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Protocol for a Scoping Review

Defining Dominance in Domestic Dogs (*Canis familiaris*): A Scoping Review with Recommendations for Human-Canine Interactions

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Author Contributions: EKG is the guarantor and provided content expertise, EDF developed methodological processes, and GJdV contributed to selection criteria. GJdV and EDF developed the search strategy.

Abstract: *The topic of dominance in domestic dogs and its relevance to social interactions with humans remains controversial. This scoping review explores whether dogs form social hierarchies with other dogs and/or humans, how dominance is defined by canine professionals versus the general public, and the role of dominance theory in training methods that pose a risk to dog welfare and the human-canine bond. A systematized search with inclusion/exclusion criteria was used to identify peer-reviewed articles across three databases (CAB Abstracts, APA PsycInfo, and Scopus). Origins and popularity of dominance terminology are tracked in order to observe any correlations with societal attitudes about dog behavior and training over time.*

Registration: This has been submitted to SYREAF on 4/18/2023, and eScholarship, University of California (<https://escholarship.org/>) on 4/18/2023.

Amendments from Original Protocol: Not applicable

Funding and Support: No funding or support was garnered for this project.

Role of Sponsor or Funder: Not applicable

Introduction

Rationale: Confusion persists about the concept of dominance, both between dogs and within dog-human relationships. Dominance theory, which emphasizes a hierarchical social ranking between group members (Barnett, 2019), has influenced ideas about canine behavior and training methods (Charles et al., 2021). The enduring belief that people must establish dominance over their dogs often leads to humans applying force and intimidation. These techniques have been associated with an increase in dog aggression (Herron et al., 2009), possibly resulting in a higher frequency of dog bites, abandonment, and/or euthanasia. We will synthesize the peer-reviewed literature about dominance in domestic dogs and evaluate the use of training techniques derived from dominance theory.

Objectives: Our project will analyze behaviors and interactions associated with canine dominance, as well as any social structure(s) that may apply to domestic dogs. We will also include articles that mention training dogs with dominance-based methods. Extracting data on these topics will effectively consolidate information about canine social behavior, as well as the origins and validity of dominance theory as a basis for dog training. This paper will help to clarify future research directions and generate suggestions for improving science communication about dog social dynamics.

Methods

Eligibility Criteria:

Study Designs: Only peer-reviewed literature was included for analysis, although conference proceedings and book chapters were tagged in the title/abstract screening. All original studies and narrative reviews were included, with the exception of individual case studies.

Participants: Domestic dogs (*Canis familiaris*)

Interventions and Comparators: Dominance theory and dominance-based approaches to dog social interactions, in comparison to other frameworks for interpreting canine behavior

Outcomes: Evaluating how the concept of dominance contributes to our understanding of dog behavior and cognition, training methods, and the dog-human relationship

Information Sources:

Database	Interface	Date Coverage	Date Searched
CAB Abstracts (included products: CAB ABSTRACTS, VetMed Resource, CABI Full Text, Global Health, Animal Health and Production Compendium (AHPC))	CAB Direct	1966 to Present	15 February 2023
APA PsycInfo	ProQuest	1840 to Present	15 February 2023
Scopus	Scopus	1996 to Present	15 February 2023

Search Strategy:

PRISMA-S Template (based on v1.0 retrieved from <https://osf.io/2ybwn/>)

Simultaneous Searches: Not applicable

Item 2: Other Online Resources (As Needed): Not applicable

Manual Searching (Searching Relevant Journals' Table of Contents): Not applicable

Citation Searching and Text Analysis:

