

Longitudinal Study of Early Behavioral Predictors in Puppies Raised with Mentorship vs Conventional Methods

Background and Rationale

Early developmental stages in dogs are critical for shaping lifelong behavior [akc.org](https://www.akc.org). Between 8 weeks and 12 months of age, puppies undergo rapid behavioral and neurological changes, including critical socialization windows and fear periods. Puppies experience a *primary fear period* around 8–11 weeks of age (often coinciding with their transition to a new home) and a second fear period during adolescence (~6–14 months) [akc.org](https://www.akc.org) [akc.org](https://www.akc.org). During these times, puppies may suddenly become more sensitive or fearful of new stimuli, even ones they previously handled well. How a puppy is guided through such developmental milestones can have lasting effects: puppies exposed to excessive stress or trauma during a fear period can develop amplified behavioral problems later in life [akc.org](https://www.akc.org). Conversely, with proper support, puppies can learn to cope and emerge more confident [akc.org](https://www.akc.org). In addition to fear periods, other milestones such as the teething phase (around 4–6 months, often accompanied by increased chewing and nipping) and initial encounters with novel environments and social situations are pivotal in a puppy's development. These early experiences and behaviors are believed to be formative – “early life experiences are known to shape the behavioural development of animals” and events in preadolescence may persist into adulthood [sciencedirect.com](https://www.sciencedirect.com). However, identifying which specific early behaviors reliably predict future traits remains a challenge in canine behavioral science [pmc.ncbi.nlm.nih.gov](https://pubmed.ncbi.nlm.nih.gov).

Understanding early behavioral predictors has high practical importance. If we can determine, for example, that a puppy's intense fear reaction at 10 weeks or its engagement (or lack thereof) with novel objects at 4 months reliably foreshadows later anxiety levels or reactivity, then targeted early interventions could be implemented. Currently, the literature on predicting adult dog behavior from puppy observations is mixed. Some studies have found that standardized puppy tests during the socialization period (6–12 weeks) have limited predictive validity for adult behavior

[pmc.ncbi.nlm.nih.gov](https://pubmed.ncbi.nlm.nih.gov). For instance, in a longitudinal study of Border Collies, most behaviors measured in a puppy test at ~7 weeks showed little correspondence to the same dogs' behavior at 1.5–2 years old, with only exploratory activity showing a modest correlation [pmc.ncbi.nlm.nih.gov](https://pubmed.ncbi.nlm.nih.gov). Traditional puppy temperament tests (e.g., 7-week aptitude tests) often fail to consistently predict long-term outcomes in pet dogs [pmc.ncbi.nlm.nih.gov](https://pubmed.ncbi.nlm.nih.gov). On the other hand, recent research with working dogs suggests that predictive power improves when dogs are tested at slightly older ages or repeatedly. In detection dog programs, it was observed that improvements in behavioral scores across a puppy's first year were predictive of success, even though a single test

at one time point was not [pmc.ncbi.nlm.nih.gov](https://pubmed.ncbi.nlm.nih.gov). Indeed, across various studies, the ability of early tests to predict adult behavior tends to increase with the age at testing, reflecting greater stability of traits in later puppyhood [pmc.ncbi.nlm.nih.gov](https://pubmed.ncbi.nlm.nih.gov). Certain heritable traits, such as extreme fearfulness or strong prey-drive, can sometimes be identified very early (as early as 7–12 weeks) and have been linked to later outcomes [pmc.ncbi.nlm.nih.gov](https://pubmed.ncbi.nlm.nih.gov). These findings underscore the value of a longitudinal approach – tracking puppies over time rather than relying on one-off assessments – to capture the development and stabilization of behavioral traits.

Another critical factor is the role of rearing and training methods on behavioral development. Conventional puppy-raising often centers on obedience training classes, treat-based reward learning, and socialization outings. While effective in teaching commands, mainstream training paradigms may inadvertently emphasize excitement and constant stimulation. In contrast, the Just Behaving mentorship model proposes a different philosophy for raising puppies, one rooted in structured mentorship, emotional modeling, calm reinforcement, and proactive behavioral development. *Just Behaving* eschews purely command/reward-focused training and instead prioritizes deep emotional bonds, trust, and intrinsic understanding between human and dog. At its core is the idea of structured mentorship, where puppies learn desirable behaviors by observing and interacting with calm, mature role models (whether adult dogs or humans acting as mentors). Rather than relying on repetitive commands or constant food lures, this approach gently guides puppies through natural learning processes. For example, a puppy can learn social cues and impulse control by mirroring a well-balanced older dog's behavior, or by receiving patient, low-arousal guidance from a human caregiver. This model heavily emphasizes emotional calmness: families are coached to model calm behavior and minimize exciting or frenetic interactions, on the premise that frequent excitement during training can inadvertently reinforce hyperactivity or anxiety. By maintaining an atmosphere of calm and stability, the puppy is encouraged to default to a relaxed demeanor and develops better self-regulation. The mentorship philosophy also focuses on proactive prevention of problem behaviors. Instead of waiting for misbehaviors to emerge and then correcting them, caregivers using Just Behaving methods anticipate and preempt unwanted behaviors from the start. Puppies are gently prevented from rehearsing behaviors like jumping up, excessive barking, or rough biting, so these habits never become ingrained (thereby reducing the need for any harsh corrections later). Finally, Just Behaving highlights emotional attunement and modeling – owners learn that their own emotions and reactions can “spill over” to the puppy. By practicing mindfulness and emotional neutrality (remaining calm and confident especially in challenging moments), the human mentor provides a stable emotional reference for the puppy. In essence, the puppy is raised in an environment of consistent calm leadership and guidance, analogous to how a well-balanced older dog

