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RESEARCH ARTICLE



A Systematic Review of the Characterization of Behavior in Canine Behavioral Questionnaires

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ABSTRACT

Whilst many questionnaires assessing canine behavior exist, characterizations of behavior are inconsistent. Therefore, this systematic review identified how existing canine behavioral questionnaires characterize dog behavior. Completed in accordance with PRISMA guidelines, Study characteristics and eligible questionnaires were extracted for synthesis. Based on previous literature, a behavioral characterization framework was developed consisting of: Temperament, Emotion, Literal behavior related to composition, Literal behavior resulting from learning, Literal behavior – other, and Other. Thirty-eight studies reporting 37 questionnaires were included. Item coding revealed substantial variability in how canine behavior was operationalized, with emotion-based descriptors ranging from 2.3% – 40.5% across groups, and a high proportion of mixed or uncategorizable items (26.3% – 64.4%), indicating conflation of observable behavior with inferred traits or emotional states. This review highlights inconsistency in how canine behavior is defined and measured, with many existing questionnaires conflating observable behavior with inferred traits or emotions. The findings emphasize the need for a clearer conceptualization of “canine behaviour” and development of tools that capture literal, observable actions rather than human interpretation.

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KEYWORDS

Canine behavior; systematic review; behavior questionnaire; canine companions; dog temperament

A 2023 survey showed that dogs are the most common pet in the UK, with 31% of households reporting having at least one dog (Shahbandeh, 2024), and an estimated 11 million pet dogs in the UK (PDSA, 2023). Similar rates of dog ownership at the household level are reported internationally (World Population Review, 2024). This is unsurprising given the desire for canine companionship and the widely reported benefits of canine companionship to both humans and dogs (Christian et al., 2018; Hoffman et al., 2018; Hughes et al., 2020; Peel et al., 2010; Powell et al., 2018). However, human-canine cohabitation can break down for a number of reasons, leading to a concerning number of dogs being relinquished to shelters and rehoming centers each year (Shelter Animals Count, 2023). Whilst such relinquishment occurs for many reasons (e.g., death of the human guardian, financial difficulties, or relocating to residences that cannot accommodate dogs), one of the most cited reasons for relinquishment is due to perceived canine behavioral concerns (Diesel et al., 2008, 2010; Friend & Bench, 2020; Powdrill-Wells et al., 2021). Importantly, research highlights how lay populations appear to make a distinction between “undesirable” behaviors, such as jumping up, attention seeking, excitability, and “problematic” behaviors such as aggression, destructive behaviors and chasing (Blackwell et al., 2008) – a categorization that is likely to influence decisions around relinquishment. Recent research has highlighted variability around what humans constitute as problematic behavior (Stephens-Lewis et al., 2022) and the extent to which behaviors

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are deemed problematic by guardians (Lord et al., 2020). Thus, it is integral to understand what factors influence these perceptions of dog behavior to improve human-dog relationships and to reduce the number of relinquishments. Before such research can be conducted, it is important to first consider how canine behavior is assessed and characterized within the academic literature.

Whilst evidence suggests that lay populations typically refrain from pathologizing dog behavior, preferring to describe their dog as “excited” and “curious” instead (Shabelansky & Dowling-Guyer, 2016), other research has highlighted the potential misuse of terms such as “Reactivity” in conceptualizing normal canine behavior as problematic (Stephens-Lewis et al., 2022). Moreover, recent research asking specifically about dog behaviors found that guardians typically referred to their dog’s temperament or emotions, rather than their literal behaviors, despite being asked to specify literal canine behaviors (Stephens-Lewis & Schenke, 2023). For example, when asked to report the exact behaviors their dogs exhibited when approached by an unfamiliar stranger, many participants reported their dog acting “aggressively” or “happily,” rather than reporting specific behaviors such as “lunging,” “pulling,” “snapping” etc. This is problematic because it reflects the use of broad emotional labels rather than specific observable behaviors, and relies on the guardian’s subjective interpretation of their dog’s actions. Whilst self-reporting high levels of understanding around dog behavior (Tami & Gallagher, 2009), both lay and professional populations often have limited ability to identify subtle signs of stress in canine companions (Grigg et al., 2021; Kerswell et al., 2013; Mariti et al., 2012).

This interchangeable use of concepts reflects the overarching need for clarity when conceptualizing and discussing canine behavior, particularly the need to separate canine behaviors from human interpretations. One area where there is a vital need for standardization in definitions relates to perceptions around dangerous behaviors (something that has been on the rise since the increase in canine companionship during the recent pandemic; Boardman & Farnworth, 2022; Weng & Ogata, 2023). For example, a clearer distinction between biting and mouthing (Waite et al., 2021) is needed, which could be the difference between a dog being euthanized or not. This heterogeneity in terms of the classification of canine behavior and the inconsistencies around human understanding and perception of such behaviors can make it difficult to accurately and objectively assess and measure canine behavior.

There are many standardized canine behavioral assessments available within the scientific community. Such assessments include behavioral tests requiring the manipulation of settings for assessing canine responses to chosen stimuli (Piotti et al., 2022; Serpell & Hsu, 2001; Wilsson & Sundgren, 1997), as well as specifically developed guardian-reported questionnaires (Hsu & Serpell, 2003; Sheppard & Mills, 2002). However, while such questionnaires aim to develop insight into canine behavioral traits or responses, the way in which behavior is conceptualized within these is often inconsistent (Brady et al., 2018). For example, some aim to assess specific postures or observable behavior (Szabó et al., 2018) such as tail position, some assess more inference-based profiles such as “temperament” (Bray et al., 2019; Wilsson & Sundgren, 1997) such as “playful,” “personality” (Svartberg & Forkman, 2002), or “emotional predisposition” (Sheppard & Mills, 2002) such as “anxious,” and some are inconsistent in their conceptualization (Hsu & Serpell, 2003). It has been argued that behavioral tests may provide more objective recordings of canine behavior due to being reliant on immediate observation as opposed to relying on prior perceptions and/or memories of a dog’s “typical” behavior (Brady et al., 2018). Yet, the use of questionnaires in assessing canine behavior are more cost- and time-effective, as well as better able to capture “typical” behaviors, and assess behaviors impossible to capture within behavioral tests (e.g., aggression toward children). Given the need for such economically prudent approaches in assessing canine behavior, particularly in the contexts of shelters and rehoming charities, canine behavioral questionnaires assessing key facets of canine behavior may be beneficial in generating more information within little time, and with reduced economic burden. However, given the aforementioned concerns regarding the distinction of canine behavioral elements (Stephens-Lewis & Schenke, 2023), there is a need to examine the ways in which these questionnaires define, assess and conceptualize canine behavior.

As such, this systematic review aims to identify and assess the ways in which existing canine behavioral questionnaires characterize dog behavior. Specifically, it addresses the question: “What are the current behavioural questionnaires employed in assessing literal behaviour in canine companions?” Whilst there are various methods that can be used to assess canine behavior, the current review focuses on behavioral questionnaires completed both by owners and professionals, with the following objectives:

- To identify questionnaires assessing literal dog behavior through the systematic review of published studies aimed at examining the behavior of canine companions.
- To assess how behavior is characterized within these questionnaires through the extraction and comparison of questionnaire aims and item descriptors.
- To assess the validity (i.e., the accuracy of the measure) and reliability (i.e., the consistency of the measure, either over time or across raters) of included behavioral questionnaires.
- To identify areas for improvement and make recommendations for future research

Method

This systematic review was completed in accordance with the Preferred Reporting for Systematic Reviews and Meta-Analyses (PRISMA) statement (Page et al., 2021).

Search strategy

A University librarian with expertise in systematic reviews and a canine behavior specialist assisted in developing the database search strategies. Databases were systematically searched on March 25 2022. No date, language, or publication-type restrictions were applied but searches were limited to titles and abstracts. Searches were updated twice (in 2022 and 2026) to capture studies published during the extended review and peer-review process. Due to changes in database access at the university, Scopus was not included in the initial search, and the Russian Science Citation Index was not included in the updated search. [Table 1](#) provides an overview of database search results.

The following search terms were used: ((Canine* OR dog* OR “canis familiaris” OR pup*) AND (Behav* OR temperament OR personality) AND (measure OR test OR scale)). Given the interchangeable use of behavior, temperament, and personality constructs within the literature, the review team agreed that inclusion of personality and temperament terms would maximize retrieval of potentially relevant studies.

Eligibility criteria

The primary inclusion criteria for the selection of articles were:

- (1) Written in the English language or an English translation available.
- (2) Literature that reports canine behavioral questionnaire measures (both objective and subjective).
- (3) Literature that reports on companion canines, as opposed to working canines (who are usually assessed on working characteristics and above the expectations the general population hold for canine companions).
- (4) Literature that reports original data (i.e., not a review or meta-analysis) consisting of observable canine behavior (as opposed to physiological or inferences of behavior) via a questionnaire.
- (5) Literature that reports on the validity or reliability of the behavioral measure.

No exclusions were made based on canine characteristics or test parameters.

Table 1. Electronic databases searched for relevant literature.

Database	Collection	Number of Results		
		Initial search (25/03/2022)	Updated search (November 2022)	Updated search (20–24/02/2026)
<i>Web of Science</i>	Web of Science Core Collection	11,653	1,368	
	BIOSIS Citation Index	8,959	760	
	MEDLINE	8,577		
	SciELO Citation Index	166	11	
	KCI-Korean Journal Database	118	18	
	Russian Science Citation Index	73		
<i>University Discovery Service</i>	ScienceDirect	5,663	157	1,266
<i>EBSCOhost</i>	CINAHL with full text	636	102	374
	PsychINFO	4,549	312	1,278
	Psychology and Behavioral Sciences Collection	560	51	166
	MEDLINE		670	1,881
			1,082	3,763
Scopus				

Study selection

Across the initial search and subsequent updates, all titles and abstracts were screened against the inclusion criteria. For the initial search and first update, screening was conducted independently by two reviewers, with substantial inter-rater agreement ($\kappa = .63$; 95.4% agreement). A discussion between all authors resolved disagreements. Full-text screening for records retained from these stages was also conducted independently by two reviewers, yielding fair agreement ($\kappa = .23$; 89.0% agreement). A discussion between all authors resolved disagreements. For the final updated searches, records were assessed against the same eligibility criteria, with any uncertainties discussed within the review team.

Data extraction

Data were extracted from all eligible studies by one author, and approximately 10% were also extracted by another author. Extracted data included publication details, sample characteristics, questionnaire characteristics (including the specific construct measured and the questions asked), and validity and reliability information.

Quality assessment

Study quality was also assessed using the Critical Appraisal Skills Programme (CASP) checklist for cross sectional and descriptive studies. Studies were assessed against 11 criteria including questions around study research questions and aims, design and reporting of findings. For example, studies were rated at high risk of bias for data collection when the measures used were inadequately described or lacked established reliability/validity. Sample sizes were judged as adequate when the authors reported numbers sufficient to minimize the likelihood of chance findings based on standard sample size conventions for observational studies. Two authors completed this independently, with discussions ensuing until 100% agreement was achieved.

Data analysis

The review follows a narrative synthesis approach to summarizing the key characteristics of studies included. This was completed in accordance with the Joanna Briggs Institute manual for evidence

synthesis (Aromataris et al., 2024). Furthermore, questionnaire items were assessed in relation to the behaviors they captured. The planned assessment of reliability and validity was not possible due to insufficient reporting within the manuscripts. Although over half of articles included some reliability data, reporting was inconsistent and often limited to subscales. Approximately three-quarters of articles reported a form of validity, but the type and completeness of reporting varied widely. None reported prospective power analyses.