Article Citation
Ákos, Z., Beck, R., Nagy, M., Vicsek, T., & Kubinyi, E. (2014). Leadership and path characteristics during walks are linked to dominance order and individual traits in dogs. <i>PLoS Computational Biology</i> , 10(1), Article e1003446. https://doi.org/10.1371/journal.pcbi.1003446
Beaver, B. V. (1983). Clinical classification of canine aggression. <i>Applied Animal Ethology</i> , 10(1-2), 35-43. https://doi.org/10.1016/0304-3762(83)90110-4
Borchelt, P. L., & Voith, V. L. (1986). Dominance aggression in dogs. <i>Compendium on Continuing Education for the Practicing Veterinarian</i> , 8(1), 36-44.
Bradshaw, J. W. S., Blackwell, E.-J., & Casey, R. A. (2009). Dominance in domestic dogs—useful construct or bad habit? <i>Journal of Veterinary Behavior</i> , 4(3), 135-144. https://doi.org/10.1016/j.jveb.2008.08.004
Bradshaw, J. W. S., Pullen, A. J., & Rooney, N. J. (2015). Why do adult dogs “play”? <i>Behavioural Processes</i> , 110, 82-87. https://doi.org/10.1016/j.beproc.2014.09.023
Bradshaw, J. W. S., Blackwell, E.-J., & Casey, R. A. (2016). Dominance in domestic dogs—A response to Schilder et al. (2014). <i>Journal of Veterinary Behavior</i> , 11, 102-108. https://doi.org/10.1016/j.jveb.2015.11.008
Cameron, D. B. (1997). Canine dominance-associated aggression: concepts, incidence, and treatment in a private behavior practice. <i>Applied Animal Behaviour Science</i> , 52(3-4), 265-274. https://doi.org/10.1016/S0168-1591(96)01127-6
Cordoni, G., & Palagi, E. (2019). Back to the future: A glance over wolf social behavior to understand dog–human relationship. <i>Animals</i> , 9(11), Article 991. https://doi.org/10.3390/ani9110991
Herron, M. E., Shofer, F. S., & Reisner, I. R. (2009). Survey of the use and outcome of confrontational and non-confrontational training methods in client-owned dogs showing undesired behaviors. <i>Applied Animal Behaviour Science</i> , 117(1-2), 47-54. https://doi.org/10.1016/j.applanim.2008.12.011
Jones, A. C., & Josephs, R. A. (2006). Interspecies hormonal interactions between man and the domestic dog (<i>Canis familiaris</i>). <i>Hormones and Behavior</i> , 50(3), 393-400. https://doi.org/10.1016/j.yhbeh.2006.04.007
LaFollette, M. R., Rodriguez, K. E., Ogata, N., & O'Haire, M. E. (2019). Military veterans and their PTSD service dogs: Associations between training methods, PTSD severity, dog behavior, and the human-animal bond. <i>Frontiers in Veterinary Science</i> , 6, Article 23. https://doi.org/10.3389/fvets.2019.00023

- Line, S., & Voith, V. L. (1986). Dominance aggression of dogs towards people: Behavior profile and response to treatment. *Applied Animal Behaviour Science*, 16(1), 77-83. [https://doi.org/10.1016/0168-1591\(86\)90042-0](https://doi.org/10.1016/0168-1591(86)90042-0)
- Reisner, I. R., Mann, J. J., Stanley, M., Huang, Y., & Houpt, K. A. (1996). Comparison of cerebrospinal fluid monoamine metabolite levels in dominant-aggressive and non-aggressive dogs. *Brain Research*, 714(1-2), 57-64. [https://doi.org/10.1016/0006-8993\(95\)01464-0](https://doi.org/10.1016/0006-8993(95)01464-0)
- Reisner, I. R. (2014.) Moving beyond ‘leader of the pack’: Changing dog behavior using science instead of myth. *Today’s Veterinary Practice*, 46-49.
- Rooney, N. J., Bradshaw, J. W., & Robinson, I. H. (2000). A comparison of dog–dog and dog–human play behaviour. *Applied Animal Behaviour Science*, 66(3), 235-248. [https://doi.org/10.1016/S0168-1591\(99\)00078-7](https://doi.org/10.1016/S0168-1591(99)00078-7)
- Rooney, N. J., & Bradshaw, J. W. S. (2003). Links between play and dominance and attachment dimensions of dog-human relationships. *Journal of Applied Animal Welfare Science*, 6(2), 67-94. https://doi.org/10.1207/S15327604JAWS0602_01
- Schilder, M. B. H., Vinke, C. M., & van der Borg, J. A. M. (2014). Dominance in domestic dogs revisited: Useful habit and useful construct? *Journal of Veterinary Behavior*, 9(4), 184-191. <https://doi.org/10.1016/j.jveb.2014.04.005>
- Smuts, B., Bauer, E., & Ward, C. (2015). Rollovers during play: Complementary perspectives. *Behavioural Processes*, 116, 50-52. <https://doi.org/10.1016/j.beproc.2015.04.006>
- Strickler, B. G. (2018). Helping pet owners change pet behaviors: An overview of the science. *Veterinary Clinics of North America: Small Animal Practice*, 48(3), 419-431. <https://doi.org/10.1016/j.cvsm.2017.12.008>
- Sueda, K. L. C., & Malamed, R. (2014). Canine aggression toward people: A guide for practitioners. *Veterinary Clinics of North America: Small Animal Practice*, 44(3), 599-628. <https://doi.org/10.1016/j.cvsm.2014.01.008>
- Takeuchi, Y., Ogata, N., Houpt, K. A., & Scarlett, J. M. (2001). Differences in background and outcome of three behavior problems of dogs. *Applied Animal Behaviour Science*, 70(4), 297-308. [https://doi.org/10.1016/S0168-1591\(00\)00156-8](https://doi.org/10.1016/S0168-1591(00)00156-8)
- Trisko, R. K., Sandel, A. A., & Smuts, B. (2016). Affiliation, dominance and friendship among companion dogs. *Behaviour*, 153(6-7), 693-725. <https://doi.org/10.1163/1568539X-00003352>
- van der Borg, J. A. M., Schilder, M. B. H., Vinke, C. M., de Vries, H. (2015). Dominance in domestic dogs: A quantitative analysis of its behavioural measures. *PloS One*, 10(8), Article e0133978. <https://doi.org/10.1371/journal.pone.0133978>
- Wallis, L. J., Iotchev, I. B., & Kubinyi, E. (2020). Assertive, trainable and older dogs are perceived as more dominant in multi-dog households. *PloS One*, 15(3), Article e0227253. <https://doi.org/10.1371/journal.pone.0227253>

