Emotional Reciprocity in the Human–Canine Bond: Just Behaving's Mentorship Model

Introduction

In the human–canine relationship, emotions are a two-way street. Owners often notice their dog's mood seems to "mirror" their own – a calm owner tends to have a calm dog, while an anxious owner may find their dog on edge. This observation is not just anecdotal; it's rooted in the deep attachment bond between people and their dogs and the phenomenon of emotional contagion. Just Behaving's mentorship model, a philosophy of dog-rearing that positions the human as a calm, guiding mentor rather than a conventional trainer, is built on the premise that **"calm creates calm"** in a dog. The model emphasizes structured companionship, parental-style guidance, and emotional consistency from the owner to naturally foster a well-behaved, emotionally resilient dog.

This whitepaper presents a fully developed study examining emotional reciprocity – the reciprocal exchange of emotional states – in the human–dog bond under the Just Behaving mentorship approach. Over a 6-week intervention (with a one-month follow-up), first-time and experienced dog owners learned and applied mindful self-regulation techniques (such as controlled breathing and low-arousal responses) to test the impact on their dogs' stress and behavior. We measured changes in the dogs' behavioral stress indicators, recovery times after stress, stress hormone (cortisol) levels, and the synchrony between handler and dog. Through both quantitative data and qualitative case studies, we observed how training the humans to be better emotional mentors affected canine outcomes. The results, illustrated with cases like Ellie (a puppy with an anxious new owner) and Bruno (an adult rescue with an experienced handler), show measurable improvements in canine stress and dog–handler harmony when owners consistently practiced calm guidance.

By sharing these findings in a practical, narrative format, we aim to inform researchers, veterinary behaviorists (including DACVB candidates), and trainers about the power of human emotional regulation in behavior modification. The structure of this report follows that of previous Just Behaving whitepapers (e.g., *Family Matters*), blending scientific insight with real-life application. We begin with the theoretical background that underpins the mentorship model, then detail the study methodology, population, and behavioral metrics. We present key data findings and bring them to life with embedded case studies. Finally, we discuss collaborative implications – how these insights can shape future protocols, encourage multi-disciplinary cooperation, and integrate human-focused emotional regulation into canine behavioral treatment plans. All of this is aligned with Just Behaving's philosophy, reinforcing the idea that improving ourselves as calm, consistent caregivers is a critical part of helping our dogs "just behave."

Theoretical Background

Attachment and Emotional Mirroring: Dogs form strong attachment bonds with their human caregivers, often analogous to the parent–infant relationship in humans. Like a child uses a parent as a secure base, dogs look to their owners for safety and guidance, especially in unfamiliar or stressful situations. A securely attached dog (one whose owner provides consistent, calm support) explores the world with confidence and copes better with challenges, whereas an insecurely attached dog (owner is inconsistent or anxious) may develop clingy, fearful, or reactive behaviors. This attachment dynamic sets the stage for emotional reciprocity: the dog is tuned into the owner's emotional cues as signals of whether the world is "safe" or not. In essence, the human–dog pair functions as an emotional unit, each influencing the other. When a caregiver remains steady and reassuring, the dog uses that emotional anchor to self-regulate; if the caregiver is tense or erratic, the dog can absorb that tension. Modern behavioral science has documented this emotional contagion between species – a process where one individual "catches" the emotional state of another. Dogs are remarkably attuned to human body language, tone of voice, and even facial expressions, often mirroring the emotional tone of their owners in real time. For example, a relaxed, soft-spoken owner signals to a dog that everything is fine, resulting in a dog that remains calm and content. In contrast, an owner's agitated voice or stiff posture can quickly transmit to the dog, elevating the dog's own stress or arousal. Over time, these moment-to-moment interactions can shape a dog's baseline temperament.