Behavioral conceptualisation

Following extraction of all questionnaire items from each of the studies included, each item was assessed alongside a behavior characterization framework and assigned to one category. This framework was developed iteratively based on established conceptualizations of canine behavior within the field, combined with the constructs represented in the measures identified in the present review and expert input from the research team. A framework consisting of six core facets of behavior was then constructed, consisting of:

- (1) **Temperament/personality:** behavior linked to observations made regarding the dog's general disposition trait including aspects of personality. **2. Emotion:** behavior observed as resulting from an emotional response/reaction experienced by a dog due to situation/stimuli. **3. Literal behavior as related to behavioral composition:** behavior associated with species-typical, genetically predisposed patterns, including elements of the predatory sequence reinforced during development (as outlined by Coppinger & Coppinger, 2001). This facet reflects behaviors shaped by evolutionary and biological foundations, rather than those primarily influenced by learning, emotional inference, or human interpretation. **4. Literal behavior as a result of learning:** behavior occurring as a response to learning either directly or indirectly. This can include trained behavior as well as behavior dogs have learnt from experience.
- (2) **Literal behavior – other:** other literal behaviors that dogs display including body language signals as well as general functional behaviors unrelated to learning.
- (3) **Other:** behaviors stemming from cognitive processes, multiple sources or being human inferences rather than observed behavior, or which do not align with the five categories detailed above.

After initial construction by one author, all authors reviewed the framework and refined the conceptualization. Subsequently, two authors coded the question items against the framework (agreement between coders was 83.08% and conflicts were resolved between the two authors). One author reviewed the final coding set for all measures included.

Results

Screening and study selection

Following duplicate removal, 29,109 articles were identified. Following initial screening, 1,349 records underwent secondary screening against the eligibility criteria, resulting in 38 being extracted (see Figure 1).

Quality assessment

Whilst the quality assessment determined studies had a relatively low risk of bias (see Table 2), there was some lack of information or clarity around some assessment items. For example, in accordance with the CASP checklist, four studies did not clearly detail their recruitment processes for

participants (Canejo-Teixeira et al., 2018; Riemer et al. 2014; Salonen et al., 2021; Szabó et al., 2018). Additionally, five studies were deemed at a high risk of bias in their data collection measures (Dalla Villa et al., 2017; King et al., 2016; Salonen et al., 2021; Stevens et al., 2021; van den Berg et al., 2006). Of the 38 included studies, only 11 reported sample sizes large enough to reduce the likelihood of chance findings (Boonhoh et al., 2023; Broseghini et al., 2023; Canejo-Teixeira et al., 2018; Csibra, Bunford, et al., 2024, 2025; Csibra, Reicher, et al., 2024; Mackay et al., 2023; Mondal et al., 2023; Smith & Mills, 2025; Wauthier & Williams, 2018; Wilkins et al., 2024). The remaining 27 provided insufficient information to assess sample adequacy. Only one study was indicated as being at a high risk based on analysis rigor (Dalla Villa et al., 2017), and a further study was indicated to be at high risk for application of results to the local population (Riemer et al., 2013).

Study characteristics: Behaviour examined, design and population

Resource guarding (McGuire et al., 2020), anxiety (Mills et al., 2020), television viewing behaviors (Montgomery et al., 2025), rank and dominance behaviors (Vékony & Pongrácz, 2024) and behavioral addictions (Mazzini et al., 2025) were each considered by a single study. While four studies focused on aggression (Craig et al., 2017; Dalla Villa et al., 2017; Hsu & Sun, 2010; van den Berg et al., 2006), nine studies considered inattention, hyperactivity and/or impulsivity (Csibra et al., 2022, 2025; Csibra, Bunford, et al., 2024; Csibra, Reicher, et al., 2024; Fadel et al., 2016; Marlois et al., 2022; Riemer et al., 2014; Wan et al., 2009; Wright et al., 2011), two studies focused on frustration (McPeake et al., 2019, 2021), one study focused on both anxiety and impulsivity (King et al., 2016), and another focused on both behavior and temperament (Wilkins et al., 2024). Behavioral assessment linked to relinquishment and/or adoption was assessed by two studies (Clay et al., 2020; Mondal et al., 2023), while breeding or place of origin were considered by two studies (von Rentzell et al., 2022; Wauthier & Williams, 2018). Aspects relating to training and/or learning were assessed by two studies (Salonen et al., 2021; Stevens et al., 2021), while five studies examined cognitive dysfunction (Madari et al., 2015; Salvin et al., 2011; Schütt et al., 2015; Smith & Mills, 2025; Szabó et al., 2018). Finally, five studies considered behavioral problems and behavior assessment in general (Boonhoh et al., 2023; Broseghini et al., 2023; Canejo-Teixeira et al., 2018; Mackay et al., 2023; Richard et al., 2025),

One study utilized a randomized control trial design (Mills et al., 2020), 13 studies adopted a quasi-experimental design (Craig et al., 2017; Csibra et al., 2025; Fadel et al., 2016; King et al., 2016; Marlois et al., 2022; Mazzini et al., 2025; Richard et al., 2025; Smith & Mills, 2025; Szabó et al., 2018; Vékony & Pongrácz, 2024; von Rentzell et al., 2022; Wan et al., 2009; Wauthier & Williams, 2018), and the remaining 24 studies were correlational. Recruited sample sizes ranged from 13 (Riemer et al., 2014) to 15,371 (Salonen et al., 2021). Canine behavior was reported by professionals in three studies (Csibra et al., 2022; Madari et al., 2015; Marlois et al., 2022), although Csibra et al. (2022) also collected data from guardians. The final 35 studies employed guardian-only reports of canine behavior. In terms of canine characteristics, 35 studies included samples of mixed sex, with two studies only recruiting neutered/spayed dogs (Craig et al., 2017; McGuire et al., 2020). Two studies did not report on sex or sexual status (Riemer et al., 2014; von Rentzell et al., 2022). In terms of age, one study did not report on age (von Rentzell et al., 2022), three studies recruited seniors (Madari et al., 2015; Salvin et al., 2011; Schütt et al., 2015), while the remaining 34 studies reported mixed age samples. Three studies reported breed-specific samples, consisting of German Shepherds (Wan et al., 2009), Golden Retrievers (van den Berg et al., 2006), and a mix of Border Collies and Labrador Retrievers (Fadel et al., 2016). While two studies did not report on breed (McGuire et al., 2020; von Rentzell et al., 2022), 33 studies included mixed breed samples. See Table 3 for an overview of study characteristics.

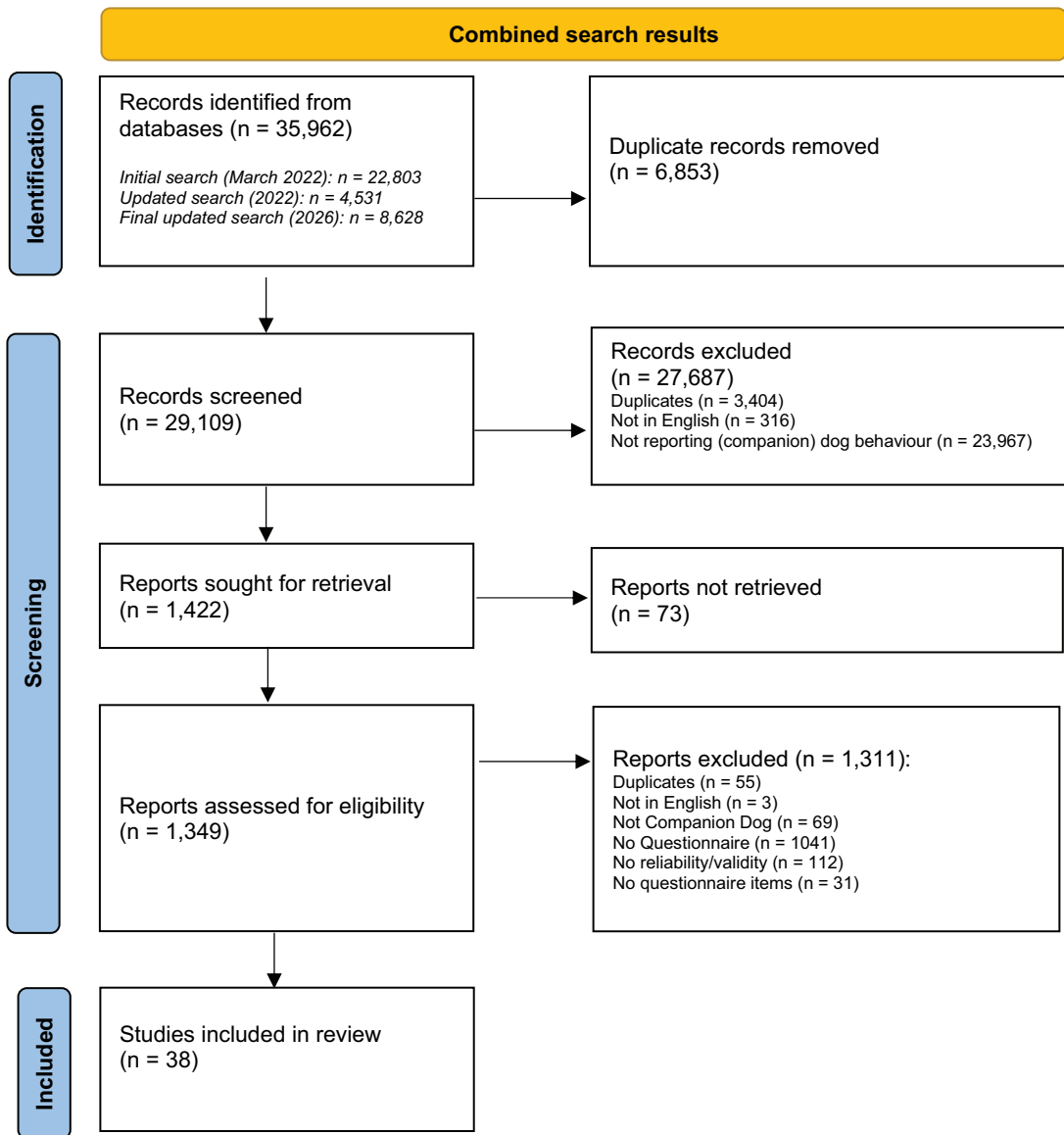


Figure 1. PRISMA flow diagram of search results.

Questionnaire characteristics

Of the 38 studies included, 37 unique questionnaires were deemed eligible and extracted for this synthesis (see Table 4 for an outline of questionnaire characteristics). Of these questionnaires, 13 were versions of the validated Canine Behavioural Assessment and Research Questionnaire (C-BARQ), 13 were unpublished/original questionnaires, and a further 11 were validated questionnaires. Of these 11 validated questionnaires, the Dog Impulsivity Assessment Scale (Wright et al., 2011) was utilized by four studies (Fadel et al., 2016; Riemer et al., 2014; Stevens et al., 2021; Wright et al., 2011), while two unique versions of the Canine Frustration Questionnaire were used by two studies (McPeake et al., 2019, McPeake et al. 2021). The Dog ADHD-Rating Scale was adopted by two studies (Csibra et al., 2022; Wan et al., 2009), the Canine Cognitive Dysfunction Scale used by

Table 2. Quality appraisal.