Contacts (Researchers Contacted for Additional Information): Not currently planned

Process: Not applicable

Additional Methodologies Not Listed Above: Not currently planned

Limits and Restrictions

Date and Time Period: None

Language: English

Publication Status: Peer-reviewed

Species Included: Domestic dogs (*Canis familiaris*)

Study Design: Narrative reviews and primary research, excluding individual case studies

Database Subset: N/A

Pre-Specified Cut-Off or Saturation Point for Results: N/A

Other Restrictions: None

Search Filters:

Database	Interface	Search Filters Applied
CAB Abstracts	CAB Direct	English (language)
APA PsycInfo	ProQuest	[STRICT] searching for wildcards, English (language)
Scopus	Scopus	English (language)

Search Database: CAB Abstracts

Search ID	Terms (copy and paste)	Results
#1 dominance	(title:("aggression" OR "aggressive behav*" OR "agonistic" OR "dominance" OR "group behav*" OR "hierarch*" OR "high* rank*" OR "high* status*" OR "low* rank*" OR "low* status*" OR "resource guard*" OR "social behav*" OR "social	164,300

	cognition" OR "social dynamic*" OR "social order" OR "social rank*" OR "social status" OR "social structure" OR "submissive" OR "subordinat*" OR "territorial*") OR ab:("aggression" OR "aggressive behav*" OR "agonistic" OR "dominance" OR "hierarch*" OR "high* rank*" OR "high* status*" OR "low* rank*" OR "low* status*" OR "resource guard*" OR "social behav*" OR "social cognition" OR "social dynamic*" OR "social order" OR "social rank*" OR "social status" OR "social structure" OR "submissive" OR "subordinat*" OR "territorial*") OR de:("aggression" OR "aggressive behaviour" OR "agonistic behaviour" OR "dominance" OR "group behaviour" OR "social behaviour" OR "social dominance" OR "social structure" OR "territoriality") OR id:("aggressive behavior" OR "agonistic behavior" OR "collective behaviour" OR "dominance behaviour" OR "group behavior" OR "social behavior" OR "social order"))	
#2 dogs	(title:("canine*" OR "dog" OR "dogs" OR "wolf" OR "wolves")) OR ab:("canine*" OR "dog" OR "dogs" OR "wolf" OR "wolves") OR od:("dogs" OR "wolves") OR up:("Canis"))	259,508
#3	#1 AND #2	3,169
#4	#3 AND English (Language) Filter	2,613
Copy and paste entire search (must add English filter)	(title:("canine*" OR "dog" OR "dogs" OR "wolf" OR "wolves")) OR ab:("canine*" OR "dog" OR "dogs" OR "wolf" OR "wolves") OR od:("dogs" OR "wolves") OR up:("Canis")) AND (title:("aggression" OR "aggressive behav*" OR "agonistic" OR "dominance" OR "group behav*" OR "hierarch*" OR "high* rank*" OR "high* status*" OR "low* rank*" OR "low* status*" OR "resource guard*" OR "social behav*" OR "social cognition" OR "social dynamic*" OR "social order" OR "social rank*" OR "social status" OR "social structure" OR "submissive" OR "subordinat*" OR "territorial*") OR ab:("aggression" OR "aggressive	

	<p>behav*" OR "agonistic" OR "dominance" OR "hierarch*" OR "high* rank*" OR "high* status*" OR "low* rank*" OR "low* status*" OR "resource guard*" OR "social behav*" OR "social cognition" OR "social dynamic*" OR "social order" OR "social rank*" OR "social status" OR "social structure" OR "submissive" OR "subordinat*" OR "territorial*") OR de:("aggression" OR "aggressive behaviour" OR "agonistic behaviour" OR "dominance" OR "group behaviour" OR "social behaviour" OR "social dominance" OR "social structure" OR "territoriality") OR id:("aggressive behavior" OR "agonistic behavior" OR "collective behaviour" OR "dominance behaviour" OR "group behavior" OR "social behavior" OR "social order"))</p>	
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Search Database: APA PsycInfo

