their dogs, than owners who do not.⁷¹ Oxytocin is believed to have a role in bond formation,⁸⁰ so frequent affiliative interactions between dogs and humans probably strengthen bond formation. This may provide a physiological explanation of why the amount of time that dogs and owners spend together is often reported to have a critical influence on both dog–manhood¹¹ and functional dog–human relationships.⁴⁶ These

results emphasize the importance of affiliative interactions in the dog-human dyad, and their capacity to reduce stress and strengthen bond formation in both dogs and owners.

Conclusion and future directions

This review highlights growing evidence that human factors, including personality and attitudes, influence the dog-human relationship. In particular, both positive attitudes and affiliative behavior seem to contribute to a strong dog-human bond, as is apparently confirmed by hormonal changes that emerge in both dyad members. This illustrates the benefits that can ensue from successful dog-human relationships and should inspire the cultivation of such relationships. In contrast, negative attitudes, insecure attachment, and misunderstanding of dog behavior have the potential to disrupt relationships and even lead to dog relinquishment. Future studies should consider the influence of both owner attitudes and behavior on canine physiology and affective states. Such investigations may reveal a potential causal relationship between attitudes and behavior. Interestingly, although the human personality dimension of neuroticism may relate to poor dyadic functionality, it may not compromise the quality of the relationship. Assessing the personality of working dog handlers in a standardized setting may clarify whether neuroticism contributes to a given dyad's struggle with practical tasks.

Recent studies have highlighted the importance of social and associative learning in the dog-human dyad. Indeed, given the ease with which dogs learn complex commands and behavioral sequences, training methods that exploit social learning, such as DAID, as a complement to shaping techniques may provide a means of further capitalizing on the dogmanship of handlers.

Importantly, the dog-human relationship and attachment relationships held by both humans and dogs may not be complementary. The MDORS is currently the most robust measure of the dog-human relationship, addressing primarily the human perceptions of the relationship. Future studies investigating the influence of dog temperament, measured using an internally consistent, validated scale, on the dog-human relationship may reveal how the MDORS should be refined to capture more information on canine members of the dyad. Moreover, to investigate the relationship between the dog-human bond and attachment, a measure of canine attachment, such as the SST, should also be included. The ability to produce successful dog-human dyads through the identification of factors contributing to the HAB promises to enhance the welfare of both species in this unique and ancient dyad.

Disclosure

None of the authors of this paper has a financial or personal relationship with other people or organizations that could inappropriately influence or bias the content of the paper.

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