	Did the study address a clear focused issue?	Did the authors use an appropriate method to answer their question?	Were the subjects recruited in an acceptable way?	Were the measures accurately measured to reduce bias?	Were the data collected in a way that addressed the research issue?	Did the study have enough participants to minimize the play of chance?	How are the results presented and what is the main result?	Was the data analysis sufficiently rigorous?	Is there a clear statement of findings?	Can the results be applied to the local population?	How valuable is the research?
Boonhoh et al. (2023)	Yes	Yes	Yes	Can't tell	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Brosghini et al. (2023)	Yes	Yes	Yes	Can't tell	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Canejo-Teixeira et al. (2018)	Yes	Yes	Can't tell	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Clay et al. (2020)	Yes	Yes	Yes	Yes	Yes	Can't tell	Yes	Yes	Yes	Yes	Yes
Craig et al. (2017)	Yes	Yes	Yes	Yes	Yes	Can't tell	Yes	Yes	Yes	Yes	Yes
Csibra, Bunford, et al. (2024)	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Csibra et al. (2022)	Yes	Yes	Yes	Yes	Yes	Can't tell	Yes	Yes	Yes	Yes	Yes
Csibra et al. (2025)	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Csibra, Bunford, et al. (2024)	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Dalla Villa et al. (2017)	Yes	Yes	Yes	No	Yes	Can't tell	Yes	No	Yes	Yes	Yes
Fadel et al. (2016)	Yes	Yes	Yes	Yes	Yes	Can't tell	Yes	Yes	Yes	Yes	Yes
Hsu and Sun (2010)	Yes	Yes	Yes	Yes	Yes	Can't tell	Yes	Yes	Yes	Yes	Yes
King et al. (2016)	Yes	Yes	Yes	No	Yes	Can't tell	Yes	Yes	Yes	Yes	Yes
Mackay et al. (2023)	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Madani et al. (2015)	Yes	Yes	Yes	Yes	Yes	Can't tell	Yes	Yes	Yes	Yes	Yes
Marlois et al. (2022)	Yes	Yes	Yes	Yes	Yes	Can't tell	Yes	Yes	Yes	Yes	Yes
Mazzini et al. (2025)	Yes	Yes	Yes	Yes	Yes	Can't tell	Yes	Yes	Yes	Yes	Yes
McGuire et al. (2020)	Yes	Yes	Yes	Yes	Yes	Can't tell	Yes	Yes	Yes	Yes	Yes
McPeake et al. (2019)	Yes	Yes	Yes	Yes	Yes	Can't tell	Yes	Yes	Yes	Yes	Yes
McPeake et al. (2021)	Yes	Yes	Yes	Yes	Yes	Can't tell	Yes	Yes	Yes	Yes	Yes
Mills et al. (2020)	Yes	Yes	Yes	Yes	Yes	Can't tell	Yes	Yes	Yes	Yes	Yes
Mondal et al. (2023)	Yes	Yes	Yes	Can't tell	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Montgomery et al. (2025)	Yes	Yes	Yes	Yes	Yes	Can't tell	Yes	Yes	Yes	Yes	Yes
Richard et al. (2025)	Yes	Yes	Yes	Yes	Yes	Can't tell	Yes	Yes	Yes	Yes	Yes
Riemer et al. (2013)	Yes	Yes	Can't tell	Yes	Yes	Can't tell	Yes	Yes	Yes	No	Yes
Salonen et al. (2021)	Yes	Yes	Can't tell	No	Yes	Can't tell	Yes	Yes	Yes	Yes	Yes
Salvin et al. (2011)	Yes	Yes	Yes	Yes	Yes	Can't tell	Yes	Yes	Yes	Yes	Yes
Schütt et al. (2015)	Yes	Yes	Yes	Yes	Yes	Can't tell	Yes	Yes	Yes	Yes	Yes
Smith and Mills (2025)	Yes	Yes	Yes	Yes	Yes	Can't tell	Yes	Yes	Yes	Yes	Yes
Stevens et al. (2021)	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Szabó et al. (2018)	Yes	Yes	Can't tell	No	Yes	Can't tell	Yes	Yes	Yes	Yes	Yes
van den Berg et al. (2006)	Yes	Yes	Yes	Yes	Yes	Can't tell	Yes	Yes	Yes	Yes	Yes
Vékony and Pongrácz (2024)	Yes	Yes	Yes	Can't tell	Yes	Can't tell	Yes	Yes	Yes	Yes	Yes
von Rentzell et al. (2022)	Yes	Yes	Yes	Yes	Yes	Can't tell	Yes	Yes	Yes	Yes	Yes
Wan et al. (2009)	Yes	Yes	Yes	Yes	Yes	Can't tell	Yes	Yes	Yes	Yes	Yes
Wauthier and Williams (2018)	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Wilkins et al. (2024)	Yes	Yes	Yes	Can't tell	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Wright et al. (2011)	Yes	Yes	Yes	Yes	Yes	Can't tell	Yes	Yes	Yes	Yes	Yes

two studies (Salvin et al., 2011; Schütt et al., 2015), the Canine Dementia Scale was used by one study (Madari et al., 2015), the Dog ADHD and Functionality Rating Scale was used by two studies (Csibra, Bunford, et al., 2024; Csibra, Reicher, et al., 2024) and the Lincoln Canine Anxiety Scale adopted in another study (Mills et al., 2020). Finally, one study utilized modified versions of the Canine Cognitive Dysfunction Scale, Canine Dementia Scale, and Age-Related Cognitive and Affective Disorders Scale (Smith & Mills, 2025).

Thirteen versions of the C-BARQ were used across seven studies. Five versions were reportedly based on Hsu and Serpell's (2003) PennBARQ (Dalla Villa et al., 2017; Hsu & Sun, 2010; van den Berg et al., 2006; von Rentzell et al., 2022). A further study (Wauthier & Williams, 2018) cited the mini C-BARQ (Duffy et al., 2014). Four studies (Boonhoh et al., 2023; Broseghini et al., 2023; Canejo-Teixeira et al., 2018; Clay et al., 2020) reported versions based on Duffy and Serpell's (2012) version of the C-BARQ. Item numbers varied from 11 (van den Berg et al., 2006) to 78 (Canejo-Teixeira et al., 2018; Clay et al., 2020), although Canejo-Teixeira et al. (2018) only list 77 items. One study (Wilkins et al., 2024) reported using two original C-BARQ questionnaires without modifications, one based on the mini-C-BARQ (Duffy et al., 2014) and the other based on Duffy and Serpell's (2012), pp. 100-item version. One final study (Mondal et al., 2023) reported a version based on Serpell and Hsu (2005). Thirteen of the questionnaires adopted were self-developed or modified versions of non-standardized surveys.

Behavioral characterisation: Temperament, emotion, behaviour and inference

Unique items included in questionnaires ranged from eight (McGuire et al., 2020) to 395 (Salonen et al., 2021). Individual items underwent coding against a behavioral characterization framework to determine the behavior facets captured within each questionnaire (see Table 5). The 11 questionnaires identified in the review that were based on adaptations or translations of the C-BARQ were clustered into a single group (hereafter referred to as the modified C-BARQ group), with item-level coding aggregated to produce an overall average profile across these questionnaires. However, substantial variation and limited transparency in how these questionnaires reported or operationalized behavioral items raised concerns regarding the extent to which they reflected the original intent of the C-BARQ. For example, some authors reported providing respondents with additional behavioral descriptors to illustrate specific facets of behavior (Hsu & Sun, 2010; van den Berg et al., 2006; von Rentzell et al., 2022), although the nature and consistency of these descriptors were often insufficiently detailed to permit systematic evaluation of their influence on item coding.

To address this limitation, the original versions of the C-BARQ were additionally independently extracted and coded: the 100-item C-BARQ (Duffy & Serpell, 2012), the 68-item PennBARQ (Hsu & Serpell, 2003), and the 42-item mini-C-BARQ (Duffy et al., 2014). One study in this review (Wilkins et al., 2024) reported using the mini-C-BARQ and 100-item C-BARQ without modifications. As the authors correctly cited their sources and describe the questionnaires (albeit without mention of behavioral descriptors), these questionnaires have not been included in the modified C-BARQ group. While the 68-item PennBARQ was not part of the questionnaires included in the review, this questionnaire plus the 100-item C-BARQ and mini-C-BARQ were analyzed separately to form an original C-BARQ comparator group (referred to as the Standardized C-BARQ). This additional analytic step was undertaken to enable direct comparison between how the C-BARQ was intended to characterize canine behavior and how C-BARQ-derived questionnaires have been implemented and reported in practice. A total of 1686 questionnaire items across all three groups were coded against the framework.

The modified C-BARQ group contained 645 items. Of these, 2.5% assessed temperament (e.g., “hyperactive,” “restless”), 40.5% assessed emotion (e.g., “dog acts anxious or fearful towards a familiar dog”), and 21.6% captured literal behaviors. Within the literal behavior category, 3.5% reflected behavioral confirmation (e.g., “dog chases cats”), 1.2% learnt behavior (e.g., “dog returns immediately when called off leash”), and 16.9% other observable actions (e.g., “excessive salivation”

Table 3. Study characteristics.

Study	Behavioral facet examined (author reported)	Design	Questionnaires	Population Reporting Outcomes	Sample size	Canine Characteristics: Breed, Age Range, Sex
Fadel et al. (2016)	Impulsivity	Quasi-Experimental	Dog Impulsivity Assessment Scale	Guardian	1161	Breed: Border Collies and Labrador Retrievers Mixed sex and age
McPeake et al. (2019)	Frustration	Correlational	Canine Frustration Questionnaire	Guardian	2348	Mixed
Dalla Villa et al. (2017)	Aggression	Correlational	Canine Behavioural Assessment & Research Questionnaire (C-BARQ)	Guardian	366	Mixed
McGuire et al. (2020)	Food aggression	Correlational	Resource Guarding: Modified Questions from CBARQ	Guardian	139	Breed: Not reported Neutered/Spayed
McPeake et al. (2021)	Frustration	Correlational	Canine Frustration Questionnaire	Guardian	44	Mixed age
Schutt et al. (2015)	Canine cognitive dysfunction	Correlational	Canine Cognitive Dysfunction Scale	Guardian	50	Mixed
Wan et al. (2009)	Impulsivity	Quasi-Experimental	Dog ADHD-Rating Scale	Guardian	236	Breed: Mixed Sex: Mixed Age: Senior 8+ Breed: German Shepherd Dogs Age: Mixed Sex: Mixed
King et al. (2016)	Anxiety and Impulsivity	Quasi-Experimental	Unnamed	Guardian	400	Mixed
Stevens et al. (2021)	Training	Correlational	Dog Impulsivity Assessment Scale	Guardian	62	Mixed
Riemer et al. (2013)	Impulsivity	Correlational	Unnamed Dog Impulsivity Assessment Scale	Guardian	13	Sex: Not reported Age: Mixed Breed: Mixed
Szabó et al. (2018)	Canine cognitive dysfunction	Quasi-Experimental	Unnamed	Guardian	1343	Mixed
van den Berg et al. (2006)	Aggressive behavior	Correlational	C-BARQ ^{Modified}	Guardian	228	Breed: Golden Retrievers Age: Mixed Sex: Mixed
Craig et al. (2017)	Aggression	Quasi-Experimental	Goodloe and Borchelt (1998) survey ^{Modified}	Guardian	21	Sex: Neutered Age: Mixed Breed: Mixed
Wauthier and Williams (2018)	Puppy farming	Quasi-Experimental	C-BARQ ^{Modified}	Guardian	2026	Mixed
Clay et al. (2020)	Post adoption behavior	Correlational	C-BARQ ^{Modified}	Guardian	107	Mixed

(Continued)

Table 3. (Continued).