Search ID	Terms (copy and paste)	Results
#1 dominance	<p>(noft("aggression" OR "aggressive behav*" OR "agonistic" OR "dominance" OR "group behav*" OR "hierarch*" OR "high* rank*" OR "high* status*" OR "low* rank*" OR "low* status*" OR "resource guard*" OR "social behav*" OR "social cognition" OR "social dynamic*" OR "social order" OR "social rank*" OR "social status" OR "social structure" OR "submissive" OR "subordinat*" OR "territorial*") OR MJMAINSUBJECT.EXACT("Aggressiveness") OR MJMAINSUBJECT.EXACT("Aggressive Behavior") OR MJMAINSUBJECT.EXACT("Animal Aggressive Behavior") OR MJMAINSUBJECT.EXACT("Animal Dominance") OR MJMAINSUBJECT.EXACT("Animal Social Behavior") OR MJMAINSUBJECT.EXACT("Dominance") OR MJMAINSUBJECT.EXACT("Dominance Hierarchy") OR MJMAINSUBJECT.EXACT("Social Cognition") OR MJMAINSUBJECT.EXACT("Social Dominance")) OR</p>	370,713

	MJMainsubject.Exact("Social Structure"))	
#2 dogs	(noft("canine*" OR "dog" OR "dogs" OR "wolf" OR "wolves") OR MJMainsubject.Exact("Canis") OR MJMainsubject.Exact("Dogs") OR MJMainsubject.Exact("Wolves"))	24,731
#3	#1 AND #2	2,600
#4	#3 AND English (Language) Filter	2,508
Copy and paste entire search (must add English filter)	(noft("aggression" OR ("aggressive behavior" OR "aggressive behaviors" OR "aggressive behaviour") OR "agonistic" OR "dominance" OR ("group behavior" OR "group behaviors" OR "group behaviour") OR "hierarch*" OR "high* rank*" OR "high* status*" OR "low* rank*" OR "low* status*" OR "resource guard*" OR ("social behavior" OR "social behavioral" OR "social behaviors" OR "social behaviour" OR "social behaviours") OR "social cognition" OR ("social dynamic" OR "social dynamics") OR "social order" OR ("social rank" OR "social ranking" OR "social ranks") OR "social status" OR "social structure" OR "submissive" OR "subordinat*" OR "territorial*") OR MJMainsubject.Exact("Aggressiveness") OR MJMainsubject.Exact("Aggressive Behavior") OR MJMainsubject.Exact("Animal Aggressive Behavior") OR MJMainsubject.Exact("Animal Dominance") OR MJMainsubject.Exact("Animal Social Behavior") OR MJMainsubject.Exact("Dominance") OR MJMainsubject.Exact("Dominance Hierarchy") OR MJMainsubject.Exact("Social Cognition") OR MJMainsubject.Exact("Social Dominance") OR MJMainsubject.Exact("Social Structure")) AND (noft("canine*" OR "dog" OR "dogs" OR "wolf" OR "wolves") OR MJMainsubject.Exact("Canis") OR MJMainsubject.Exact("Dogs") OR	

	MJMAINSUBJECT.EXACT("Wolves"))	
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Search Database: Scopus

Search ID	Terms (copy and paste)	Results
#1 dominance	TITLE-ABS-KEY ({aggression} OR {aggressive behav*} OR {agonistic} OR {dominance} OR {group behav*} OR {hierarch*} OR {high* rank*} OR {high* status*} OR {low* rank*} OR {low* status*} OR {resource guard*} OR {social behav*} OR {social cognition} OR {social dynamic*} OR {social order} OR {social rank*} OR {social status} OR {social structure} OR {submissive} OR {subordinat*} OR {territorial*})	480,148
#2 dogs	TITLE-ABS-KEY ({Canis} OR {dog} OR {dogs} OR {canine*} OR {wolf} OR {wolves})	511,264
#3	#1 AND #2	3,431
#4	#3 AND (LIMIT-TO (LANGUAGE , "English"))	3,134
Copy and paste entire search	(TITLE-ABS-KEY ({Canis} OR {dog} OR {dogs} OR {canine*} OR {wolf} OR {wolves})) AND TITLE-ABS-KEY ({aggression} OR {aggressive behav*} OR {agonistic} OR {dominance} OR {group behav*} OR {hierarch*} OR {high* rank*} OR {high* status*} OR {low* rank*} OR {low* status*} OR {resource guard*} OR {social behav*} OR {social cognition} OR {social dynamic*} OR {social order} OR {social rank*} OR {social status} OR {social structure} OR {submissive} OR {subordinat*} OR {territorial*}) AND (LIMIT-TO (LANGUAGE , "English"))	