might naturally raise a puppy with clear boundaries and reassurance
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This philosophy aligns with emerging insights in dog behavior: Puppies do learn socially from others' example, and a calm older dog (or human) can indeed **mentor** a young dog, helping instill self-control and reduce fear. Anecdotal evidence suggests, for instance, that a confident adult dog can teach a puppy not to overreact to novel stimuli and can comfort an anxious puppy by example woodriverweekly.com. Conversely, an excitable or nervous role model could pass on undesirable behaviors woodriverweekly.com. Thus, the mentorship model's principles of calm role-modeling and early boundary-setting appear to have a sound basis. What remains to be scientifically investigated is how these different rearing approaches (mentorship vs conventional training) influence the development of key behavioral traits over time, and whether certain early-life behaviors under each model can serve as reliable predictors for future outcomes. This leads to the rationale for the proposed study: we aim to fill the knowledge gap by *longitudinally tracking puppies* raised under two different paradigms – the Just Behaving mentorship model and a conventional training/socialization regimen – to identify which early behaviors and responses (from 8 weeks through 12 months) are the strongest predictors of later behavioral traits. We are particularly interested in later outcomes such as reactivity (e.g., overreaction to stimuli or strangers), anxiety (generalized anxiety or fear-based issues, including separation distress), training ease (trainability and learning speed), social behavior (quality of interactions with dogs and people), impulse control (ability to restrain immediate urges and tolerate frustration), and attention span (capacity to focus on tasks or humans without getting distracted). By comparing two cohorts raised in markedly different ways, we can also assess whether the *mentorship-based upbringing* attenuates or amplifies certain early predictors. For example, does a strong fear reaction during the first fear period inevitably lead to adult anxiety, or can a mentorship-based approach buffer this effect through guided exposure and emotional support? Are there red flags observable in any 4-month-old puppy that universally indicate future problems, or do these signals differ depending on the rearing environment? The answers have implications for early screening and intervention in puppy development, potentially allowing veterinarians, behaviorists, and breeders to identify at-risk puppies and advise owners on proactive strategies much earlier than is currently done.

In summary, this study is driven by two core needs: scientific clarity (to improve our understanding of developmental behavior trajectories in dogs and the influence of training methods) and practical application (to create tools and guidelines that help practitioners and owners raise well-adjusted dogs and nip behavior problems in the bud). The ultimate goal is to support the development of emotionally stable, calm adult

dogs – an outcome that the Just Behaving philosophy posits is achievable through its mentorship approach, and which we aim to evaluate and substantiate through empirical research.

Literature Context and Significance

The intersection of developmental behavior research and training methodology research is a rich but underexplored domain. Past studies on canine behavioral development highlight that behavioral traits evolve over the first year and can be influenced by both genetics and environment [pmc.ncbi.nlm.nih.gov](https://pubmed.ncbi.nlm.nih.gov). Classical work by Scott and Fuller (1965) established the existence of critical periods in puppy development, suggesting that experiences (or lack thereof) during certain early windows can have lasting effects on sociability and fear. More recent longitudinal studies, as noted, sometimes show weak consistency between infant puppy behavior and adult outcomes in pet dogs [pmc.ncbi.nlm.nih.gov](https://pubmed.ncbi.nlm.nih.gov). This inconsistency is often attributed to the dynamic nature of development – as puppies grow, their behavior can change due to maturation, learning, and hormonal changes, reducing the stability of traits observed at 2–3 months old [pmc.ncbi.nlm.nih.gov](https://pubmed.ncbi.nlm.nih.gov). It has been proposed that only some aspects of early behavior (particularly those with a strong genetic or temperament basis) remain stable into adulthood, whereas many context-dependent behaviors do not stabilize until later puppyhood or adolescence [pmc.ncbi.nlm.nih.gov](https://pubmed.ncbi.nlm.nih.gov). This underscores why multi-stage evaluation (e.g., testing at 3, 6, 12 months) is more predictive than a single 8-week test [pmc.ncbi.nlm.nih.gov](https://pubmed.ncbi.nlm.nih.gov). In working dog research, implementing standardized behavior batteries at multiple developmental stages has improved the ability to forecast adult performance [pmc.ncbi.nlm.nih.gov](https://pubmed.ncbi.nlm.nih.gov), and early identification of unsuitable candidates can save substantial resources [pmc.ncbi.nlm.nih.gov](https://pubmed.ncbi.nlm.nih.gov). Yet, outside of guide/service/military dog programs, far fewer studies focus on typical pet dogs' early behaviors and later pet-specific outcomes (like household manners, family compatibility, or common behavior problems). Our study aims to contribute to this gap by studying pet dogs (likely in home environments) with rigorous methods akin to those used in working dog programs.

Regarding early behavioral indicators, the literature suggests a few candidate predictors worth investigating: Novelty response (how a puppy reacts to new objects or environments) is often used to gauge fearfulness vs. curiosity; a consistently neophobic (fearful of new things) puppy might be at higher risk of anxiety or fear-aggression later in life. Startle recovery (the ability to bounce back after a sudden fright) is another; puppies that recover quickly from a mild startle may develop more resilience, whereas those that panic or fail to recover might carry heightened reactivity into adulthood. Similarly, social engagement in puppyhood – willingness to approach and play with unfamiliar humans or dogs – could predict adult sociability or, inversely, social fear if lacking. Attention span and focus during short training games at a young age might correlate with trainability and impulse control later; for example, a puppy that can't concentrate for even a minute

may indicate underlying impulsivity or hyperactivity that could persist. Some research suggests that high levels of activity or excitability in puppy tests correlate poorly with adult behavior unless measured later (when those traits have stabilized) [pmc.ncbi.nlm.nih.gov](https://pubmed.ncbi.nlm.nih.gov), but extremes might still signal something (e.g., a very high-energy puppy might always be somewhat high-energy, though training can modulate its expression).

Crucially, almost no published studies have explicitly examined how *different puppy-raising philosophies* affect the trajectory of these developmental behaviors. Most assume a relatively homogeneous “average” rearing environment or focus on specific training interventions in isolation. The Just Behaving model provides a novel framework to test scientifically: it emphasizes low-arousal mentoring, which might yield puppies that show different developmental patterns (perhaps fewer fear responses or quicker recovery, more impulse control, etc.) compared to puppies raised with high-energy play and traditional training. For instance, mainstream positive-reinforcement training often encourages frequent treats, excited praise, and high-pitched encouragement for obedience; this can be effective, but as the Just Behaving philosophy notes, it may inadvertently keep the puppy in a heightened state of arousal. By contrast, the mentorship approach reinforces calm behaviors and might promote longer attention spans and steadier nerves by not overstimulating the puppy. These differences have not been empirically measured. Our study will put these philosophies to the test, in a sense, by observing measurable outcomes: Will the mentorship-raised puppies indeed show *lower reactivity and anxiety* at one year old? Will they be *easier to train* (perhaps due to better focus and intrinsic motivation) than conventionally-raised puppies? Are there fewer instances of common behavior problems (e.g., jumping, leash pulling, excessive barking) emerging in the mentorship group due to the prevention-focused upbringing? Answering these questions will add to the scientific literature on social learning and developmental plasticity in dogs. It may also validate (or challenge) claims made by proponents of mentorship-based training that their approach leads to more emotionally balanced dogs justbehaving.com justbehaving.com.