Study	Behavioral facet examined (author reported)	Design	Questionnaires	Population Reporting Outcomes	Sample size	Canine Characteristics: Breed, Age Range, Sex
Mills et al. (2020)	Canine anxiety	Randomized Controlled Trial	Lincoln Canine Anxiety Scale	Guardian	226	Mixed
Wright et al. (2011)	Impulsivity	Correlational	Dog Impulsivity Assessment Scale	Guardian	571	Mixed
Canejo-Teixeira et al. (2018)	Behavior problems	Correlational	C-BARQ	Guardian	345	Mixed
Hsu and Sun (2010)	Aggressiveness	Correlational	C-BARQ	Guardian	852*	Mixed
Salonen et al. (2021)	Training and unwanted Behavior	Correlational	Unwanted Behaviour Questionnaire	Guardian	15,371	Mixed
Salvin et al. (2011)	Canine cognitive dysfunction	Correlational	Canine Cognitive Dysfunction Scale	Guardian	957	Breed: Mixed
von Rentzell et al. (2022)	Post adoption behavior	Quasi-Experimental	C-BARQ ^{Modified}	Guardian	803	Age: Senior 8+ Not reported
Madari et al. (2015)	Canine cognitive dysfunction syndrome	Correlational	Canine Dementia Scale	Animal Professional	215	Breed: Mixed Age: Senior 8+ Sex: Mixed
Csibra et al. (2022)	Inattention, hyperactivity, and impulsivity	Correlational	Dog ADHD-Rating Scale	Guardian & Trainer	319	Mixed
Wilkins et al. (2024)	Behavior and temperament	Correlational	C-BARQ	Guardian	435	Mixed
Csibra, Bunford, et al. (2024)	Inattention, hyperactivity, and impulsivity	Correlational	Dog ADHD and Functionality Rating Scale	Guardian	59	Mixed
Csibra, Bunford, et al. (2024)	Inattention, hyperactivity, and impulsivity	Correlational	Dog ADHD and Functionality Rating Scale	Guardian	1,168	Mixed
Mondal et al. (2023)	Post-adoption behavior	Correlational	C-BARQ ^{Modified}	Guardian	1,628	Mixed
Mackay et al. (2023)	Behavior problems	Correlational	Unnamed	Guardian	1,084	Mixed
Broseghini et al. (2023)	Behavior problems	Correlational	C-BARQ ^{Modified}	Guardian	803	Mixed
Boonhoh et al. (2023)	Behavior problems	Correlational	C-BARQ ^{Modified}	Guardian	1,827	Mixed
Montgomery et al. (2025)	Television viewing behaviors	Correlational	Dog Television Viewing Scale	Guardian	453	Mixed
Mazzini et al. (2025)	Behavioral addictions	Quasi-experimental	Big Dog Reward and Motivation Questionnaire	Guardian	105	Mixed
Richard et al. (2025)	Behavior problems	Quasi-experimental	Unnamed	Guardian	290	Mixed

(Continued)

Table 3. (Continued).

Study	Behavioral facet examined (author reported)	Design	Questionnaires	Population Reporting Outcomes	Sample size	Canine Characteristics: Breed, Age Range, Sex
Smith and Mills (2025)	Canine cognitive dysfunction	Quasi-experimental	Canine Cognitive Dysfunction Scale ^{Modified} , Canine Dementia Scale ^{Modified} , and Age-Related Cognitive and Affective Disorders Scale ^{Modified}	Guardian	314	Mixed
Csibra et al. (2025)	Inattention, hyperactivity, and impulsivity	Quasi-experimental	Dog ADHD and Functionality Rating Scale	Guardian	1,872	Mixed
Vékony and Pongrácz (2024)	Rank/dominance behaviors	Quasi-experimental	Dog Rank Assessment Questionnaire	Guardian	1,156	Mixed
Marlois et al. (2022)	Inattention, hyperactivity, and impulsivity	Quasi-experimental	Dog ADHD-Rating Scale ^{Modified}	Guardian	156	Mixed

*Number relates to guardians (dog number unknown).

Table 4. Questionnaire characteristics.

Questionnaire	Studies Adopting Questionnaire	Questionnaire Description	Constructs Assessed	Items	Behavior Assessed: Frequency (%)	Example Item
Dog Impulsivity Assessment Scale	Fadel et al. (2016)	18-item DIAS (Wright et al., 2011) description aligned with original authors, but no items reported alongside the article.	Behavioral regulation, aggression threshold and response to novelty, and responsiveness.	18	Temperament: 15 (83.3)	My dog appears to be “sorry” after it has done something wrong
	Stevens et al. (2021)	18-item DIAS (Wright et al., 2011) amended to include a “don’t know/not applicable” response option. DIAS items in supplementary materials.	Behavioral regulation, aggression, and responsiveness.	18	Emotion: 1 (5.6)	My dog becomes aggressive (e.g., growl, snarl, snap, bite) when excited
	Riemer et al. (2013)	18-item DIAS (Wright et al., 2011) description aligned with original authors, but no items reported alongside the article.	Behavioral regulation, aggression and response to novelty, and responsiveness.	18	Literal behavior- Behavioral Confirmation: 0 (0)	
	Wright et al. (2011)	Authors initially developed the Dog Personality Questionnaire (29 scale items and 5 distractor items). Following psychometric analyses, this was shortened to the 18-item Dog Impulsivity Assessment Scale (DIAS). The items from the original 34-item questionnaire, and DIAS, are included in the article.	Behavioral regulation, aggression/ response to novelty, and responsiveness.	18	Literal behavior- Learning: 0 (0)	
Canine Frustration Questionnaire Original	McPeake et al. (2019) Record 19,220	Authors initially developed a 33-item questionnaire assessing frustration. Following psychometric analyses this was shortened to the 21 item Canine Frustration Questionnaire. The authors provide the original 33 items in supplementary materials, and the 21-item version in the article.	General frustration, barrier, frustration/perseverance, unmet expectations, autonomous control, and frustration coping.	33	Literal behavior-Other : 2 (11.1) Other: 0 (0) Temperament: 3 (9.1)	My dog shows extreme physical signs when excited (e.g., drooling, panting, raising hackles, urination, licking lips, widening of eyes) My dog is protective of his/her territory (house, garden, car)

(Continued)



Table 4. (Continued).

Questionnaire	Studies Adopting Questionnaire	Questionnaire Description	Constructs Assessed	Items	Behavior Assessed: Frequency (%)	Example Item
Canine Frustration Questionnaire	McPeake et al. (2021)	21-item Canine Frustration Questionnaire (McPeake et al., 2019) – items included in supplementary materials.	General frustration, barrier Frustration/perseverance, Unmet expectations, Autonomous control, and Frustration coping.	21	Emotion: 2(6.1)	My dog becomes frustrated in a large range of situations
					Literal behavior-Behavioral Confirmation: 1 (3.0)	When on lead my dog will persist in lunging/pulling toward something he/she would like to chase (e.g., a cat, rabbit, bird, toy)
					Literal behavior-Learning: 0 (0)	
					Literal behavior-Other : 11 (33.3)	My dog can lunge and grab at a nearby object (e.g., lead, clothing, toy, bed etc.) if he/she cannot access something wanted
					Other:16 (48.5)	My dog does not like being left out of activities with other dogs
					Temperament: 2 (9.5)	My dog finds it easy to relax and settle when unable to access something he/she wants
					Emotion: 1 (4.8)	My dog becomes frustrated in a large range of situations
					Literal behavior-Behavioral Confirmation: 1 (4.8)	When on lead my dog will persist in pulling/lunging toward something he/she would like to chase
					Literal behavior-Learning: 0 (0.0)	
					Literal behavior-Other : 5 (23.8)	My dog shows increases in certain behaviors (e.g., lip licking, yawning, mounting, full body shake off) if he/she cannot immediately access something they want

(Continued)

Table 4. (Continued).

Questionnaire	Studies Adopting Questionnaire	Questionnaire Description	Constructs Assessed	Items	Behavior Assessed: Frequency (%)	Example Item
Dog ADHD-Rating Scale	Csibra et al. (2022)	Hungarian 13-item Dog-ADHD Rating Scale (Vas et al., 2007), modified to include an “I don’t know” response option. The 13 questions were worded differently as “my dog” for guardians and “this dog” for trainers. Items included in supplementary materials.	Hyperactivity/impulsivity, and inattention.	13	Other: 12 (57.1) Temperament: 11 (84.6)	My dog becomes aggressive (growl, snap or bite) if I try to remove an item he/she had My/ this dog has learning difficulties, because it is careless or because other things easily attract it’s attention
	Wan et al. (2009)	Hungarian and English versions of the 13-item Dog-ADHD Rating Scale (Vas et al., 2007), items included in appendices.	Activity-impulsivity, and inattention.	13	Emotion: 0 (0) Literal behavior-Behavioral Confirmation: 0 (0) Literal behavior-behavior-Learning: 1 (7.7) Literal behavior-Other : 0 (0) Other: 1 (7.7)	My/ this dog leaves from its place when it should stay. My/ this dog is excessive, difficult to control, or if it lunges, it is difficult to hold back.

(Continued)

Table 4. (Continued).

Questionnaire	Studies Adopting Questionnaire	Questionnaire Description	Constructs Assessed	Items	Behavior Assessed: Frequency (%)	Example Item
Canine Cognitive Dysfunction Rating Scale	Marlois et al. (2022)	French 12-item Dog-ADHD-Rating Scale (Lit et al., 2010) – items included in article.	Hyperactivity, inattention, and impulsivity	12	Temperament 12 (100) Emotion 0 (0) Literal behavior – behavior confirmation 0 (0) Literal behaviour – learning 0 (0) Literal behaviour – other 0 (0) Other (0) Temperament: 0(0)	Other things attract attention
	19217 Salvin et al. (2011)	13-item Canine Cognitive Dysfunction rating scale (Salvin et al., 2011) but only 12 items included in article.	Orientation, memory, apathy, impaired olfaction, and locomotion.	13	Emotion: 0(0)	
	Schütt et al. (2015)	Authors developed 13-item Canine Cognitive Dysfunction Rating Scale – items included in article.	Orientation, memory, apathy, impaired olfaction, and locomotion.	13	Emotion: 0(0) Literal behavior- Behavioral Confirmation: 0(0) Literal behavior- Learning: 0(0) Literal behavior-Other : 8 (61.5) Other: 5 (38.5)	How often does your dog pace up and down, walk in circles and/or wander with no direction or purpose? How often does your dog fail to recognize familiar people or pets?

(Continued)

Table 4. (Continued).