Results:

Total Records	Total Records After Deduplication	Deduplication Software/Methodology
8,255	6,355	SR Accelerator Deduplicator (Relaxed Setting)
6,355	6,322	Covidence

Study Records:

Citation data was uploaded and deduplicated in SR Accelerator Deduplicator (Bond University, Australia). Deduplicated records were uploaded into Covidence Systematic Review Software (Covidence, Melbourne, Australia) to be deduplicated again and undergo screening by two screeners for title/abstract and full text. Full text records will be retrieved via Zotero citation manager (Corporation for Digital Scholarship, Vienna, USA). Microsoft Excel (Microsoft Corporation, Seattle, USA) and VOSviewer (Leiden University, Netherlands) will be used for data extraction or characterization.

Selection Process:

GJdV and EDF will each complete the title/abstract and full text screening, with EKG acting as the arbitrator. The following chart and decision trees contain the inclusion/exclusion criteria that will be used for the screening process.

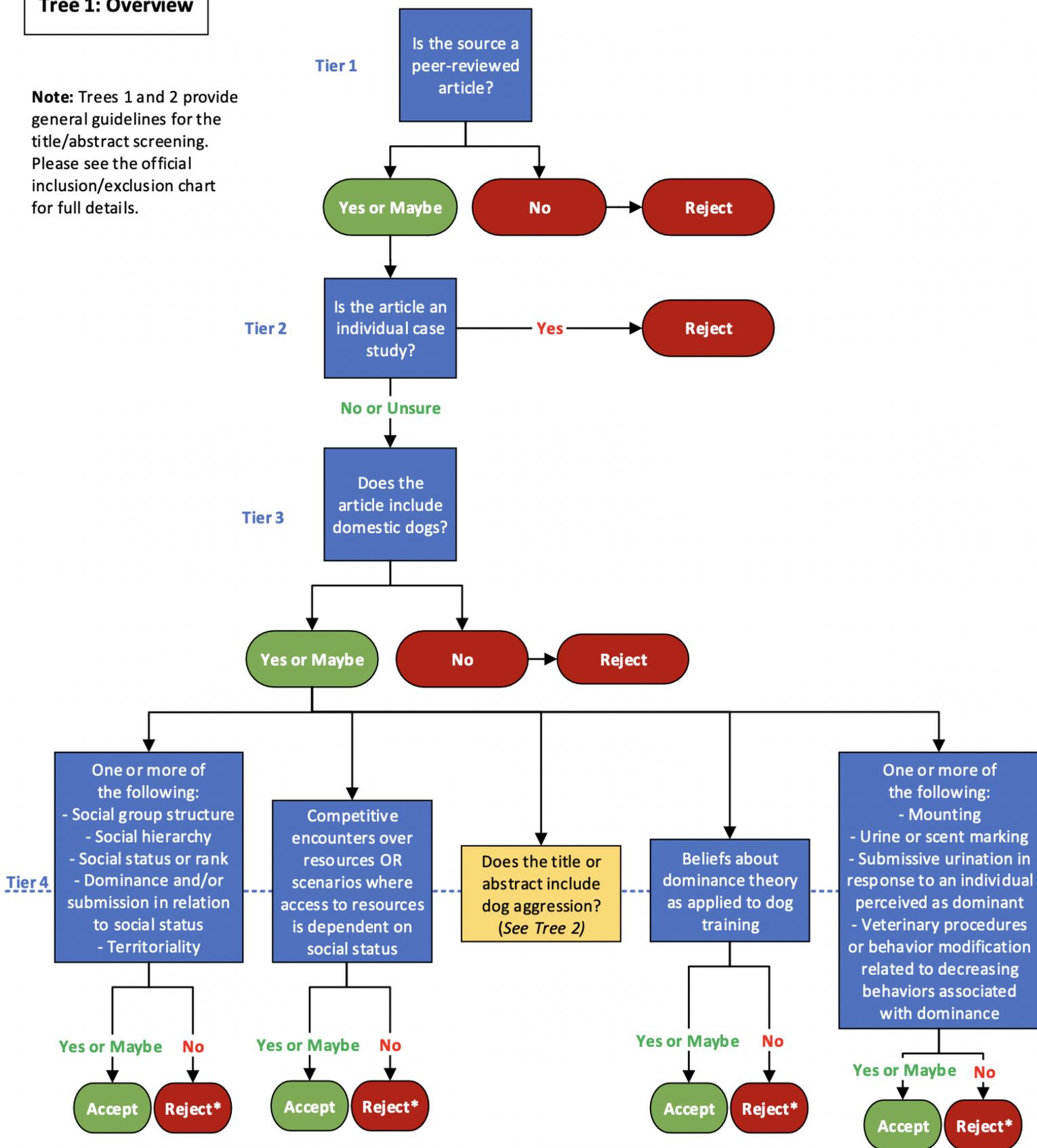
	Inclusion Criteria	Exclusion Criteria
1)	English language	Any language besides English
2)	Domestic dogs or articles including both wolves and dogs* *Note: It is acceptable for an article to include other species of animals as long as dogs or both wolves and dogs are mentioned.	<ul style="list-style-type: none"> ● Articles about wolves only ● Canids besides domestic dogs or wolves (e.g., Wolfdog hybrids, African wild dogs, coyotes, dingoes, foxes, jackals, etc.) ● Social interactions involving dogs and fake (e.g., robot or plush) models of canines or humans
3)	Peer-reviewed research (excluding individual case studies) and review papers	Book chapters, individual case studies, gray literature such as conference proceedings, and editorial pieces* *Note: Book chapters and conference proceedings should be tagged on Covidence during the screening process.
4)	Titles or abstracts that are explicitly about dog social group structures or hierarchies, social status or rank, dominance and/or submission in relation to social status, or territoriality E.g., Comparing social group structures between dogs and wolves, articles about whether social hierarchies apply to dog-dog and/or dog-human relationships, and genetic or biological components thought to influence dominance in dogs	<ul style="list-style-type: none"> ● Titles or abstracts that are not explicitly about dog social group structures or hierarchies, social status or rank, dominance and/or submission in relation to social status, or territoriality ● The terms “dominance” or “dominant” in regards to genetics (in comparison to recessive genes), or as a synonym for primary or influential ● The term “submissive” to describe the behavior of dogs experiencing fear or physical discomfort in