From a clinical and practical standpoint, the significance of this research is high. Behavior problems are a leading cause of relinquishment of pet dogs to shelters and a major concern for veterinarians and trainers. If we can develop an **early screening tool** that flags puppies at risk for serious behavior issues (like severe anxiety or aggression) by, say, 4–6 months of age, professionals could intervene well before those issues solidify. Currently, many behavior issues are only addressed in adulthood once they are severe (e.g., a dog developing leash reactivity at 18 months may not see a behaviorist until age 3 when it’s become unmanageable). Early screening and intervention align with a preventive approach – a hallmark of Just Behaving’s philosophy (prevent issues rather than react later) – and align with pediatric models in human mental health, where

early childhood behaviors can predict later problems and guide early therapy. Moreover, establishing a data-driven link between specific early behaviors and later outcomes could refine puppy aptitude/placement tests. Breeders could use such information to guide puppy placements (for example, a puppy showing early high reactivity might be placed in an experienced, calm home with mentorship, or flagged for a behavior consultation). Trainers could customize their programs based on a puppy's early profile (e.g., a puppy that shows poor impulse control early might benefit from additional impulse-control exercises throughout adolescence). And veterinary behaviorists could use an evidence-based checklist during puppy wellness visits to identify “red flags” and counsel owners accordingly.

Finally, this study's comparative aspect (mentorship vs conventional) addresses a broader question in the field: How do different training ideologies impact long-term behavior? If the Just Behaving model proves to yield quantitatively calmer, less reactive adult dogs (as hypothesized), it would provide empirical support for mentorship-based, low-arousal training methods. This could influence the future of puppy training curricula and encourage integration of mentorship principles (such as supervised interactions with stable adult dogs, or coaching owners in calm communication) into standard practice. Even if results show only subtle differences, any specific advantages or disadvantages noted will be valuable. On the other hand, if conventional training raises some traits (like obedience to commands) more strongly, that will also be informative. In sum, this research sits at the intersection of developmental ethology, applied animal behavior, and training methodology analysis – bringing together these perspectives to advance our understanding of how early life shapes the canine mind.

Objectives and Hypotheses

Primary Aim: To identify which behaviors and responses in puppies (8 weeks to 12 months old) most reliably predict later behavioral traits (in adolescence and adulthood), and to determine how the puppy's rearing model (Just Behaving mentorship vs conventional training) influences these developmental trajectories.

Secondary Aim: To develop two practical outcomes from the findings – (1) an early screening tool (provisionally called the *Just Behaving Behavioral Risk Index*) that quantifies a puppy's risk for future behavior issues or traits, and (2) a set of clinical guidelines (a list of “red flag” indicators and recommended interventions) for use by veterinarians, behaviorists, and trainers during the first year of a dog's life.

Key questions and hypotheses include:

- *Which early behaviors correlate with which later outcomes?* We hypothesize that strong fear responses during the first fear period (8–11 weeks) and poor recovery from startling or novel stimuli will predict higher anxiety and reactivity in

adulthood, especially in puppies without proper guided exposure. Conversely, we expect that puppies who exhibit curiosity and quick recovery in novel situations will have more confident social behavior later. Excessive nipping or inability to disengage during the teething phase is hypothesized to predict lower impulse control and potential mouthiness or even aggression issues later, whereas puppies gently redirected during teething (learning bite inhibition and frustration tolerance) will not exhibit such problems. Short attention span or high distractibility observed at ~4–6 months (e.g., inability to focus on a simple task for even a few seconds) may predict lower training ease and attentional issues in adulthood, whereas puppies that can engage in calming activities for longer will likely be easier to train and more settled later.

- *Do puppies raised with the mentorship model show different early behavior patterns or later outcomes than those with conventional training?* We hypothesize that the Just Behaving (JB) cohort will, by the end of 12 months, show overall *lower reactivity and anxiety scores* and *better impulse control* than the conventional cohort, due to the calm reinforcement and prevention-oriented upbringing. For instance, during the second fear period in adolescence (6–14 months), we expect JB-raised dogs to cope better (perhaps shorter fear durations, quicker return to baseline) because they have been guided to default to calm behavior. The conventional cohort might display a higher incidence of adolescent behavioral issues (e.g., leash reactivity, jumping on people, uncontrolled excitement) especially if their training emphasized excitable obedience and did not proactively prevent certain habits. An alternate hypothesis is that the JB approach might delay the expression of some behaviors (e.g., a JB puppy might not show fear early because of support, but underlying tendencies could still appear later). This will be examined by the data. We also predict that certain early predictors might be universal (showing correlation with outcomes regardless of group), while others are moderated by upbringing. For example, perhaps an extremely timid 10-week-old puppy will be somewhat fearful later whether or not mentorship is provided (indicating a primarily genetic trait), but a moderately timid puppy might flourish into a confident adult under mentorship whereas it might become fearful under standard handling.
- *What is the reliability of a composite early risk index in predicting later behavior?* We aim to test a predictive model by combining multiple early indicators (e.g., a scoring system that includes fear response, novelty seeking, attention control, etc.). We hypothesize that such an index at e.g. 16 weeks or 24 weeks can achieve significant predictive value for certain outcomes at 18–24 months, more so than any single test. Given that prior work found multi-factor assessments more predictive [pmc.ncbi.nlm.nih.gov](https://pubmed.ncbi.nlm.nih.gov), we expect our composite index to have

good sensitivity and specificity in identifying dogs likely to develop serious reactivity/anxiety vs those likely to remain stable. Our goal is to achieve a tool that might, for instance, correctly flag a high percentage of future “reactive/anxious” dogs while minimizing false alarms.