Questionnaire	Studies Adopting Questionnaire	Questionnaire Description	Constructs Assessed	Items	Behavior Assessed: Frequency (%)	Example Item
Canine Dementia Scale (CADES): Modified questionnaire drawing from Osella et al. (2007) and Salvin et al. (2011)	Smith and Mills (2025)	13-item Canine Dementia Scale (Salvin et al., 2011), modified using layman's terms – items included in supplementary materials.	Orientation, memory, apathy, impaired olfaction, and locomotion.	13	Temperament 0 (0) Emotion 0 (0) Literal behaviour – behavioral confirmation 0 (0) Literal behaviour – learning 0 (0) Literal behaviour – other 9 (69.2) Other 4 (30.8)	In the last 6 months, how often has your dog walked away while, or avoided, being patted? In the last 6 months, how often has your dog failed to recognize familiar people or pets?
					Temperament: 1 (5.9) Emotion: 1 (5.9) Literal behaviour- Behavioral Confirmation: 0 (0) Literal behaviour- Learning: 0 (0) Literal behaviour-Other : 7 (41.2) Other: 8 (47.1)	Irritable Expression of aggression Eliminate at home at random locations Disorientation in a familiar environment
Canine Dementia Scale (CADES): Modified questionnaire drawing from Osella et al. (2007) and Salvin et al. (2011)	Madari et al. (2015)	Authors developed 17-item Canine Dementia Scale (CADES) – items included in article.	Spatial orientation, social interactions, sleep-wake cycles, and house soiling.	17		

(Continued)

Table 4. (Continued).

Questionnaire	Studies Adopting Questionnaire	Questionnaire Description	Constructs Assessed	Items	Behavior Assessed: Frequency (%)	Example Item
	Smith and Mills (2025)	17-item Canine Dementia Scale (Madari et al., 2015), modified using layman's terms – items included in supplementary materials.	Spatial orientation, social interactions, sleep-wake cycles, and house soiling.	17	Temperament 1 (5.9) Emotion 0 (0) Literal behaviour – behavioral confirmation 0 (0) Literal behaviour – learning 0 (0) Literal behaviour – other 8 (47.1) Other 8 (47.1)	In the last 6 months, how often would you have described your dog as irritable? In the last 6 months, how often has your dog eliminated in its kennel or sleeping area? In the last 6 months, how often has your dog displayed aggressive behavior (e.g., growling, snarling, biting)?
Unnamed Questionnaire adapted from Golini et al. (2009)	Szabó et al. (2018)	Authors developed 31-item "scale of age-related changes" based on Golini et al. (2009) – items included in article.	Confusion, awareness, spatial orientation, relationships and social behavior, activity changes, irritability, learning and memory, and sleep-wake cycles.	31	Temperament: 2 (6.5)	Is your dog restless/agitated?
					Emotion: 1 (3.2) Literal behaviour – Behavioral Confirmation: 0 (0) Literal behaviour – Learning: 0 (0) Literal behaviour – other: 10 (32.3) Other: 18 (58.1)	Is your dog anxious when it cannot be with you? Is your dog recently experiencing restless sleep/waking at nights? Is your dog recently showing decreased interest in petting/contact?

(Continued)

Table 4. (Continued).

Questionnaire	Studies Adopting Questionnaire	Questionnaire Description	Constructs Assessed	Items	Behavior Assessed: Frequency (%)	Example Item
Adapted from the Temperament Assessment Survey developed by Goodloe and Borchelt (1998)	Craig et al. (2017)	Authors developed 26-item questionnaire based on Goodloe and Borchelt's (1998) temperament assessment survey. Additional questions about bite severity were taken from the intake form of a dog trainer. Items included in supplementary materials.	Aggression to family members, aggression to strangers, aggression to unfamiliar dogs, biting, fear and avoidance, and friendliness.	26 items from Goodloe & Borchelt, plus additional items from a trainer intake form about bite history (37 total).	Temperament: 1 (2.7)	Is gentle with small children
Lincoln Canine Anxiety Scale	Mills et al. (2020)	Authors developed 16-item Lincoln Canine Anxiety Scale – items included in article.	Anxiety	16	Emotion: 3 (8.1) Literal Behaviour – Behavioral Confirmation: 1 (2.7) Literal behaviour – Learning: 0 (0) Literal behaviour – Other: 28 (75.7) Other: 4 (10.8) Temperament: 0 (0) Emotion: 0 (0) Literal behavior- Behavioral Confirmation: 1 (6.3) Literal behavior- Learning: 0 (0)	Avoids or is fearful of unfamiliar children Steals toys, clothes, or other objects and guards them in a threatening manner Growls and/or bares teeth when away from home when an unfamiliar dog approaches Initiates fights with unfamiliar male dogs Vigilance/scanning of the environment

(Continued)

Table 4. (Continued).

Questionnaire	Studies Adopting Questionnaire	Questionnaire Description	Constructs Assessed	Items	Behavior Assessed: Frequency (%)	Example Item
Anxiety and Impulsivity Scale	King et al. (2016)	Authors developed 21-item questionnaire – items included in article.	Fear/anxiety and impulsivity/arousal	21	Literal behavior-Other : 14 (87.5) Other: 1 (6.3) Temperament: 5 (23.8) Emotion: 0 (0) Literal behavior-Behavioral Confirmation: 1 (4.8) Literal behavior-Learning: 4 (19.0) Literal behavior-Other : 11 (52.4) Other: 0 (0) Temperament: 14(58.3)	Vomiting, defecating, urinating, and/or diarrhoea Destructiveness (furniture, doors, carpets) Is typically fearful. Chases after small animals. Can maintain a “sit-stay” calmly without agitation. Whines or barks when left alone at home. My dog has good manners
Unnamed Questionnaire modified from Bennett and Rohlf (2007)	Stevens et al. (2021)	24-item questionnaire by Bennett and Rohlf (2007) – items included in supplementary materials.	Disobedience, aggression, nervousness, destructiveness, and excitability.	24	Emotion: 0 (0) Literal behavior-Behavioral Confirmation: 1 (4.2)	My dog chews things he/she shouldn't

(Continued)

Table 4. (Continued).

Questionnaire	Studies Adopting Questionnaire	Questionnaire Description	Constructs Assessed	Items	Behavior Assessed: Frequency (%)	Example Item
Unnamed Questionnaire modified from Hiby et al. (2004)	Stevens et al. (2021)	21-item questionnaire, modified from Hiby et al. (2004) – items included in supplementary materials.	Obedience, and behavioural problems.	21	Literal behavior-Learning: 6 (25.0)	My dog will sit on command
					Literal behavior-Other : 3 (12.5) Other: 0 (0.0) Temperament: 0 (0.0)	My dog shows inappropriate sexual behaviors
Unwanted Behaviour Questionnaire	Salonen et al. (2021)	Authors developed the Unwanted Behavior Questionnaire. The impulsivity/inattention section was based on Vas et al. (2007). Other sections of the questionnaire were based on Salonen et al. (2021). The 395 questionnaire items were included in supplementary materials.	Unwanted or problematic behaviors, including noise sensitivity, fearfulness, separation-related behavior, fear of surfaces and heights, aggression, impulsivity/inattention, and compulsive behavior.	395	Emotion: 4 (40.0) Literal behavior-Behavioral Confirmation: 3 (15.0) Literal behavior-Learning: 4 (20.0) Literal behavior-Other : 6 (30.0) Other: 3 (15.0) Temperament: 4 (1.0)	Fear in many situations Eating non-foodstuffs Sitting on command Growling at dogs Toilet training My dog is curious and enthusiastic

(Continued)

Table 4. (Continued).

Questionnaire	Studies Adopting Questionnaire	Questionnaire Description	Constructs Assessed	Items	Behavior Assessed: Frequency (%)	Example Item
Unnamed	McGuire et al. (2020)	5 items from the C-BARQ (the authors cite Hsu & Serpell, 2003) to assess aggression across 5 different scenarios. An additional 3 items, adapted from Marder et al. (2013), assessed whether adopters considered their dog to be possessive in guarding food, toys, or space. Items included in the article.	Resource Guarding	8	Emotion: 13 (3.3)	Fear toward strange dogs
					Literal behavior-Behavioral Confirmation: 0 (0.0)	
					Literal behavior-Learning: 1 (0.3)	My dog leaves from her/his place when she/he should stay
					Literal behavior-Other : 120 (30.4)	My dog's tail is low/between legs
					Other: 257 (65.1)	In your opinion, is your dog afraid of thunder?
					Temperament: 0 (0.0)	
					Emotion: 0 (0.0)	
					Literal behavior-Behavioral Confirmation: 0 (0.0)	
					Literal behavior-Learning: 0 (0.0)	

(Continued)

Table 4. (Continued).

Questionnaire	Studies Adopting Questionnaire	Questionnaire Description	Constructs Assessed	Items	Behavior Assessed: Frequency (%)	Example Item
Dog ADHD and Functionality Rating Scale	Csibra, Bunford, et al. (2024)	Authors created 28-item Dog ADHD and Functionality Rating Scale, which they reduced to 17 items (included in article).	Inattention, hyperactivity, and impulsivity	17	Literal behavior-Other : 8 (100)	Rank behavioral responses where: 0 = no visible signs of aggression 1 = growling or snarling 2 = snapping or biting Retrieved items or food taken by the dog Q7 - If yes to Q6, regard your dog's guarding behavior as a major concern?
					Temperament 17 (100) Emotion 0 (0) Literal behaviour – behavioral confirmation 0 (0) Literal behaviour – learning 0 (0) Literal behaviour – other 0 (0) Other 0 (0)	Has difficulties with learning, because he/she does not pay attention
	Csibra, Reicher, et al. (2024) Csibra et al. (2025)	17-item Dog ADHD and Functionality Rating Scale (Csibra, Bunford, et al., 2024). The items were not provided. 17-item Dog ADHD and Functionality Rating Scale (Csibra, Bunford, et al., 2024). The items were not provided.	Inattention, hyperactivity, and impulsivity Inattention, hyperactivity, and impulsivity	17 17		

(Continued)

Table 4. (Continued).

Questionnaire	Studies Adopting Questionnaire	Questionnaire Description	Constructs Assessed	Items	Behavior Assessed: Frequency (%)	Example Item
Unnamed	Mackay et al. (2023)	Authors created 8-item questionnaire to assess prevalence of problem behaviors. Items included in supplementary materials.	Aggressive to dogs, fear, separation-related behaviors, hyperactivity/overexcitement, aggressive to people, repetitive behavior, other behavioral problems	8	Temperament 1 (12.5) Emotion 3 (37.5) Literal behaviour – behavioral confirmation 0 (0) Literal behaviour – learning 0 (0) Literal behaviour – other 0 (0) Other 3 (37.5)	General hyperactivity/overexcitement Fears or phobias (e.g., noise reactivity/fear, fear of car travel) Separation-related behavior problem
Dog Television Viewing Scale	Montgomery et al. (2025)	Authors created 16-item questionnaire to assess dogs' interactions with the television. Items included in article.	Following objects on the television, responding to objects on television, and responding to noise on television	16	Temperament 0 (0) Emotion 0 (0) Literal behaviour – behavioral confirmation 0 (0) Literal behaviour – learning 0 (0) Literal behaviour – other 16 (100) Other 0 (0)	For the following auditory items, how often does your dog respond to these types of noises; responding includes tail-wagging, ear movements, barking, and whining?

(Continued)

Table 4. (Continued).