		<p>contexts unrelated to social status or conflict over resources. (E.g., A dog offering appeasement signals when intentionally frightened by a researcher in an experimental setting, dogs displaying lowered body postures due to discomfort with wearing specific training equipment)</p>
5)	<p>Competitive encounters over resources or scenarios where access to resources is dependent on social status, such as:</p> <ul style="list-style-type: none"> - A dog resource guarding food or other items from another dog or human - Certain group members gaining priority access to desirable items, suggesting a social hierarchy 	<p>Habitat selection based on resource availability</p>
6)	<p>Dog aggression that is explicitly related to dog-dog or dog-human conflict over resources, social status, or establishing a group hierarchy.* Additionally, the following terms or highly synonymous phrasing should be accepted:</p> <ol style="list-style-type: none"> 1. Competitive aggression 2. Conflict aggression or social conflict aggression 3. Dominance aggression 4. Food-related aggression or possessive aggression 5. Interdog household aggression, interdog housemate aggression, familiar dog aggression, dog rivalry, or “sibling rivalry” between dogs 6. “Owner-directed aggression” [as an exact phrase], occurring during conflict over resources or social status 7. Ritualized aggression 8. Same-sex aggression or intermale aggression 	<p>Dog aggression that is not explicitly related to dog-dog or dog-human conflict over resources, social status, or establishing a group hierarchy. Examples include:</p> <ul style="list-style-type: none"> ● General mentions of dog aggression without further context to specify conflict over resources or social status (e.g., dog bite statistics, aggressive behavior as a reason for relinquishment or euthanasia) ● General mentions of dogs, owners, and aggression that do not include “owner-directed aggression” as an exact phrase ● Idiopathic or pathological aggression (e.g., “Springer Rage” in English Springer Spaniels) ● Dogs behaving aggressively in veterinary clinics, since this aggression is likely to be entirely fear-based and defensive ● Aggression displayed by an animal in pain from a health issue or injury that was not caused by physical conflict over resources or social status ● Defensive aggression when a dog is deliberately threatened by a researcher in an experimental context that is unrelated to guarding resources (e.g.,