Physiological Synchronization: Emotional reciprocity isn't just behavioral – it's physiological. Research has shown that the stress responses of dogs and owners can become synchronized during prolonged relationships. A striking example is the finding that long-term cortisol levels (a hormone associated with stress) in pet dogs correlate strongly with their owners' cortisol levels. In a 2019 study, dogs living with chronically stressed individuals had higher chronic cortisol themselves, measured via hair samples, mirroring their owners' physiological stress over months. This suggests that dogs not only respond to immediate cues, but can also internalize the emotional climate of their home. In simpler terms, a household that is chronically anxious or stressed may imprint that chronic stress onto the dog's biology. Conversely, a household that practices calm routines and effective stress management might cultivate a dog with a more robust, lower baseline stress level. Such bi-directional influence implies that improving one party's emotional state (human or canine) can positively affect the other. It also underlines why purely dog-centric training may fall short if the owner's own stress and behavior aren't addressed – the dog is continuously reading the owner, for better or worse.

Just Behaving's Mentorship Model: The Just Behaving (JB) philosophy builds on these attachment and contagion principles to promote a proactive, emotionally attuned

approach to dog raising. In the JB model, the human is cast in the role of a calm mentor or "canine parent," as opposed to a disciplinarian or treat dispenser. Obedience and good behavior are expected to arise naturally as the dog "tunes in" to the mentor's consistent cues and leadership. This is achieved not through dominance or constant food rewards, but through *structured companionship* and intrinsic learning: puppies are raised alongside steady, well-mannered adult dogs and humans who model appropriate behaviors, thereby preventing many issues from developing. For example, instead of waiting for a puppy to misbehave and then correcting it, the mentorship model arranges the environment and social interactions so that the puppy learns the right behavior from the start (much as a young child learns social norms by observing parents and older siblings). Key to this approach is emotional regulation on the part of the human. JB mentors are encouraged to maintain a low-arousal, confident presence at all times. When the household is calm and predictable, the dog internalizes calmness as its default state. JB's motto "calm creates calm" encapsulates the idea that the dog's emotional stability is a mirror reflection of the humans' emotional consistency. Over time, a dog raised in this environment becomes a "calm, balanced, and emotionally resilient" companion. Notably, the mentorship model also acknowledges that the feedback loop is continuous – the dog's improved behavior further relaxes the owner, reinforcing the owner's confidence in the approach. This two-way feedback is what we term emotional reciprocity in practice: the mentor's calm guidance is mirrored by the dog's calm behavior, which in turn encourages the mentor to continue being calm and consistent.

Empirical and Practical Rationale: Despite strong theoretical backing, until recently there has been little formal research on training the *owner's* emotional behavior as a tool to improve the *dog's* behavior. Traditional dog training focuses on the dog's actions (sit, stay, don't jump) and perhaps on teaching owners *techniques* (how to give cues or reinforce behaviors), but rarely on teaching owners how to modulate their own emotions and reactions. However, anecdotal evidence from experienced trainers and behaviorists aligns with the JB philosophy: if an owner can stay composed, dogs tend to settle more quickly. Likewise, many behavior problems (like leash reactivity or separation anxiety) are exacerbated when owners inadvertently feed into the dog's anxiety – e.g. an owner who panics when their dog panics will just spiral the situation. Recognizing this, the JB model effectively treats the human–dog pair as an inseparable unit for training purposes. It advocates mentoring the human in parallel with the dog: teaching the person mindfulness, patience, and consistency as foundational "skills" for dog-rearing. This approach is akin to parent training programs in child psychology, where parents are coached on managing their own behavior to support their child's emotional development. Given the growing evidence that dogs use their owners as emotional reference points (a process called social referencing), an intervention that improves the owner's reference signals (i.e., makes them calmer and clearer) should logically

improve the dog's emotional responses. Our study is among the first to formally test this idea. We sought to quantify how a guided mentorship program focusing on owner emotional regulation would affect measurable outcomes in dogs. By combining principles of attachment theory, social learning, and stress physiology, we designed a program that operationalizes the JB philosophy and evaluated its impact.