Questionnaire	Studies Adopting Questionnaire	Questionnaire Description	Constructs Assessed	Items	Behavior Assessed: Frequency (%)	Example Item
Big Dog Reward and Motivation Questionnaire	Mazzini et al. (2025)	Authors created 19-item questionnaire to assess behavioral addictions. Items included in article.	Salience, mood modification, craving, self-control, tolerance, withdrawal symptoms, and risk of relapse	19	Temperament 13 (68.4) Emotion 1 (5.3) Literal behaviour – behavioral confirmation 0 (0) Literal behaviour – learning 1 (5.3) Other 3 (15.8)	My dog is obsessed with playing ball/fetching objects When my dog is prevented from accessing his/her toy, he/she becomes stressed and agitated With a ball/toy as a reward, I can recall my dog from any situation My dog appears not to feel pain or discomfort while he/she is playing with the ball/toy
Unnamed	Richard et al. (2025)	Authors created 56-item questionnaire to assess behavior problems. The final version was reduced to 20 items, which are included in article.	Fear, impulsivity, stability, and absence-related problems	20	Temperament 2 (10) Emotion 1 (5) Literal behaviour – behavioral confirmation 0 (0) Literal behaviour – learning 0 (0) Literal behaviour – other 10 (50) Other 7 (35)	My dog is playful and gets excited easily, but can easily stop when we ask it to My dog is afraid of toys My dog chases its tail My dog feels safe in unfamiliar place with stimuli, it explores quietly and lies down after few minutes

(Continued)

Table 4. (Continued).

Questionnaire	Studies Adopting Questionnaire	Questionnaire Description	Constructs Assessed	Items	Behavior Assessed: Frequency (%)	Example Item
Age-Related Cognitive and Affective Disorders Scale	Smith and Mills (2025)	Age-Related Cognitive and Affective Disorders scale (Pageat, 1998) modified using layman's terms (items included in supplementary materials).	Eating habits, drinking habits, grooming habits, toileting behavior, sleep behavior, response to learned behaviors, stress responses, learned social behavior, and adaptability	34	Temperament 6 (17.6) Emotion 0 (0) Literal behaviour – behavioral confirmation 1 (2.9) Literal behaviour – learning 0 (0) Literal behaviour – other 23 (67.9) Other 4 (28.6)	Restless at bedtime Steals and protects/retains stolen objects Defecates and urinates in small, scattered amounts Excessive thirst
Dog Rank Assessment Questionnaire	Vékony and Pongrácz (2024)	8-item Dog Rank Assessment Questionnaire (Vékony et al., 2022) to assess dominance and rank-related behaviors. Items not provided.	Ranks/dominance in barking, licking, eating, fighting, rewards, walking, resting place, and defense.	8	Temperament 0 (0) Emotion 0 (0) Literal behaviour – behavioral confirmation 0 (0) Literal behaviour – learning 0 (0) Literal behaviour – other 8 (100) Other 0 (0)	Which dog goes in the front during walks?

Below presents the modified versions of the C-BARQ

(Continued)

Table 4. (Continued).

Questionnaire	Studies Adopting Questionnaire	Questionnaire Description	Constructs Assessed	Items	Behavior Assessed: Frequency (%)	Example Item
Italian versions of the C-BARQ	Dalla Villa et al. (2017)	Authors translated 8/11 C-BARQ factors identified by Hsu and Serpell (2003) into Italian, which correspond to the fear/anxiety and aggression-related behaviors assessed by the SAB test (54 items – included in appendix). Authors do not report including any description or examples of behaviors within the questionnaire instructions.	Trainability, stranger-directed aggression, stranger-directed fear, owner-directed aggression, dog-directed aggression/fear, familiar dog aggression, attachment or attention-seeking, and touch sensitivity.	54	Temperament: 0 (0.0)	
					Emotion: 40 (74.1) Literal behavior-Behavioral Confirmation: 0 (0.0) Literal behavior-Learning: 2 (3.7)	Dog acts anxious or fearful toward a familiar dog in the household.
					Literal behavior-Other : 3 (5.6) Other: 9 (16.7)	Dog recalls immediately while off leash. Dog tends to follow a member of household from room to room about the house. Dog becomes agitated when a member of the household shows affection for another person.

(Continued)

Table 4. (Continued).

Questionnaire	Studies Adopting Questionnaire	Questionnaire Description	Constructs Assessed	Items	Behavior Assessed: Frequency (%)	Example Item
	Broseghini et al. (2023)	Authors translated the 100-item C-BARQ by Duffy and Serpell (2012). This resulted in a 62-item version which was included in the paper. The authors do not report including any description or examples of behaviors within the questionnaire instructions.	Stranger-directed aggression/fear, dog-directed fear, owner-directed aggression, separation-related behavior, chasing, dog-directed aggression, attachment/attention seeking, trainability, energy level, nonsocial fear, excitability, elimination problems, and touch sensitivity	62	Temperament 2 (3.2) Emotion 35 (56.5) Literal behaviour – behavioral confirmation 3 (1.6) Literal behaviour – learning 1 (1.6) Literal behaviour – other 14 (22.6) Other 7 (11.3) Temperament: 0 (0.0)	Dog is active, energetic, always on the go Dog acts anxious or fearful in response to sudden or loud noises (e.g., vacuum cleaner, car backfire, road drills, objective being dropped, etc.) Dog chases or would chase birds given the opportunity Dog returns immediately when called while off leash Dog is slow to learn new tricks or tasks
Dutch version of the C-BARQ	van den Berg et al. (2006)	76-item version of the C-BARQ, translated into Dutch was used, and the authors cite Hsu and Serpell (2003) and personal communication with Serpell as their source. The authors report that they provided a description of behaviors, such as those associated with aggression, within the questionnaire instructions, and include an example.	Training and obedience, aggression, fear and anxiety, separation-related behavior, excitability, attachment and attention seeking, and miscellaneous.	76	Emotion: 6 (7.9) Literal behavior-behavioral Confirmation: 3 (3.9) Literal behavior-learning: 0 (0.0)	Dog overreacts or is excitable when doorbell rings. Dog chases cats (given the chance).

(Continued)

Table 4. (Continued).

Questionnaire	Studies Adopting Questionnaire	Questionnaire Description	Constructs Assessed	Items	Behavior Assessed: Frequency (%)	Example Item
C-BARQ Dutch Shortform	van den Berg et al. (2006)	Questionnaires 2 and 3 were a new shortened version of the C-BARQ, and the authors state that each question addresses one of each of Hsu and Serpell's (2003) factors. Survey 2 asked about the behavior of the dog in the months prior to its first participation in the project, while survey 3 asked about the behavior of the dog in the recent past.	Each question addressed one of each of Hsu and Serpell's (2003) factors. Authors did not state exact factors.	11	Literal behavior-Other : 15 (19.7) Other: 52 (68.4) Temperament: 0 (0.0) Emotion: 0 (0.0) Literal behavior-Behavioral Confirmation: 0 (0.0) Literal behavior-Learning: 0 (0.0) Literal behavior-Other : 0 (0.0)	Dog becomes agitated (whines, jumps up, tries to intervene) when you (or others) show affection for another person. Dog acts aggressively toward unfamiliar persons visiting your home (the authors gave the following description to participants: Typical signs of moderate aggression in dogs include barking, growling, and baring teeth. More serious aggression generally involves snapping, lunging, biting, or attempting to bite.)

(Continued)

Table 4. (Continued).

Questionnaire	Studies Adopting Questionnaire	Questionnaire Description	Constructs Assessed	Items	Behavior Assessed: Frequency (%)	Example Item
					Other: 11 (100)	Most dogs are strongly attached to their owner. Some demand a great deal of attention. For instance: - Does your dog display strong attachment for 1 particular household member? - Does the dog tend to follow household members about the house? - Does the dog seek attention when you or a family member sit somewhere (sit close to you; nudge, nuzzle or paw you)? - Does your dog become agitated when you show affection for another person or animal (whining, jumping up, trying to intervene)? It is possible that your dog displays strong attachment for one particular member of the household, while it does not follow people about the house. In this case, please try to choose the answer that describes your dog the best. By checking the appropriate box, please indicate how attached your dog was at that time and how often it sought attention.

(Continued)

Table 4. (Continued).

Questionnaire	Studies Adopting Questionnaire	Questionnaire Description	Constructs Assessed	Items	Behavior Assessed: Frequency (%)	Example Item
78-item C-BARQ	Clay et al. (2020)	Authors report using the 102-item question format of the C-BARQ. The authors do not report providing any descriptions of examples of behaviors within the questionnaire instructions. Duffy and Serpell (2012) are cited, who reported the 100-item C-BARQ. The authors append a 78-item version of the C-BARQ in the appendices.	Dog rivalry, dog-directed aggression, dog-directed fear, separation-related behavior, attachment or attention-seeking behavior, trainability, chasing, excitability, touch sensitivity, and energy.	78	Temperament: 2 (2.6)	Dog is playful, puppyish, boisterous
					Emotion: 45 (57.7) Literal behavior-Behavioral Confirmation: 3 (3.8) Literal behavior-Learning: 1 (1.3) Literal behavior-Other : 12 (15.4) Other: 15 (19.2)	Dog acts anxious or fearful when examined/treated by a veterinarian. Dog chases or would chase birds if given the opportunity. Dog begs persistently for food when people are eating. Dog tends to nudge, nuzzle, or paw you (or others) for attention when you are sitting down. Dog is slow to learn new tricks or tasks.

(Continued)

Table 4. (Continued).

Questionnaire	Studies Adopting Questionnaire	Questionnaire Description	Constructs Assessed	Items	Behavior Assessed: Frequency (%)	Example Item
Thai version of C-BARQ	Boonhoh et al. (2023)	Authors report translating the 78-item version of the C-BARQ into Thai. Following psychometric analyses, the final Thai version of the C-BARQ includes 63 items, which are included in the article. The authors cite Duffy and Serpell (2012) as their source, who reported the 100-item C-BARQ. The authors do not report providing any descriptions of examples of behaviors within the questionnaire instructions.	Stranger-directed aggression, unfamiliar dog/human-directed fear, owner-directed aggression, excitability, dog rivalry, attachment and attention-seeking, nonsocial fear and touch sensitivity, chasing, energy, trainability, and dog-directed aggression.	63	Temperament 2 (3.3) Emotion 43 (71.7) Literal behaviour – behavioural confirmation 4 (6.7) Literal behaviour – learning 0 (0) Literal behaviour – other 6 (10) Other 5 (8.3)	Will “fetch” or attempt to fetch sticks, balls, or objects. Whining (question refers to separation-related behaviors). Displays a strong attachment for one particular member of the household. Playful, puppyish, boisterous Excitability when doorbell rings Chases or would chase cats, squirrels, or other animals entering your yard Tends to sit close to, or in contact with, you (or others) when you are sitting down Displays a strong attachment for one particular member of the household

(Continued)

Table 4. (Continued).

Questionnaire	Studies Adopting Questionnaire	Questionnaire Description	Constructs Assessed	Items	Behavior Assessed: Frequency (%)	Example Item
Taiwanese version of C-BARQ	Hsu and Sun (2010)	Authors report translating the 103-item version of the C-BARQ into Chinese. Following psychometric analyses, the final Chinese version of the C-BARQ includes 61 items (included in the article). The authors report that they provided descriptions of behaviors within the questionnaire instructions and provide examples of these descriptions in the paper. The authors state that the 103-item version of C-BARQ is revised from the PennBARQ by Hsu and Serpell (2003).	Stranger-directed aggression, owner-directed aggression, dog-directed aggression, social fear, nonsocial fear, separation-related behavior, attachment or attention-seeking behavior, trainability, excitability, and pain sensitivity.	61	Temperament: 0 (0.0)	
					Emotion: 6 (9.8)	Dog overreacts or is excitable when a household member returns after a brief absence.
					Literal behavior-Behavioral Confirmation: 0 (0.0)	
					Literal behavior-Learning: 1 (1.6)	Dog returns immediately when called while off leash.
					Literal behavior-Other : 11 (18)	Dog displays loss of appetite when left or about to be left on its own.