	<p>9. Status-dependent aggression</p> <p>10. Territorial aggression</p> <p><i>*Note for titles without abstracts:</i> If the title mentions dog aggression, it should be accepted for further evaluation.</p>	<p>a researcher, in a laboratory setting, approaching a dog in a threatening manner)</p> <ul style="list-style-type: none"> ● A dog behaving aggressively in response to abusive treatment from a human
7)	<p>Beliefs about dominance theory as applied to dog training (including related terms like “alpha roll” or “alpha rollover,” “dominance down,” “pack theory,” etc.)*</p> <p><i>*Note:</i> Extrapolating beliefs about wolf social behavior to interpretations of dog behavior problems may imply a connection to dominance theory, even if related terms are not mentioned.</p>	<p>Broader training concepts that may exist outside of techniques derived from dominance theory, such as general mentions of positive punishment and negative reinforcement</p>
8)	<ul style="list-style-type: none"> ● Mounting (in relation to social status, nonsexual) ● Urine or scent marking ● Submissive urination in response to an individual perceived as dominant ● Veterinary procedures (e.g., medication, spay and neuter surgeries) or behavior modification related to decreasing behaviors associated with dominance* <p><i>*Note:</i> Aggressive behavior should either be labeled as a type of aggression from Section #6 or explicitly relate to conflict over resources or social status, rather than general mentions of aggression without further context.</p>	<ul style="list-style-type: none"> ● Unwanted urination that is not considered urine marking (e.g., “inappropriate elimination” in the context of housetraining, urination due to high levels of excitement or fear in situations unrelated to social status*) ● General documentation of spay/neuter statistics or health outcomes, unrelated to impacts on social behavior associated with dominance. This includes general mentions of aggression without further context. ● Any chemical intervention that is not intended as a treatment to decrease behaviors associated with dominance (e.g., giving dogs alcohol or cannabis to observe the effects on social dynamics) <p><i>*Note:</i> Urination due to excitement or fear might still be referred to as “submissive urination,” even when unrelated to social status. Categorize as a “Maybe” for further evaluation if context is unclear.</p>