Outcomes of Interest (Later Traits): For clarity, the later behavioral traits we will evaluate in adolescence/adulthood (the dependent variables) include:

- **Reactivity:** propensity to overreact to stimuli (e.g., lunging or excessive barking at strangers, other dogs, or novel sights/sounds).
- **Anxiety/Fearfulness:** signs of generalized anxiety, fear responses in everyday life, or specific anxieties (like separation anxiety, noise phobia).
- **Training Ease/Trainability:** how readily the dog learns and follows commands or routines, and its working relationship with humans (e.g., willingness to obey, problem-solving ability).
- **Social Behavior:** quality of interactions with unfamiliar humans and dogs – friendliness, appropriate play, lack of aggression or extreme fear in social contexts.
- **Impulse Control:** ability to exhibit self-control, e.g., waiting when asked, not grabbing food or toys without permission, tolerating frustration or delays calmly.
- **Attention Span:** the ability to focus on a task or the handler for a sustained period relative to age expectations, and resistance to distraction.

Each of these will be quantified through specific measures (detailed in methodology) at multiple time points. The study will examine correlations between early-life measures and these outcomes, as well as differences between the JB and control groups on each outcome.

Deliverables:

1. **Just Behaving Behavioral Risk Index (JBBRI):** A screening tool developed from the data. It will likely be a checklist or rating scale that can be administered when a puppy is, say, 4–6 months old (or possibly with components at 3 and 6 months). The index might include items like “Degree of Startle Recovery”, “Approach to Novel Object”, “Intensity of Nipping/Mouthing”, “Ability to Settle Calmly for X minutes”, etc., each with scores that have empirically derived weightings. The output could be a composite score indicating low, moderate, or high risk for future behavior problems. We will design this tool based on which early behaviors prove statistically significant in predicting later issues (e.g., a puppy that scores high on fear and low on attention might get a high-risk score).

The goal is for this index to be something a practitioner or even an informed owner could use as part of an early evaluation to decide if intervention is needed.

2. **Clinical Guidelines & Red Flags for Early Intervention:** Based on the patterns observed, we will compile a guide for vets and behavior consultants that outlines specific red flag behaviors in puppies and recommended actions. For example, if a 10-week-old puppy shows an extreme fear reaction to a routine novelty (and remains fearful for an extended period), the guideline might suggest this is a red flag for later anxiety and recommend a referral to a behaviorist or implementation of a fear-reduction protocol immediately (rather than a “wait and see” approach). Another guideline might be: if by 5–6 months a puppy cannot self-soothe at all and is constantly in an excited state, this may predict impulse control issues – an early intervention might be to implement a structured calming mentorship routine (teaching the puppy to relax, possibly involving an older calm dog if available, or targeted impulse control exercises). These guidelines will be grounded in the Just Behaving philosophy of *proactive mentorship and calm coaching*, offering constructive strategies (e.g., increased controlled social exposure for pups trending toward fear, or stricter consistency and calm leadership for pups pushing boundaries). They will essentially translate the research findings into practical advice for preventing the escalation of problem behaviors. We envision publishing these as a white paper or manual for veterinary behaviorists and puppy trainers, possibly with the backing of data (e.g., “behavior X at 4 months had an 80% likelihood of leading to behavior Y at 18 months in our study; therefore, we recommend doing Z when you see X”).

Methodology

Study Design Overview

This will be a longitudinal, comparative cohort study tracking two groups of puppies from 8 weeks of age (post-weaning, just after adoption) through 12 months of age, with follow-up assessments in adolescence and adulthood (e.g., at 18 months and 24 months). The two cohorts are: (1) Mentorship-model reared puppies (JB cohort) and (2) Conventionally reared puppies (Control cohort). We plan to enroll a sufficient sample size in each group to allow for statistical comparisons and regression analyses (~30–50 puppies per group, for a total of ~60–100 puppies, accounting for potential drop-offs). All puppies will be placed in home environments as typical pets; the differentiation is in the guidance their owners receive and the training philosophy followed.

Group 1 – Just Behaving Mentorship Model: Puppies in this group will be raised according to Just Behaving principles. Their owners (or foster trainers) will be educated in the five pillars of the JB philosophy (Mentorship, Calmness, Indirect Correction, Structured Leadership, Prevention justbehaving.com) before the study begins, ensuring

they apply these methods consistently. Key aspects include: Owners acting as calm mentors (minimizing yelling or excited squealing during interactions, using low-key praise or petting as reinforcement), providing structured social exposure with stable adult dogs if possible (e.g., supervised play sessions with a calm adult mentor dog to teach the puppy appropriate behaviors woodriverweekly.com), proactively preventing unwanted behaviors (for example, if the puppy starts to jump up or nip, the owner gently intervenes or redirects before it escalates, rather than ignoring until it's a problem), and focusing on emotional modeling (owners managing their own reactions, remaining composed during puppy tantrums or fear moments, thereby not exacerbating the puppy's emotions). Formal obedience commands are de-emphasized in the first months; instead of "sit" drills with treats, an owner might simply encourage the puppy to relax by modeling calm sitting, or teach manners indirectly (for instance, waiting for calm before feeding). Essentially, this group's experience is one of mentorship over instruction – think of it as the puppy having a life coach rather than a schoolteacher. We will verify adherence through regular owner check-ins and possibly having trainers observe some sessions.

Group 2 – Conventional Training/Socialization: Puppies here will be raised in the more typical way many pet puppies are. Owners might enroll in a standard puppy class at a local training center (which usually emphasizes obedience commands, socialization playtimes, and basic manners using treats and maybe clickers). They will likely use common techniques such as treat-reward for sitting, verbal corrections or redirection for nipping (e.g., saying "ouch" or time-outs for biting), crate training, leash walking practice, etc. We are not advocating any harsh methods, so "conventional" here implies modern, primarily positive-reinforcement-based training but without the specialized JB coaching. These owners will be encouraged to socialize their puppies broadly (puppy playdates, trips to parks or pet stores for exposure, etc.) following typical advice, and to address issues as they arise in a reactive way (for example, if the puppy starts jumping, they might train a "off" command or just tolerate it until it's older, rather than the JB approach of preventing jump habits from day one). The conventional group therefore serves as a control representing the status quo in puppy raising.