(Continued)

Table 4. (Continued).

Questionnaire	Studies Adopting Questionnaire	Questionnaire Description	Constructs Assessed	Items	Behavior Assessed: Frequency (%)	Example Item
Shortened version of the C-BARQ	von Rentzell et al. (2022)	Authors state using shortened version of the C-BARQ with 31 questionnaire items in the appendix. However, the authors provide 33 C-BARQ questionnaire items in a separate appendix. The authors provide descriptions and examples of the behaviors in the questionnaire instructions, included in the appendices. The authors cite Hsu and Serpell (2003) as their source, who reported the 68-item Penn-BARQ.	Excitability, aggression, fear and anxiety, separation-related behavior, attachment and attention-seeking, training and obedience, and miscellaneous problems.	33	Other: 43 (70.5) Temperament: 2 (6.1)	Dog acts anxiously or fearfully when barked, growled or lunged at by an unfamiliar dog (the authors gave the following description to participants: signs of moderate fear include avoiding eye contact, avoidance of the feared object, crouching or cringing with tail lowered or tucked between legs, whimpering or whining, freezing and shaking or trembling, while extreme fear is characterized by exaggerated cowering and/or vigorous attempts to escape, retreat or hide from the feared object, person or situation). Active, energetic, always on the go.
					Emotion: 0 (0.0) Literal behavior-behavioral Behavioral Confirmation: 2 (4.8)	Chases or would chase birds given the chance.

(Continued)

Table 4. (Continued).

Questionnaire	Studies Adopting Questionnaire	Questionnaire Description	Constructs Assessed	Items	Behavior Assessed: Frequency (%)	Example Item
	Below presents the original versions of the C-BARQ	Hsu and Serpell (2003) Authors created a 152-item questionnaire, which is shortened to 68 items following psychometric analyses. The final items are available in the paper. The authors provide descriptions and examples of the behaviors in the questionnaire instructions.	Stranger-directed aggression, owner-directed aggression, stranger-directed fear, nonsocial fear, dog-directed fear or aggression, separation-related behavior, attachment or attention-seeking behavior, trainability, chasing, excitability, and pain sensitivity	68	Literal behavior-Learning: 0 (0.0)	Restlessness/agitation/pacing (question refers to separation-related behaviors).
					Literal behavior-Other : 13 (31.0) Other: 24 (57.1)	Excitability just before being taken for a walk (the authors include the following description for participants: 0 = calm: little or no special reaction, 4 = over-reacts, hard to calm down).
					Temperament 0 (0)	Acts aggressively toward cats, squirrels, and other animals
					Emotion 4 (5.9) Literal behaviour – behavioural confirmation 3 (4.4) Literal behaviour – learning 1 (1.5) Literal behaviour – other 11 (16.2) Other 49 (72.1)	entering its yard Chases birds if given the chance Returns immediately when called while off leash Tends to follow a member of household from room to room about the house Typical signs of moderate aggression in dogs include barking, growling, and baring teeth, while more serious aggression generally involves snapping, lunging, biting, or attempting to bite – Dog acts aggressively toward unfamiliar persons visiting the home

(Continued)

Table 4. (Continued).

Questionnaire	Studies Adopting Questionnaire	Questionnaire Description	Constructs Assessed	Items	Behavior Assessed: Frequency (%)	Example Item
100-item C-BARQ	Duffy and Serpell (2012)	100-item version of the C-BARQ, with 78 items condensed into 14 subscales, plus 22 miscellaneous items. The authors provide descriptions and examples of the behaviors in the questionnaire instructions. Items included in the supplementary materials. The authors cite Hsu and Serpell (2003) as their source, who reported the 68-item Penn-BARQ.	Trainability, stranger-directed aggression, owner-directed aggression, dog rivalry, stranger-directed fear, nonsocial fear, dog-directed aggression, dog-directed fear, touch sensitivity, separation-related behaviors, excitability, attachment/attention-seeking, chasing, and miscellaneous	100	Temperament 3 (3) Emotion 1 (1) Literal behaviour – behavioral confirmation 4 (4) Literal behaviour – learning 1 (1) Literal behaviour – other 27 (27) Other 64 (64)	Hyperactive, restless, has trouble settling down Nervous or frightened on the stairs Rolls in animal droppings or other smelly substances When off the leash, returns immediately when called Excessive salivation (in relation to separation-related behavior) Some dogs show relatively little reaction to sudden or potentially exciting events and disturbances in their environment, while others become highly excited at the slightest novelty. Signs of mild to moderate excitability include increased alertness, movement toward the source of novelty, and brief episodes of barking. Extreme excitability is characterized by a general tendency to over-react. The excitable dog barks or yelps hysterically at the slightest disturbance, rushes toward and around any source of excitement, and is difficult to calm down – Excitability when visitors arrive at your home
	Wilkins et al. (2024)	100-item version of the C-BARQ. Authors do not include the questionnaire items in the article but do describe the C-BARQ in alignment with Duffy and Serpell (2012), who are cited as their source. The authors do not report providing any descriptions of examples of behaviors within the questionnaire instructions.	Stranger-directed aggression, owner-directed aggression, stranger-directed fear, nonsocial fear, dog-directed aggression, dog-directed fear, dog rivalry, separation-related behavior, attachment and attention-seeking behavior, trainability, chasing, excitability, touch sensitivity, energy level, and miscellaneous	100		

(Continued)

Table 4. (Continued).

Questionnaire	Studies Adopting Questionnaire	Questionnaire Description	Constructs Assessed	Items	Behavior Assessed: Frequency (%)	Example Item
42-item Mini C-BARQ	Duffy et al. (2014)	Authors created a shortened version from the 100-item C-BARQ, citing Hsu and Serpell (2003) and Duffy and Serpell (2012) as their sources. The 42 items of the shortened version of the C-BARQ, titled the mini C-BARQ, are available in the supplementary materials. The authors provided descriptions of behaviors within the questionnaire instructions.	Excitability, attachment/attention-seeking, trainability, chasing, energy, stranger-directed aggression, dog-directed fear, touch sensitivity, separation-related problems, owner-directed aggression, dog rivalry, and miscellaneous	42	Temperament: 3 (7.1)	Hyperactive, restless, has trouble settling down.
	Wauthier and Williams (2018)	Authors used the mini C-BARQ, which has 42 items, and cite Duffy et al. (2014) as their source. The authors do not include the items in the paper but do describe the mini C-BARQ in alignment with Duffy et al. (2014). The authors report that they provided descriptions of behaviors within the questionnaire instructions, although they do not provide any examples of these descriptions in the paper.	Stranger-directed aggression, owner-directed aggression, dog rivalry, dog-directed aggression, stranger-directed aggression, nonsocial fear, dog-directed fear, touch sensitivity, separation-related behavior, excitability, attachment/attention seeking, training difficulty, chasing, and energy levels.		Emotion: 21 (50.0)	Aggression when approached directly by an unfamiliar person while being walked/exercised on a leash.
	Wilkins et al. (2024)	42 item Mini C-BARQ (citing Duffy et al., 2014 as their source). No items included in article, but do describe the mini C-BARQ in alignment with Duffy et al. (2014). The authors do not report providing any descriptions of examples of behaviors within the questionnaire instructions.			Literal behavior-Behavioral Confirmation: 2 (4.8)	Chases, or would chase squirrels, rabbits etc, given the chance.
					Literal behavior-Learning: 0 (0.0)	
					Literal behavior-Other : 13 (31.0)	Urinates against objects/furnishings in your home.
					Other: 3 (7.1)	Obeys a sit command immediately.

Table 5. Percentages and standard deviations for questionnaire groupings.

	Group 1: CBARQ Modified (787)	Group 2: CBARQ (210)	Group 3: Other (831)
Coding Label	% (Standard Deviation)	% (Standard Deviation)	% (Standard Deviation)
<i>Temperament – response to a(n hypothetical) stimuli</i>	2.5 (2.5)	3.4 (3.6)	25.0 (35.3)
<i>Emotion – specific response to a stimulus</i>	40.5 (29.7)	2.3 (3.2)	4.4 (8.4)
<i>Literal behavior linked to behavior confirmation</i>	3.5 (2.4)	4.4 (0.4)	1.8 (3.4)
<i>Literal behavior linked to learning</i>	1.2 (1.3)	0.8 (0.8)	3.2 (7.3)
<i>Literal behavior other</i>	16.9 (9.7)	24.7 (7.7)	39.3 (32.0)
<i>Other</i>	35.5 (34.8)	64.4 (7.5)	26.3 (27.1)
Total	100.0	100.0	100.0

when left alone”). Questionnaire items were coded as “other” when the question referenced reflected temperament or emotion, but definitions or examples were given that referenced literal behaviors, thereby reflecting a mixed construct. The “other” category was also used if they did not fit the previous coding categories, resulting in 35.5% being categorized as “other.”

The standardized C-BARQ group contained 210 items coded over the three questionnaires. Of these, 3.4% assessed temperament (e.g., “Playful, puppyish, boisterous”), 2.3% assessed emotion (e.g., “Dog acts anxious or fearful When examined by a veterinarian?”) and 29.9% assessed literal behaviors. Within the literal behavior category, 4.4% reflected behavioral confirmation (e.g., “Chases or would chase birds if given the opportunity”), 0.8% reflected learnt behavior (e.g., “When off the leash, returns immediately when called.”), and 24.7% reflected other behavior such as communication signals or developmental factors like teething (e.g., “Chewing/scratching at doors, floor, windows, curtains, etc.”). However, 64.4% of items were categorized as “other,” encompassing behaviors that were uncategorizable or reflected mixed constructs.

The “other” questionnaires group contained 747 items. Of these, 25.0% assessed temperament (e.g., “Is gentle with small children”), 4.4% assessed emotion (e.g., “Is your dog anxious when it cannot be with you?”) and 44.3% reflected literal behaviors. Within the literal behavior category, 1.8% reflected behavioral confirmation (e.g., “When on lead my dog will persist in pulling/lunging towards something he/she would like to chase”), 3.2% reflected learnt behavior (e.g., “My/ this dog leaves from its place when it should stay.”), and 39.3% reflected other behavior such as communication signals (e.g., “Whines or barks when left alone at home.”). However, 26.3% were categorized as “other,” encompassing behaviors that were uncategorizable or reflected mixed constructs.

Group comparisons

There was a clear difference in items assessed as characterizing behavior as emotion over literal behavior between the modified and standardized C-BARQ groups. For example, whilst only 2.3% were assigned to emotions in the standardized group, 40.5% of items were assessed as emotion for the modified C-BARQ group. This discrepancy may relate to the formatting of questions. For example, for six questionnaires (Boonhoh et al., 2023; Broseghini et al., 2023; Canejo-Teixeira et al., 2018; Dalla Villa et al., 2017 Questionnaire 1; Mondal et al., 2023; Wauthier & Williams, 2018) it was unclear whether literal dog behavior descriptors were provided for the questionnaires included in the modified C-BARQ group. Rather, items were seemingly presented as broader statements such as “My dog shows . . . Fear towards strange dogs.” Conversely, within the standardized C-BARQ group such items provided further descriptors, such as “Cowers, Retreats, Hides.” Whilst some of these descriptors can be labeled as literal behavior such as communication (e.g., “Snaps,” “Cowers”) others are dependent on human interpretation (e.g., “over-reacts,” “hard to calm

down”). Thus, the variable use of such descriptors can help explain the clear differences in how the two groups characterize canine behavior.