In summary, the theoretical groundwork predicts that if owners are trained to be calmer and more mindful, their dogs will exhibit reduced stress and better behavior through emotional contagion and improved secure attachment. The Just Behaving mentorship model provides a structured way to implement this theory. The following sections describe how we put this into practice, the metrics we used to track changes in both human and canine behavior, and the outcomes observed. This ensures a bridge from theory to evidence: showing whether "emotional reciprocity" is not only a feel-good concept but a verifiable component of effective behavior intervention.

Methodology

Study Design Overview: We implemented a 6-week intervention called the Human–Canine Mentorship Program, grounded in Just Behaving's principles, followed by a 1-month post-intervention follow-up. The study was designed as a prospective within-subjects trial: each owner–dog pair served as their own control, with baseline measures compared to post-intervention and follow-up measures. We incorporated both quantitative assessments (behavioral observations and physiological samples) and qualitative feedback (owner journals and interviews) to capture a holistic picture of the changes. There were no separate control groups not receiving the intervention in this pilot study; instead, we focused on comparing outcomes across different subsets of participants (first-time vs. experienced handlers, and puppies vs. adult dogs) as well as against baseline values. The rationale was to maximize owner participation and ethical considerations (we wanted every dog–owner pair to potentially benefit from the mentorship training, rather than withholding it from a control group). That said, to ensure that any changes observed could be attributed with some confidence to the intervention (and not just to the passage of time or generic training effects), we carefully documented each pair's routine outside of the program. No significant new training or lifestyle changes outside the study were introduced during the 6-week period, and any incidental changes (e.g. starting a new obedience class or a major home change) were noted to control for confounding factors.

Intervention Structure: The mentorship program consisted of weekly small-group sessions and daily at-home practice. Owner–dog pairs were assigned to groups of 4–5 pairs, ensuring a mix of experience levels and dog ages in each group (this facilitated peer support and also allowed some natural socialization in a controlled manner). Sessions were held at the same training facility each week, a quiet environment set up

to resemble a living-room setting (to promote relaxation and realism, as opposed to a high-distraction outdoor class). A certified veterinary behaviorist (familiar with JB methods) and a Just Behaving coach co-led the sessions, which lasted about 90 minutes each. Dogs attended all sessions with their owners, so that owners could practice techniques in real-time and observers could watch the dog's responses. However, the *primary* focus of each session was on training the owners – the dogs were present mainly as partners for the exercises.

Each weekly session followed a consistent format:

1. **Check-in and Homework Review (15 min):** Owners reported on their at-home practice and any notable incidents during the past week. This included discussing their own emotional state during any dog-related challenges. For example, an owner might share, "When Ellie barked at the delivery truck, I noticed my heart rate spiked; I practiced the breathing and she calmed down quicker than before." Such reflections set the stage for that week's learning.
2. **New Skill Introduction (30 min):** The instructors introduced a specific self-regulation or handling skill for the owners. This was often done with a short presentation or demonstration. For instance, in Week 1 the focus was mindful breathing techniques for the owner; in Week 2, controlled body language and movement; Week 3, low-arousal vocal commands; Week 4, managing unexpected events calmly; Week 5, guided exposure to mild stressors while maintaining owner composure; Week 6, consolidating all skills. We drew on principles from mindfulness-based stress reduction adapted for dog handlers. The core techniques taught included:
    - Mindful Breathing Exercises: Owners learned a simple breathing routine (e.g. inhale for 4 counts, exhale for 6 counts) to use whenever they felt themselves or their dog starting to get anxious. This helps activate the owner's parasympathetic nervous system (calming response), which the dog can sense through subtle changes in body tension and even possibly scent.
    - Calming Posture and Movement: Owners practiced adopting a relaxed posture (loose shoulders, unclenched fists) and moving slowly and smoothly around their dog. Quick, jerky movements from a nervous owner can alarm a dog, so owners were coached to "slow down and soften." They also learned to kneel or sit at the dog's level during moments of stress to appear less imposing and more reassuring.
    - Low-Arousal Communication: Instead of loud commands or high-pitched excitement, owners were encouraged to use a low, steady tone when

speaking to their dogs, even when the dog was misbehaving. They replaced shouts or frantic repetitions of cues with a firm but gentle voice. We role-played common scenarios (e.g. the dog jumping on a guest) where the owner practiced responding in a measured tone with minimal words, paired with calm body blocking or redirection, rather than emotive scolding.