All other factors will be attempted to keep as consistent as possible between groups. We will recruit puppies of the same breed or of comparable size and temperament profiles to reduce variability. One strategy is to partner with a breeder who has a large litter (or multiple litters) and allocate littermates to different groups. For instance, if a breeder of Golden Retrievers is collaborating, half of the litter could go to JB-trained foster homes and half to regular pet homes. This helps control genetic background. Another approach is to recruit from the general public but ensure diversity is balanced between groups (e.g., equal numbers of retrievers, shepherd mixes, etc., in each

group). We'll record each puppy's breed, sex, and initial temperament testing (if any) at 7-8 weeks to use as covariates.

The study is observational in the sense we are not imposing a novel experimental treatment beyond the training style that owners follow, but we will be rigorously measuring behavior. Owners and puppies will live their normal lives, with the JB group following a set program (which could be akin to an early mentorship curriculum provided by Just Behaving mentors) and the control group possibly following whatever guidance they get from classes or vets (we'll provide basic standard puppy care literature to ensure they are not negligent, of course). We will ensure ethical standards: all training methods in both groups must be humane and force-free (the study will not allow, for instance, aversive punishment tools even if some "conventional" trainers might use them; we'll restrict conventional to positive-oriented training to isolate differences to mentorship vs standard positive training).

Data Collection Plan

We will collect both qualitative and quantitative data at regular intervals throughout the first year, plus at follow-up points. The multi-method approach is critical to capture a rich picture of each puppy's development.

1. Schedule of Assessments:

- **8 weeks (study enrollment):** Initial intake assessment. Puppies will be evaluated within a few days of arriving in their new home (around 8-9 weeks old). We will record baseline measures: a simple puppy aptitude test (for descriptive purposes, e.g., reaction to being gently restrained, reaction to a loud noise, etc.), initial vet check including any health issues (to control for health effects on behavior), and an owner report on how the first few days have been (e.g., any notable fearful or bold behaviors). No group differences are expected yet since training has just begun, but this gives us a baseline.
- **Every 2 weeks from 8–16 weeks:** Owners will maintain a behavior diary and have bi-weekly check-ins. The diary is a qualitative log where owners note significant events (first trip outside, first meeting with children, any scary incidents, how the puppy responded) and day-to-day observations (energy level, new skills, new fears, etc.). Check-ins (via phone or video call) with researchers will review these diaries and ensure protocols are followed. Key developmental points like the first fear period (~8–11 weeks) will be closely monitored: owners will be asked specifically if they noticed any sudden increase in fearfulness or new anxieties during that window, and how they handled it. We will provide a short checklist for that period (e.g., "In the past week, did your puppy suddenly shy away from a familiar object or person?", etc.).

- **3 months (≈12 weeks):** First major laboratory assessment. Puppies (along with owners) will visit a controlled testing environment (or we will visit them at home if stress is a concern) for a standardized behavioral test battery, which will be video-recorded for later coding. This battery might include: a Novel Object Test (introducing a new item like an umbrella or a remote-control toy into the room and observing approach/avoidance), a Noise Startle Test (a brief sudden sound like a dropping object to see startle and recovery), a Social Approach Test (a friendly stranger approaches slowly and attempts to pet the puppy, gauging friendliness or wary behavior), and a Simple Obedience/Focus Task (the owner will attempt to get the puppy's attention and ask for a simple action like "sit" or "come" – not all puppies will know the command, but we're observing responsiveness or attention to owner). During this session, we will also administer an owner questionnaire (possibly an age-appropriate subset of the validated C-BARQ questionnaire tailored for puppies) to get standardized ratings on various temperament dimensions (e.g., attachment, trainability, fear, excitability) pmc.ncbi.nlm.nih.gov. These quantitative scores will serve as one reference point.
- **6 months:** Second lab assessment (midpoint of first year). By 6 months, many puppies have hit puberty or are approaching adolescence. The test battery will be repeated with some adjustments for age: e.g., a slightly more challenging Novel Object (maybe a mechanical toy or something unusual), a Delayed Gratification Test (testing impulse control by having the puppy wait before getting a treat under a transparent cup, etc.), a Play Session with another dog of similar age to observe social behavior (or an adult dog to see if they respect cues), and an Obedience/Problem-Solving Task (such as teaching the puppy a simple new task on the spot for a few minutes to gauge learning and focus). Owner questionnaire again (C-BARQ or similar) at 6 months, and collection of the owner's diary notes. We will also particularly look at how puppies navigated the period between 4–6 months: this often includes teething. Owners will be asked about the puppy's nipping/chewing intensity during teething and how they managed it – e.g., did the puppy destroy objects, respond to redirection with chew toys, get cranky? This qualitative info might later correlate with impulse control measures. The JB philosophy expects owners to handle teething calmly and provide outlets justbehaving.com, so we will see if JB puppies perhaps had easier transitions (anecdotal expectation: they might, due to consistent guidance).
- **9 months:** Third checkpoint (late juvenile stage). This might be a lighter assessment, possibly just an owner questionnaire and brief home observation. At 9 months some dogs enter a secondary fear phase; owners will again be queried

about any resurgence of fear or behavioral “regression” during 6–9 months. If feasible, a short video-coded test could be done at home by the owner (we can provide instructions, such as “record your puppy when a delivery person comes to the door” or “take a video at the dog park” to capture real-world behavior).