Additionally, across all three groups, many items were coded as “Other” (35.5%, 64.4%, 26.3% respectively), highlighting the cumulative or multi-faceted nature of some items. For example, rather than include specific descriptions of canine behavior, some items rely on human inference on the likes and dislikes of their companion (e.g., ‘My dog does not like being left out of activities with other dogs’), or force synonymy between emotion and behavior (e.g., “My dog becomes aggressive [growl, snap or bite] if I try to remove an item he/she had”). Other items characterized behavior based upon the capability of the human in managing their dog (e.g., “My/this dog is excessive, difficult to control, or if it lunges, it is difficult to hold back”) or recognizing changes in behavior (e.g., “Is your dog recently showing decreased interest in petting/contact?”). The standardized C-BARQ, often provided very detailed outlines prior to the presentation of items. However, when considering the characterization of dog behavior within this, it is evident that temperament (“excitable”), inference (“problem behaviours”), literal behavior (“barks or yelps”) as well as other facets, such as human capability (e.g., the guardian’s ability to manage the behavior), are being drawn upon. This inclusive framing makes it difficult to determine the exact facet of canine behavior being assessed resulting in the higher percentage of items being assigned as “Other.”

The “other” questionnaires group included 44.3% of items assessing literal behavior, in comparison to 21.6% for the modified C-BARQ group, and 29.9% for the standardized C-BARQ group. Such behaviors included behavior deemed to be part of dog confirmation such as the predatory sequence (e.g., “Chases after small animals”), learnt behaviors (e.g., “My dog will sit on command”) or other behaviors such as communication signals (e.g., “My dog’s tail is low/between legs”). While conceptually the behaviors could be inferred as differing based on context, each of these items presents the literal behavior exhibited, or to be exhibited, by the dog. When comparing the “other” questionnaires group with the two C-BARQ-related groups, such a difference in literal items can be partly explained by the mixed nature of the descriptors provided to respondents (as reported above). This lack of distinctness renders items uncategorizable, even when literal behaviors are seemingly assessed. [Table 5](#) presents a breakdown by behavior categorization of the average percentage and the standard deviation of items for each group.

Discussion

This systematic review aimed to examine how canine behavioral questionnaires characterize dog behavior. Specifically, it sought to identify current questionnaires and evaluate how behavior was defined within them. Analysis revealed a range of questionnaires employing mixed definitions, often encompassing cognitive processes, emotionality, temperament, and personality judgments rather than strictly observable behavior. These inconsistencies highlight a fundamental challenge: without clear and consistent definitions, researchers’ ability to make accurate and valid observations of dog behavior is compromised.

Current canine behaviour questionnaires

Studies included a range of behavior-related questionnaires, including behaviors associated with ADHD, impulsivity or frustration (Csibra et al., 2022, 2025; Csibra, Bunford, et al., 2024; Csibra, Reicher, et al., 2024; Fadel et al., 2016; McPeake et al., 2019, McPeake et al. 2021; Riemer et al., 2014; Stevens et al., 2021; Wan et al., 2009; Wright et al., 2011), cognitive dysfunction (Madari et al., 2015; Salvin et al., 2011; Schütt et al., 2015; Smith & Mills, 2025; Szabó et al., 2018) or behaviors associated with emotional states such as anxiety and/or fear (Craig et al., 2017; King et al., 2016; Mills et al., 2020; Salonen et al., 2021). Other than one study (Schütt et al., 2015), studies using non-C-BARQ-related, validated questionnaires clearly appended items included within their surveys. Such clear reporting was also evident within the studies using unnamed questionnaires (Craig et al., 2017; King

et al., 2016; McGuire et al., 2020; Salonen et al., 2021; Stevens et al., 2021; Szabó et al., 2018). Thirteen questionnaires (Boonhoh et al., 2023; Broseghini et al., 2023; Canejo-Teixeira et al., 2018; Clay et al., 2020; Dalla Villa et al., 2017; Hsu & Sun, 2010; McGuire et al., 2020; Mondal et al., 2023; van den Berg et al., 2006; von Rentzell et al., 2022; Wauthier & Williams, 2018; Wilkins et al., 2024) included some variation or modification of the C-BARQ (Duffy & Serpell, 2012; Duffy et al., 2008; Hsu & Serpell, 2003).

In contrast to other questionnaires, this review highlighted a number of methodological flaws within the reporting of the C-BARQ, supporting previous concerns raised by the instrument's authors (Duffy & Serpell, 2012). Specifically, many studies modified or omitted questions from the original questionnaire or cited incorrect versions of the instrument used. This resulted in studies being excluded due to a lack of clarity around the exact questionnaire items used. While some included studies were validation studies (Boonhoh et al., 2023; Broseghini et al., 2023; Canejo-Teixeira et al., 2018; Dalla Villa et al., 2017; Hsu & Sun, 2010; van den Berg et al., 2006), assessing the suitability or validity of an alternative language version of the C-BARQ, others modified the existing C-BARQ versions for the aims of their work. While these latter studies provided supplementary materials regarding the questionnaire and its use, data extraction often highlighted inconsistencies between items reported within supplementary materials, and descriptions provided within the article itself (Clay et al., 2020; von Rentzell et al., 2022; Wauthier & Williams, 2018). As such, it is not always clear how the authors are using this questionnaire, and, subsequently, how they are characterizing the behavior they are examining. Such misapplication, inconsistent use of terminology and lack of clarity around the exact items used within studies, compromises the validity of such an instrument (Cobern & Adams, 2020), as well as the inferences made regarding the behaviors reportedly assessed (Brady et al., 2018). Thus, it is important that researchers ensure that questionnaire items are clearly outlined, in detail, for more accurate inferences on canine behavior to be assessed.

Behavior characterisation

This review highlighted a lack of consistency in how canine behavior is characterized. Definitions of behavior in the literature are often vague and contradictory (Levitis et al., 2009), further complicated by the conflation of mechanistic (e.g., jumping, chasing) and explanatory (e.g., cognition, ontogenetic processes) accounts, which can lead to an integrated but confusing understanding. As a result, behavior is frequently represented as a mix of physiological activity, environmental context, and human interpretation. While some questionnaire items capture observable behaviors directly (e.g., chasing, barking, jumping), many combine these with assumptions about cognition or emotion (e.g., “barks protectively,” “growls aggressively”). Accurate reporting of such items relies on human inference, which is known to be limited even among professionals (Grigg et al., 2021; Kerswell et al., 2013; Mariti et al., 2012) and further complicated by inconsistent guardian expectations (Lord et al., 2020; Stephens-Lewis & Schenke, 2023; Stephens-Lewis et al., 2022). Consequently, items requiring inference may lead to underreporting, overreporting, or misreporting of canine behaviors.

Implications

The inconsistent, vague, and human-dependent characterization and assessment of canine behavior pose several implications for both research and practice. Firstly, given the inconsistent use of behavioral facets within the research design and interpretation, it is difficult to make valid conclusions around canine behavior. Authors should clearly outline what facet of behavior they are aiming to assess, and how they expect to do this (i.e., all items used should be reported within the research). While human inference or guardian-reported perceptions of temperament, personality, and emotion can provide valuable information, it is important to explicitly indicate when these approaches are being employed and to distinguish them from direct observations of behavior.

Secondly, the reliability of assessing canine behavior is questionable due to the multifaceted ways in which behavioral questionnaires characterize behavior. Many questionnaires rely on human inference, requiring respondents to interpret a behavior and assign a label, personality trait, or emotional predisposition to the dog. This contrasts with the simpler approach of identifying literal, observable behaviors (e.g., yawning or lip licking). Such an approach would reduce the need to have an understanding around which behaviors relate to which emotions, traits, or predispositions, and the biases based on human expectations and experience. This is important because we do need human reported and inferred approaches to capturing dog behavior (especially given their ease and economic value). It is important to note, however, that even questionnaires that ask about clearly observable behaviors may exhibit low to moderate reliability, highlighting the need for careful questionnaire design and scoring. Recent research has established a potential framework, from which, clearer assessment, could be based (Stephens-Lewis & Schenke, 2023; Stephens-Lewis et al., 2022). The Canine Behavior Framework is designed to capture the multi-faceted ways in which canine behavior is interpreted, comprising three components: (1) canine characteristics, (2) human expectations, and (3) human capability. These elements reflect the types of items identified in the questionnaires synthesized in this review. Canine characteristics relate to literal behaviors, including behavioral confirmation, body language, and trained behaviors, while human expectations and capability encompass emotional inferences, contextual attributions, and management skills. This framework could inform the development of a new, multi-faceted questionnaire that separately assesses literal behaviors, canine traits (e.g., personality, temperament), and human factors. Clear separation and scoring of these facets would enable more accurate and interpretable measurement of canine behavior.

Limitations

Although efforts were made to reduce potential biases, there are several limitations to the current systematic review. Firstly, only studies published in the English language, or with an English translation available, were included. Thus, the synthesis of behavioral questionnaires may not reflect questionnaires published in other languages.

Secondly, although we aimed to assess the reliability and validity of behavioral questionnaires, inconsistent and incomplete reporting prevented this. The lack of standardized practices, including absent prospective power analyses and minimal discussion of statistical power, raises concerns about sample adequacy and the risk of Type I and II errors. These issues highlight the need for more rigorous reporting to improve transparency and reproducibility. Future work should prioritize adherence to established guidelines for psychometric properties and statistical power. Furthermore, the interchangeable use of terminology and inconsistent reporting of C-BARQ items call the construct validity of these questionnaires into question.

Thirdly, this review only included papers explicitly stating that the questionnaire assessed canine behavior. Due to inconsistent terminology – such as emotions, temperament, or literal behaviors – this synthesis may not capture all questionnaires assessing literal behaviors. In addition, the requirement for reported reliability or validity may have excluded some relevant questionnaires.

Conclusion

This systematic review included 38 journal articles and examined questionnaires claiming to assess literal canine behavior. The synthesis revealed inconsistent characterization, often combining mixed definitions and relying on human inference and judgment. Variability in the aspects assessed – including literal behavior, personality, and emotionality – hindered accurate and valid observations. The review makes two key recommendations: first, to clarify and standardize what constitutes canine behavior, and second, to develop questionnaires that capture literal behavior without human inference. While human interpretation and context remain important, explicitly measuring

observable behaviors (e.g., chasing cats, barking when left, digging in the garden) is essential to reduce underreporting, misreporting, and overreporting in canine research.

Author contributions

CRedit: **Johnson A:** Conceptualization, Data curation, Formal analysis, Investigation, Methodology, Project administration, Writing – original draft, Writing – review & editing; **Schenke K:** Conceptualization, Data curation, Formal analysis, Investigation, Methodology, Project administration, Writing – original draft, Writing – review & editing; **Foster J:** Data curation, Formal analysis, Investigation; **Stephens-Lewis D:** Conceptualization, Data curation, Formal analysis, Investigation, Methodology, Project administration, Writing – original draft, Writing – review & editing.

Disclosure statement

No potential conflict of interest was reported by the author(s).

Ethics statement

This review synthesizes evidence exclusively from studies that have already received ethical approval from their respective institutions. No direct interaction with human participants occurred, and no identifiable personal data were accessed. Consequently, this systematic review did not require ethics committee approval or informed consent procedures.

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