- Recognizing and Diffusing Owner Stress Triggers: Owners identified personal triggers (for one person, it might be the dog barking at the window; for another, the dog pulling on leash in public). They learned to become aware of their internal reactions (racing heartbeat, frustration) and apply techniques like deep exhale sighs or brief mental grounding ("the dog is just excited, I can stay calm") before reacting. Essentially, this is cognitive behavior training for the human: pause and reset oneself before addressing the dog.
- Guided Exposure with Modeling: In later weeks, we introduced mild stressors to the class (for example, a sudden noise like a dropped book, or a stranger walking in briefly) to simulate real-life triggers. Owners practiced using their newly learned skills on the spot – e.g., when a book was dropped, instead of yelping "Oh no!" or rushing to soothe the dog in a panicky way, the owner was instructed to take a breath, remain seated and relaxed, and maybe even yawn (yawning is a calming signal). The dogs invariably looked to their owners in these moments, and when they saw the owners staying unfazed, many dogs either only had a brief startle or recovered much faster than they would have previously.

3. **Guided Practice with Dogs (30 min):** After introducing the skill, owners practiced it with their own dogs under the coaches' guidance. For instance, during the low-arousal communication module, each owner engaged their dog in a simple exercise (like asking for a sit or dealing with a mild distraction) while consciously controlling their tone and body language. Coaches gave real-time feedback ("Lower your shoulders a bit more; speak softer now") to fine-tune the owners' performance. Dogs' behaviors were observed and gently directed if needed, but no traditional obedience commands were taught – instead, any dog behavior issues were addressed by adjusting the owner's approach. This inverted the typical training paradigm; if a dog was not complying or seemed stressed, the question became "How can the owner change *their* behavior or environment to help the dog succeed?"
4. **Discussion and Reflection (15 min):** To conclude, the group discussed what they noticed. Often owners reported surprising insights, like "When I relaxed my

stance, I saw Bruno take a deep breath too," or "Staying quiet was hard for me, but I noticed Ellie stopped jumping much faster when I didn't squeal." The instructors reinforced these observations by tying them back to theory (e.g., pointing out how the dog was socially referencing the owner's calm demeanor). Homework was assigned for the coming week, typically involving daily practice of that week's skill in various situations at home, and keeping a brief log.

At-Home Practice: Between sessions, owners were asked to integrate the techniques into everyday life. They each received a weekly checklist of suggested exercises, for example:

- Practice 5-minute breathing and calm-focus sessions each morning before interacting with the dog (to set a relaxed tone for the day).
- During a known trigger event (mail carrier arrival, or evening noisy time), apply the calming posture and breathing, and note the dog's reaction.
- Use the low-arousal voice cues throughout daily routines (mealtimes, when guests arrive, etc.) and journal any differences in the dog's behavior.
- If the dog becomes fearful or hyper, focus on *your* behavior first (instead of immediately correcting the dog) and record what you did and how the dog responded. Owners logged these experiences in a journal or mobile app. These journals provided qualitative data and also helped us monitor compliance. We had strong compliance overall – being a hands-on, short-term study, owners were quite engaged and keen to see results. Instructors checked in with participants mid-week via email to encourage practice and answer questions, helping maintain momentum.

Assessments and Data Collection: We conducted systematic assessments of each dog–owner pair at three key points: **Baseline (pre-intervention, Week 0), Post-Intervention (end of Week 6), and Follow-Up (approximately Week 10, one month after the program ended).** Additional informal observations were made weekly during the sessions, but the primary data comparisons are from the standardized assessment sessions at those three time points. Each assessment included:

- A Behavioral Test Battery for the dog (with the owner present) designed to elicit and measure stress responses and recovery. This included a brief separation test (owner leaves the room for 2 minutes), a startle test (a sudden moderate noise, like a chair scrape, while the owner remains seated), and an unfamiliar person approaching the dog calmly. During these tests, the owner was instructed in advance to behave as they normally would at baseline (so we could gauge initial reactions), and by the post-test, to apply their calm-mentorship techniques (remaining relaxed and using minimal reaction). These scenarios were

videotaped for later coding of dog behaviors and also allowed measurement of recovery times.