- **12 months:** Final assessment of the formal study period (end of first year). A full behavioral test battery in lab will be conducted, similar to 6 months but slightly upgraded for a near-adult dog. This will measure the outcomes of interest directly: we will have a stranger approach in a more provocative way to measure reactivity (if safe – or use a realistic dummy or remote-controlled approach to test reactivity without risking anyone), a Neutral Dog Interaction Test (introduce a neutral temperament adult dog on leash at a distance to see if our subject reacts aggressively, fearfully, or calmly social), an Impulse Control Test (perhaps the classic “wait” command with a treat or a toy temptation task), and a Focused Attention Task (have the owner attempt a 2-minute training routine to see how long the dog stays engaged). We will also do a veterinary exam simulation to gauge compliance/handling (does the dog allow paws touched, etc., which can relate to impulse control and fear). All these are recorded on video. The owner will fill out the full C-BARQ at 12 months, which provides standardized scores for traits like Stranger-Directed Fear, Dog-Directed Aggression, Trainability, etc. We will also ask owners for overall satisfaction with the dog’s behavior and any concerns.
- **Follow-Up at 18 months and 24 months:** These follow-ups are to see how stable the behaviors remain and to formally evaluate “adulthood” outcomes. At 18 months (mid-adolescence for many dogs) and 2 years (full adulthood for most breeds), we will have owners fill out surveys again and possibly do a shorter test battery or at least a videotaped session at home. The 24-month point is critical for evaluating our predictions – by then, any persistent behavior issues (like chronic reactivity or anxiety) are likely evident. We might not bring all dogs back in at 2 years for a lab test due to practical constraints, but at minimum a detailed owner report or possibly a behaviorist’s evaluation for each dog at 2 years will be obtained. (If resources allow, a home visit by a blinded evaluator or a video review could be done to validate owner reports.)

2. Qualitative Observations: Throughout the study, the owner observation diary will yield qualitative data. We will instruct owners to note notable events like: first time alone at home, any incident that scared the puppy, interactions with children, etc., and how the puppy behaved. For JB group, we’ll also collect notes from their mentorship guidance sessions (JB mentors might note how the puppy responds to the calming exercises or indirect corrections). These qualitative notes will later be analyzed for common themes or early anecdotes that signaled later issues (e.g., an owner might

write “at 5 months, he started barking at strangers on walks” – which could be an early sign of reactivity developing). Additionally, we will interview owners (especially those in JB group) at key points about their *perceptions* of the puppy’s behavior and their own confidence. This can shed light on how easy or hard the puppy is to manage, complementing the objective measures.

3. Quantitative Measures: We will derive a set of quantitative variables from the tests and questionnaires at each stage. Examples include: *latency to approach novel object (seconds)*, *startle recovery time (seconds to resume normal behavior after a noise)*, *percentage of time spent focused on owner during a 2-min task*, *number of impulsive grabs for a forbidden toy in a set period*, *C-BARQ score for stranger-directed fear*, etc. Each such measure addresses one facet of behavior. Many of these measures are well-established in canine behavior research, allowing us to compare to known benchmarks. For instance, C-BARQ provides normative data on traits which we can use to contextualize our sample. We will also create some composite scores for analysis, such as an “Early Fearfulness score” combining performance in the novel object and startle tests at 3 months, or an “Impulse Control composite” combining the delayed gratification test result and owner-rated overexcitement items.

4. Video-Coded Ethological Analysis: All major test sessions (3mo, 6mo, 12mo) are video recorded. We will employ a coding scheme (using software like BORIS or Observer XT) to code specific behaviors from the videos in a fine-grained way. For example, in the novel object test, coders (blinded to group if possible) will code tail posture, proximity to the object over time, stress signals (panting, lip licking), etc. In the social interaction tests, they might code each greeting behavior or any signs of aggression or fear. This ethological approach ensures objectivity and richness: rather than relying solely on owner reports (which can be biased), we get direct behavioral data. We will train coders and establish inter-rater reliability on a subset of videos (seeking high agreement, e.g., Cohen’s kappa > 0.75 for key behavior categories) to ensure the data is reliable [pmc.ncbi.nlm.nih.gov](https://pubmed.ncbi.nlm.nih.gov). The video data also allow retrospective analysis of subtleties that might be missed in person. For example, a puppy might show a slight freeze (a subtle fear sign) during a test that owners didn’t notice – video review can capture that.

5. Mentor vs Conventional Protocol Monitoring: We will keep track of the fidelity to each training model. For JB group, we might have a checklist of core practices (such as “routinely uses calm petting instead of excited praise”, “provides daily structured play with older dog or calm interaction”, “does not use treat luring for commands excessively”) to ensure they truly experienced the mentorship model. For conventional group, we’ll note which puppy classes or methods they used (most likely all will use

reward-based training but with more energetic tone). This is important so that if outcomes differ, we can attribute with confidence to the method. We may also measure the owner's behavior in some way – perhaps through video of owner-puppy interaction. For instance, at 3mo test, we might include an “Owner interaction” segment where the owner is asked to play with the puppy for 2 minutes as they normally would. We will film it and later code the owner's style (e.g., calm vs excited tone, how often they issue commands or use treats). This can confirm differences (we expect JB owners to be more calm, fewer commands; conventional owners possibly more animated). It also might correlate with the puppy's behavior (supporting the idea of emotional modeling – e.g., puppies with calmer owners might exhibit more settled behavior even in the test).

Data Analysis Plan

Given the rich dataset, we will use a combination of statistical analyses:

- **Longitudinal trajectory analysis:** We will analyze how each measure changes over time in each group. A mixed-model ANOVA or growth curve modeling can be used for repeated measures (with age as a within-subject factor and group as a between-subject factor). This will tell us, for example, if the two groups diverge significantly in certain metrics over time (e.g., does reactivity score increase from 6 to 12 months more in the control group than the JB group?). We anticipate interactions between age and group for key traits (indicating different developmental trajectories under different rearing conditions).
- **Correlation and regression:** To identify predictors, we will calculate correlations between early measures (from 3mo or 6mo) and outcome measures (12mo, 18mo, 24mo). We will then build regression models (or even use machine learning classification) to see which combination of early factors best predict a particular outcome. For instance, a multiple regression for “adult reactivity score” might include predictors like “3mo novel object avoidance”, “6mo startle recovery”, “whether first fear period reaction was noted”, etc. We expect to find a subset of predictors with significant weights. We will be cautious of overfitting given sample size; cross-validation or splitting sample for training vs testing our predictive model can be employed (especially useful for refining the screening tool).
- **Group comparisons:** At each major age (6mo, 12mo, etc.), we will compare the JB vs conventional groups on the measured outcomes using t-tests or nonparametric equivalents (if data not normal). This addresses whether the mentorship model yields statistically different behaviors by the end of the study. We hypothesize differences like lower mean fear score, lower reactivity in JB. If differences are found, effect sizes will be calculated to judge practical significance.