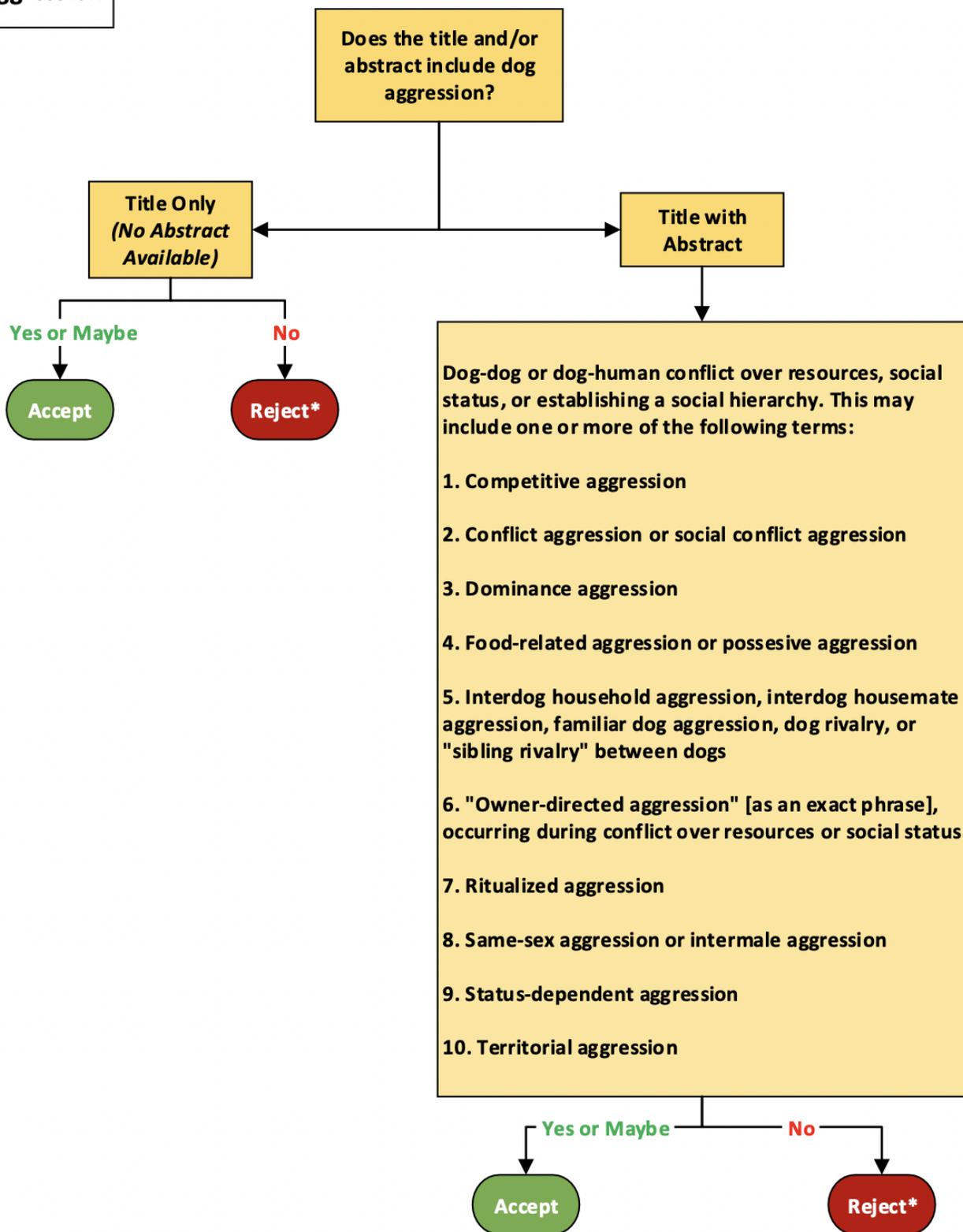
Tree 1: Overview

Note: Trees 1 and 2 provide general guidelines for the title/abstract screening. Please see the official inclusion/exclusion chart for full details.



*Only reject if *none* of the criteria in Tier 4 is met. Accept if criteria from at least one box in Tier 4 is met.

Tree 2: Aggression



*Only reject if *none* of the criteria in Tier 4 from Tree 1 is met. Accept if criteria from at least one box in Tier 4 is met.

Data Collection Process: VOSviewer (Leiden University, Netherlands) and Microsoft Excel (Microsoft, USA) will be used to extract data and visually present citation information. We will analyze information about type of study, year published, scientific journal, author(s), and author affiliations. We will also collect data about what dominance-related terms are used, as well as whether dominance is considered a key principle in the behavioral evaluation and treatment of domestic dogs.

Outcomes and Prioritization: The following chart will be used for data extraction; no specific prioritization is applicable. Data extraction will be done by 2 reviewers, GJdV and EDF.

Extraction Data:

Title	Fill in the blank
Author(s)	Fill in the blank
Institution(s)	Fill in the blank
Journal	Fill in the blank
Year	Fill in the blank
Country of origin	Fill in the blank
Study type	Survey Expert opinion literature review Evidence synthesis Observational study Experimental study
Population and sample size	Fill in the blank
Study details	Fill in the blank - describe study methodology (essay)
Is dominance, in the context of dog social status, explicitly defined?	Yes/no/unclear
List any definitions of dominance included in the article.	Fill in the blank
Does the article relate specific dog behaviors to being dominant?	Yes/no/unsure
List any dog behaviors explicitly related to being dominant.	Fill in the blank

Is submission, in the context of dog social status, explicitly defined?	Yes/no/unclear
List any definitions of submission included in the article.	Fill in the blank
Does the article relate specific dog behaviors to being submissive?	Yes/no/unclear
List any dog behaviors explicitly related to being submissive.	Fill in the blank
Is dominance described as a static or dynamic concept?	Static/dynamic/unclear
Does the article consider dogs to be pack-forming animals?	Yes/no/unclear
Does the article consider dominance to be relevant to the dog-human relationship?	Yes/no/unclear
List any reasons given for why dominance is considered relevant to the dog-human relationship.	Fill in the blank
List any reasons given for why dominance is <i>not</i> considered relevant to the dog-human relationship.	Fill in the blank
Does the article mention specific dominance-based training techniques?	Yes/no/unclear
List any specific dominance-based training techniques mentioned in the article.	Fill in the blank
Does the article support dominance theory as a basis for dog training?	Yes/no/unclear
List any reasons given in support of dominance theory as a basis for dog training.	Fill in the blank
List any reasons given against dominance theory as a basis for dog training.	Fill in the blank
If dominance theory is not supported as a basis for dog training, is an alternative approach recommended?	Yes/no/unclear

List any alternative approaches that are recommended instead of dominance-based training techniques.	Fill in the blank
Does the article use the term “dominance aggression” to label dogs displaying undesirable behaviors?	Yes/no/unclear
If the term dominance aggression is used, who was the article written by?	Dog trainer Behaviorist (CAAB or ACAAB) Veterinarian Veterinary nurse Veterinarian or veterinary nurse specialized in behavior (DACVB or AVBT) Other Unclear
Does the article include any medical or behavioral treatment(s) for dominance aggression?	Yes/no/unclear
List any medical or behavioral treatment(s) for dominance aggression.	Fill in the blank

Risk of bias in individual studies, data synthesis, and confidence in cumulative evidence are not applicable for this scoping review.

Discussion: This scoping review will provide insight about how definitions of dominance, as applied to domestic dogs, have evolved over multiple decades. To our knowledge, this is the first evidence synthesis project to systematically evaluate the literature on this topic up to the present day. Tracking the use of dominance terminology may indicate cultural shifts in perspectives and treatment of dogs (e.g., the frequency of labeling dogs with “dominance aggression,” how that corresponds to the type of behavior modification used, and the resulting effects on dog welfare). Our ultimate goal is to facilitate informative discussions between scientists, canine professionals, and dog guardians.

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