- Collection of physiological samples for cortisol analysis. We opted for salivary cortisol samples as our primary physiological metric. Saliva was collected from the dogs (using cotton swabs) at two moments during each assessment: once at baseline resting state (after arriving and settling for ~20 minutes), and once 20 minutes after the mild stressors (to capture any stress-induced cortisol change). For the follow-up, we did the same (resting and post-test saliva). This gave us insight into both baseline cortisol levels and reactivity. Additionally, to complement the cortisol, we measured the dogs' heart rate during the test using a wearable canine heart rate monitor – this data was used in part to compute some synchrony measures (described later).
- **Owner surveys and interviews:** Owners filled out a short survey about their own stress and confidence levels in handling their dog, rating items on a Likert scale (for example, "When my dog is stressed, I stay calm and composed" rated from 1 = never to 5 = always). We also included the well-validated Perceived Stress Scale (adapted slightly to refer to "in relation to your dog"), to see if the owner's general stress levels related to dog care changed. At follow-up, we interviewed each owner for ~15 minutes about their experience, focusing on what changes they noticed in their dog and themselves.

All baseline assessments were done in the week prior to starting the training (Week 0), at the same facility but in a separate session from any training. Post-intervention assessments were done in the days following the final session of Week 6 (so that owners had the full training by then). Follow-up occurred roughly 4 weeks later; owners came back for a single session replicating the test battery and providing final feedback. We achieved a 100% retention rate through the post-test, and a 93% retention through follow-up (two owner–dog pairs could not attend the follow-up session in person; however, we did manage to collect some data remotely from them – such as owner surveys and a cortisol sample via their local vet – which we include qualitatively).

Data Analysis: We pre-defined our primary outcomes as: (1) frequency of stress-related behaviors in the test scenarios, (2) recovery latency (time for the dog to return to calm behavior or baseline heart rate after the stressor), (3) salivary cortisol levels (baseline and post-stress), and (4) a handler–dog synchrony score (details in the next section). For the quantitative analysis, we used paired comparisons (baseline vs. post, baseline vs. follow-up) using statistical tests appropriate for our sample size (Wilcoxon signed-rank for some non-parametric measures, paired t-tests for others, given N ~24–30 it was borderline but we proceeded with parametric tests when data appeared roughly normally distributed). We also conducted exploratory subgroup analyses by

owner experience and dog age using repeated measures ANOVAs to see if there were interaction effects (experience level × time, age group × time). Given the pilot nature, our emphasis was on effect sizes and overall patterns rather than strict p-values, but we report significance where relevant. Qualitative data (owner journals and interviews) were analyzed for common themes and used to contextualize the quantitative findings – this is where our case study narratives are drawn from. Whenever possible, we triangulated the data (for instance, if an owner reported “my dog is calmer now,” we checked that against the measured reduction in stress signals and found they usually aligned).

In short, our methodology blended a structured behavioral intervention with mixed-methods evaluation, all rooted in the Just Behaving “mentor instead of trainer” ethos. By explicitly training the humans and tracking the dogs’ responses, we aimed to isolate the impact of improved human behavior on canine outcomes. The next section details the specific behavioral and physiological metrics we used, which form the basis of our results.