- **Thematic analysis of qualitative data:** Owner diaries and interviews will be analyzed by qualitative coding to extract common themes or notable case studies. We might identify, for example, that many conventional owners reported a “regression” around 7-8 months (common adolescent issues) whereas JB owners often did not, or handled it differently. These narratives will enrich the interpretation of quantitative results and could be included as illustrative examples in the write-up of guidelines (e.g., a case vignette of a puppy that was flagged early and successfully guided).
- **Development of the JBBRI:** Using the statistical findings, we will compose the Just Behaving Behavioral Risk Index. Likely, we will assign point values to certain risk factors that emerged. For example, if “extreme fear at 3mo novel object test” and “high excitability rating at 6mo” are top predictors for adult reactivity, those would be high-weight items in the index. We will test the index’s performance by seeing how well the index score at 6mo correlates with actual outcomes at 18mo. We might use ROC (receiver operating characteristic) analysis to see how well the index distinguishes dogs that developed problems vs those who didn’t, to choose an optimal cutoff for “high risk”.
- **Statistical power and significance:** With ~60-100 dogs, we expect to detect medium effect sizes. Given the longitudinal nature, missing data handling will be important (some attrition or missed assessments may happen). We will use mixed models that handle missing-at-random, or impute missing values where appropriate. Significance will be set at $p < 0.05$, but we will interpret results with caution given multiple comparisons (adjusting with methods like Bonferroni for multiple outcomes, or focusing on the most hypothesis-driven comparisons).
- **Blinding and bias control:** The researchers coding videos and analyzing data will ideally be blinded to which group each dog was in when assessing behavior on video to reduce bias. Owners obviously know their group, but the use of objective tests mitigates self-report bias. Also, we will compare owner-reported data with the observed data to see if there’s any bias (e.g., do JB owners rate their dogs as more well-behaved due to expectation? If so, the video/observer data will help correct any rose-colored interpretations).

Expected Outcomes and Deliverables

By the conclusion of data collection (end of year 1, plus the follow-ups), we expect to have robust data addressing our aims. We anticipate being able to identify specific early behavioral indicators that have statistically significant associations with later outcomes. For example, we might find that *Puppies that scored in the top 25% for fearfulness at 3 months were 3 times more likely to develop anxiety-related behaviors by 18 months* – a valuable piece of information for early screening. Or, *90% of puppies that showed*

consistently low impulse control (per our tests) in the first year developed at least one owner-reported behavior problem by age 2, compared to 40% of those with good impulse control. On the flip side, we may identify puppies who *despite* early hiccups turned out fine, especially within the JB group, highlighting how management can alter trajectories.

Just Behaving Behavioral Risk Index (Screening Tool): We will draft and validate the JBBRI based on our data. The format might be a one-page checklist where a professional or owner can rate a puppy on, say, 10 dimensions at a certain age. Each rating would correspond to a score that tallies into a risk level. The tool will be evidence-based – for each item we include, we'll have justification (from our analysis or literature) for its inclusion. We will also include clear definitions for each item so it can be used reliably. For instance, an item could be: "Reaction to Novel Object: (A) Approaches confidently (0 points); (B) Cautious but approaches within 30s (1 point); (C) Hangs back or avoids for >30s (2 points); (D) Panic or extreme avoidance (3 points)." Higher total points = higher risk. We will validate the index's performance on our sample (and if possible, even test it on an independent sample if time permits by using some late-joiners solely for validation). Ideally, the JBBRI could be published as a supplementary outcome of this study, potentially for use in veterinary clinics. It could be called the "Just Behaving Puppy Profile" or similar for branding, but with rigorous criteria behind it.

Clinical Guidelines (Red Flags and Interventions): Alongside the screening tool, we will produce a document summarizing the practical takeaways. This will likely be organized by developmental stage and behavior area. For example:

- **8–16 Weeks:** Red flags include intense fear of everyday stimuli, inability to recover from mild stress, excessive biting that cannot be redirected at all, or complete lack of engagement with people. If these are seen, we recommend interventions such as increased controlled socialization with a calm role model, consult with a behaviorist for fear conditioning exercises, etc.
- **4–6 Months (Teething and Adolescence onset):** Red flags: persistent mouthing that escalates to biting clothes or skin even after training, extreme hyperactivity with inability to settle, signs of territorial behavior emerging (e.g., growling over food/toys). Intervention: structured impulse control games, strict routines to provide security, perhaps neutering/spaying considerations if relevant to reduce certain drives, etc., always emphasizing calm reinforcement.
- **6–12 Months (Adolescence):** Red flags: new phobias or reappearance of fear (could indicate second fear period issues), increased reactivity on leash or to strangers, challenge behaviors like ignoring commands or testing boundaries aggressively. Interventions: do not punish or get into confrontation (that could worsen aggression); instead, intensify the mentorship approach – lots of exercise

combined with mental stimulation, refresh calm leadership routines, possibly temporary use of management tools (like head halters for strong pullers) while reinforcing good behavior. Emphasize that owners remain patient and consistent – as JB philosophy states, “parental guidance rather than excitement-driven training” is key to navigate this phase justbehaving.com.

These guidelines will reference our data (e.g., “we found that puppies showing X at 6 months often had Y later, so address X early”). They will also align with JB principles, advocating for gentle, calm, and proactive approaches. Importantly, they will serve to educate even those who may not fully adopt JB methods – essentially translating some of the mentorship philosophy into broadly applicable advice. For instance, even a conventional trainer could implement the guideline “if your puppy is suddenly fearful, don’t force them; calmly encourage exploration and pair the new thing with positivity – avoid overwhelming them akc.org.” This is something JB does intuitively, and our findings might back it up with evidence.