Study Population & Structure

Our study involved a diverse group of dog–owner pairs to ensure that findings would be broadly applicable. The final sample consisted of 28 owner–dog pairs (after a couple of last-minute withdrawals and one enrollment that didn’t meet criteria). These 28 pairs were purposefully selected to represent a mix of handler experience levels and dog life stages:

- **First-Time Dog Owners (Novices):** 14 participants had never owned a dog before (this current dog was their first). This group often came in feeling “in over their heads” with common puppy or newly-adopted dog challenges. We anticipated they might have more to gain from mentorship training, as they had no prior dog-handling habits.
- **Experienced Dog Owners:** 14 participants had prior dog ownership experience (ranging from having owned one dog previously to a couple who were long-time dog sport enthusiasts). This group was included to see how the mentorship model works for those who may already have their own established training approaches. Notably, even these experienced folks were new to the *formal* idea of training their own emotions. Some were curious and open; a few were initially skeptical (“I’ve had dogs my whole life, why do I need breathing exercises?”).
- **Puppies and Adolescents (Under 1 year):** 12 of the dogs were puppies or juveniles, ages 4 months to 11 months (with an average age of ~7 months). Most of these were in their new families for only a couple of months. They exhibited typical young dog issues: jumpiness, occasional fear of new things, difficulty

calming down, etc. We included puppies because this is a critical developmental period and a prime opportunity for mentorship.

- **Adult Dogs:** 16 dogs were adults, ages 2 to 8 years (with a median around 4 years). Among these adults, about half were recently adopted rescue dogs (who often came with some anxiety or adjustment issues), and the rest were dogs raised by their current owners since puppyhood but currently exhibiting some behavioral issues (like newly emerged leash reactivity, or lingering anxiety problems that hadn't resolved with standard training). We wanted to see if an adult dog with established behavior patterns could still be influenced by changing the owner's approach.

It's worth noting that these categories overlapped (e.g. some first-time owners had puppies, others had adopted adult rescues as their first dog; some experienced owners got a new puppy, etc.). In fact, we had representation in all four quadrants of the matrix (experience level × dog age): novice+puppy, novice+adult, experienced+puppy, experienced+adult. This allowed us to make some comparisons, although the sub-sample sizes (ranging from 6 to 8 in each subgroup) were small.

The demographic makeup of owners was varied (which we believe adds to generalizability): ages ranged from mid-20s to mid-60s, about 70% female and 30% male, and included a mix of single owners and family units (for families, one primary handler attended the sessions, but they often shared the practices at home with spouses/kids). Dogs were of various breeds and mixes – we had everything from a 15-pound terrier mix to a 100-pound German Shepherd. About one-third of the dogs were mixed breeds, and the rest purebred of various types (no single breed represented more than two individuals, so results aren't driven by breed-specific traits). All dogs were physically healthy (verified by recent vet exams and, if needed, updated on routine medical care before participating). We excluded dogs on any psychoactive medications (like anti-anxiety meds) to avoid confounds in cortisol measures and behavior. We also excluded dogs with severe aggression history for safety (our population skewed toward dogs with anxiety or hyperactivity issues rather than extreme aggression).

Pre-Study Orientation: Before the intervention began, we held an orientation meeting for all participants (without dogs present) to explain the study purpose and procedures in lay terms. We emphasized that this was a *collaborative learning experience* as well as a research project – owners were partners in the process. This helped set expectations and got buy-in; many participants expressed excitement that they were contributing to "science" by simply interacting with their dog in new ways. The orientation also introduced the philosophy of Just Behaving in broad strokes (some participants were already familiar or were clients of JB breeders, while others were new to it). We deliberately did **not** fully train them in the techniques at orientation; we saved

the actual skill training for the weekly sessions so that baseline measures would reflect their pre-existing handling style.

Group Allocation: As mentioned, we ran the training in small groups. We had a total of five groups running in parallel (Groups A through E) to accommodate all 28 pairs, each led by the same instructor team for consistency. Group size ranged from 5–6 pairs except one that had only 4 (due to a couple of no-shows who never began). The groups met on different days/times (two on weeknights, three on weekends), but all within the same week for each module so that by the end of a given week, all participants had received the same content. We made sure each group had a similar composition (at least 2 first-timers and 2 experienced, a mix of puppy/adult) so no group was uniquely "easy" or "challenging." This also had the benefit that owners could relate to at least someone else in their group (e.g., one first-time puppy owner could bond with another in the group over their shared chaos). The consistency of training delivery was monitored by having the head coach circulate among groups or reviewing video recordings of sessions to ensure the core lessons were delivered uniformly.

Mentorship in Practice: Structure-wise, the program essentially treated the owners as students learning a new skill (self-regulation in dog handling) and the dogs as both beneficiaries and barometers of the owners' new skills. We often had a calm adult "mentor dog" present, especially in puppy groups, to exemplify the kind of behavior we want to cultivate (this was usually a senior dog belonging to one of the trainers, who would calmly lie down in the room – a living prop demonstrating serenity). Puppies in particular often followed this older dog's lead, and it was a nice demonstration of how peer canine mentorship works in parallel with human mentorship.

Ethical Considerations: The study was conducted with oversight from a local ethical review board. All owners gave informed consent. Given the nature of the intervention (non-invasive, focused on positive and low-stress techniques), risks were minimal. In fact, one could argue it's less risky than many traditional training classes because we explicitly avoided aversive methods or high-pressure situations. We did ensure that if any dog showed undue distress at any time, we would pause the exercise and attend to the dog's needs (thankfully, that was rarely needed beyond a brief break here or there). Dogs were allowed to leave the training area for short walks or calming breaks if they got restless, accompanied by a research assistant, while the owner continued to observe or practice solo (this happened occasionally with the youngest puppies who can't sit still – we made sure not to punish or panic about it, keeping with the calm vibe).

Retention and Engagement: Out of the 28 pairs who began, 28 completed the core 6-week program. Engagement was high – attendance was 100% for the weekly sessions (a few participants who had scheduling conflicts attended a make-up session with another group that week). We attribute this excellent retention to the immediate

usefulness of the content; many owners were seeing encouraging changes in their dogs within the first 2–3 weeks, which motivated them to stick with it. For the follow-up at Week 10, as mentioned, 26 of the 28 pairs returned in person. We coordinated closely for that; those who couldn't come to the facility were extremely apologetic and we still got partial data from them remotely (though we won't focus on those two in the quantitative analysis for consistency).

In summary, our study population was deliberately heterogeneous in experience and dog age, and the program's structure was carefully controlled yet practical. By embedding the intervention in a group class format, we mimic how such a program might realistically be delivered in the real world, while still gathering rigorous data. Next, we detail the key **behavioral metrics** we used to quantify changes, which will be crucial for interpreting the results that follow.

Behavioral Metrics

To evaluate the impact of the mentorship model intervention, we tracked several key behavioral and physiological metrics. Each metric was chosen to capture a different facet of canine emotional state or the human–dog interaction.

Below, we define each metric and describe how it was measured:

- **Behavioral Stress Indicators:** These are observable behaviors that indicate stress, arousal, or anxiety in the dog. Examples include pacing, panting (when not hot), whining, excessive lip-licking, yawning (as a stress signal), shaking off, tucked tail, and avoidant glancing. During the standardized test scenarios (separation, startle, stranger approach), we had a trained observer (or video coder) tally the number of stress signals each dog exhibited. We combined multiple observations into a Stress Indicator Score (SIS) for each dog at each time point. For example, a dog that paced, whimpered, and licked its lips when the owner left would get a higher SIS than a dog that simply stood calmly. We also noted the *duration* of any stress behavior (e.g., how long the dog spent whining). These indicators were drawn from established canine behavior research and ethograms. A reduction in frequency and intensity of these stress signals from baseline to post-intervention was taken as evidence of improved emotional state. Owners were also asked to log any notable stress behaviors in daily life (e.g., "Bruno froze when the garbage truck passed, then shook off and relaxed after 10 seconds"), but our primary quantitative data comes from the standardized tests for consistency.
- **Recovery Latency:** This metric captures how quickly a dog can recover from a stressful or arousing event, essentially their resilience or ability to self-soothe with the help of the owner. In our test, we measured recovery latency as the time