Group Differences: We expect to report on how the JB vs conventional cohorts differed. If hypotheses hold, we might report something like: *By 12 months, the JB group had significantly lower average reactivity scores than the conventional group ($p < 0.01$), and on video assessments, 80% of JB dogs remained calm during a sudden noise compared to 50% of control dogs.* We also might find differences in owner stress or satisfaction (possibly JB owners feel more in control because of the structured guidance, which could be measured via a separate owner survey). If the data show that the mentorship model yields clear benefits in behavior, this provides a compelling case for its efficacy – something we would highlight in dissemination. Alternatively, if both groups end up similar in many respects, that itself is an interesting finding: it could mean some aspects of dog development are robust to training style, or it could indicate that our conventional owners, by virtue of being study participants, were more conscientious than average (which is possible; a self-selection bias might mean even “conventional” owners in our study tried hard to socialize their pups). We will interpret accordingly.

Potential Challenges and Considerations: We acknowledge that behavior prediction is complex. We might find only modest correlations, meaning the screening tool could indicate risk but not certainty. This is still useful – it’s about probability, not fate. Also, individual differences will exist; our goal is to capture trends that apply broadly, but we will also discuss outliers. For example, if a puppy showed high fear but turned out fine because of a certain therapeutic intervention mid-study, that’s noteworthy for the guidelines (it shows early fear isn’t destiny if handled well). We also consider that the act of observing could itself influence behavior (Hawthorne effect on owners). We mitigate this by keeping instructions naturalistic and not overly interfering except for necessary guidance.

Potential Impact and Conclusion

This research stands to make several important contributions:

- **Advancing Scientific Understanding:** It will add longitudinal data to the canine behavior literature, particularly on the continuity (or change) of temperament from puppyhood to adulthood in a pet setting. Few studies track pet dogs so intensively; our findings on what early behaviors predict later outcomes will inform theories of canine personality development, and potentially help resolve the debate on how early one can reliably detect traits pmc.ncbi.nlm.nih.gov. Moreover, by including two rearing strategies, we'll generate empirical evidence on the role of environment and training methodology in shaping behavior – effectively a nature/nurture interplay study in real life. For example, evidence that a calm, mentorship-based upbringing significantly lowers later anxiety would support models of development that emphasize early learning and social referencing, whereas lack of differences might underscore genetic predispositions as primary. This could inspire further research into the specific mechanisms (e.g., does mentorship actually blunt cortisol stress responses in puppies? Future physiological add-ons could explore that).
- **Practical Tools for Early Intervention:** The *Just Behaving Behavioral Risk Index* could become a valuable tool in the toolkit of veterinarians, trainers, and rescue organizations. Imagine every puppy's first vet visits including a quick behavioral risk screening – if high risk, the vet can refer the owner to a behavior specialist or a mentorship-based puppy class early on. This proactive approach could prevent many dogs from developing severe issues. The *guidelines and red flags* will help translate data into action: busy practitioners will have a reference for what to watch for in puppies and clear suggestions to give clients. This is particularly useful for veterinary behaviorists who often only see dogs once problems are entrenched; catching signs at 4-6 months and intervening could reduce the caseload of serious aggression/anxiety cases later. Shelters and breeders could also use the findings – e.g., a breeder might use our screening to identify which pup needs a more experienced owner. In essence, the work could shift the paradigm from reactive to preventive in canine behavioral health, much as pediatric screenings do in human health.
- **Influence on Training Practices:** If our study substantiates the benefits of the Just Behaving approach, it could encourage more trainers and dog owners to adopt mentorship-style techniques. We foresee sharing results in conferences and publications accessible to the training community. A demonstration that, for instance, puppies raised with low-arousal mentorship had better impulse control than those in standard classes would be a strong message. It might lead to

modifications in how puppy classes are run (maybe incorporating controlled mentor-dog interactions, or instructing owners on managing their own energy). It also adds credibility to programs like Just Behaving that, until now, may have been based on anecdotal successes – turning it into evidence-based practice. Even if some aspects of conventional training are shown to be equally good or better in some domain (for example, maybe conventionally trained pups have slightly faster command response times), that will identify areas where mentorship approach can borrow from traditional methods to improve, leading to an evolving best-of-both-worlds training recommendation. The comparative nature is not to declare a “winner” but to learn what truly benefits puppies the most.

- **Welfare and Human-Animal Bond:** Ultimately, preventing behavior problems means fewer dogs surrendered and euthanized for behavior reasons and happier human-canine relationships. Early identification of issues allows course-correction during a time when dogs are highly adaptable. If a high-risk puppy is flagged at 5 months and gets a tailored intervention (perhaps even something like a temporary stay with a mentorship trainer or extra resources given to the owner), that dog might avoid becoming the 2-year-old that bites someone or lives in chronic anxiety. The positive ripple effects on welfare are significant. Our guidelines promoting calm, empathetic handling also improve welfare – dogs in the mentorship model likely experience less confusion and stress since their owners learn to communicate more clearly and calmly. Strengthening the human-animal bond through trust and understanding (core to JB philosophy) is not just an idealistic notion; it has tangible effects on training success and pet retention. We anticipate that owners in the study (especially those practicing mentorship) will report a strong bond with their dogs and enjoyment in the process, which we will anecdotally document.

Conclusion: This proposed study marries a cutting-edge training philosophy with rigorous scientific inquiry, in service of enhancing our ability to raise well-adjusted dogs. By focusing on developmental milestones – from the wobbly, wide-eyed 8-week-old to the boisterous adolescent and finally the mature adult dog – we seek to map out the early indicators that matter most for the adult outcome. The comparison of mentorship vs conventional rearing provides a unique lens to observe how environment and guidance can alter a puppy’s developmental path. We expect to deliver actionable knowledge: a screening tool that can be used widely, and guidelines that translate research to practice immediately. In alignment with Just Behaving’s foundation, our approach throughout the study remains one of structured guidance, calm reinforcement, and proactive intervention, demonstrating how these principles can be implemented and evaluated scientifically. The findings will be disseminated as an academic publication

and a practical white paper for veterinary and training professionals. By identifying the “signals in the noise” of puppy behavior, we can intervene sooner, train smarter, and ultimately ensure more dogs grow up to be the confident, calm, and well-behaved companions we know they can be justbehaving.com.

Through this research, we aim not only to test hypotheses, but to influence a paradigm shift in how we think about puppy training: from a narrow focus on obedience outcomes to a broader focus on behavioral development and emotional well-being. This aligns perfectly with the ethos of Just Behaving and has the potential to improve practices in the field of canine behavior and welfare on a larger scale.