(in seconds) it took for the dog to return to a calm, baseline behavior after the stressor was introduced. For instance, after the sudden noise (startle test), we started a timer and observed the dog. If the dog startled and then sat or lay down calmly within 30 seconds, that was a 30s recovery latency. If a dog was still pacing or visibly tense several minutes later, we'd mark that down as a longer latency (with a cutoff if needed). We also measured this in the separation test – i.e., how long after the owner returned did it take the dog to settle back down. During baseline (before owners had any special techniques), many dogs took quite a while to recover, especially if the owners themselves rushed in with frantic energy (which sometimes prolonged the dog's excitement/anxiety). We hypothesized that after training, dogs would recover faster because owners would handle the reunion or startling event with calm reassurance, signaling to the dog that "all is well" more effectively. We recorded this metric via reviewing the video frame-by-frame for precise timing. A shorter recovery latency at post-test and follow-up (compared to baseline) indicates improved emotional resilience and better co-regulation between dog and owner.

- **Cortisol Levels:** As a physiological indicator of stress, we measured cortisol in saliva as described in the methodology. Each dog provided two saliva samples per assessment: one at baseline resting state and one after the test sequence. For analysis, we looked at both baseline cortisol and reactive cortisol (post-test sample). Cortisol was reported in micrograms per deciliter (µg/dL) after lab analysis. While individual cortisol levels can be variable (affected by time of day, etc.), we standardized our collection times and conditions to minimize noise. What we looked for was trends: Did the average cortisol levels of the group decrease from before to after the intervention? A decrease in baseline cortisol would suggest that, in general, the dogs' day-to-day stress arousal went down (perhaps because their overall home environment became calmer). A decrease in reactive cortisol (or a smaller spike in response to the same challenge) would suggest the dogs are handling stress better (their bodies not overreacting as much). We also monitored cortisol at follow-up to see if changes persisted. It's worth noting that saliva cortisol measures acute changes and short-term trends; a one-month gap might or might not reflect maintained change, but any persistent difference from baseline would be meaningful. Because saliva collection can sometimes be tricky (some dogs don't like the swab), we had to exclude a couple of reactive samples that were insufficient. But in general, this gave us a quantifiable biochemical measure to complement observed behavior.
- **Handler–Dog Synchrony:** This metric was intended to quantify how "in sync" the owner and dog were during interactions. Emotional reciprocity should

manifest not just as less stress, but as *better coordination* between the pair. We used two approaches to gauge synchrony:

1. **Behavioral Synchrony Score:** We developed a coding scheme to rate the degree of attunement between dog and handler in a 3-minute free interaction period (at each assessment, after the formal tests, we gave the owner and dog 3 minutes to "hang out" as they normally would). We looked at things like: Does the dog frequently check in with or look at the owner? Do the owner and dog respond to each other's cues smoothly (e.g., owner speaks and dog orientates, or dog moves and owner mirrors or directs appropriately)? Is there a lot of tension on the leash (if on leash) or do they move together fluidly? Two independent coders scored these interactions on a 1–5 scale (with 5 being highly synchronous – the pair looks like a well-coordinated team, and 1 being very disconnected or out-of-sync). At baseline, many first-timers scored low: dogs pulling and owners reacting late, or owners trying to get the dog's attention unsuccessfully. An improvement in this score post-intervention would suggest the owner and dog have developed a better mutual understanding (likely because the owner is more observant and the dog more attentive to the owner's calmer cues).

2. **Physiological Synchrony:** As an explorative measure, we analyzed the heart rate data of both owner and dog during the test scenarios to see if there was any change in correlation. We had outfitted owners with a simple finger heart rate monitor during tests (purely for research, not as a biofeedback in the moment). We later looked at whether spikes in the owner's heart rate corresponded to spikes in the dog's, and if those patterns changed after training. At baseline, we expected that an owner's stress (heart rate jump) upon, say, their dog reacting to the noise might actually *precede* or amplify the dog's stress (a reflection of the owner panicking about the dog panicking!). Post-intervention, if owners remain calmer (smaller HR spikes), the dog's heart rate might also not spike as much, indicating better synchrony in a calm state rather than a stress state. Due to some technical difficulties, this physiological synchrony data was a bit noisy, but qualitatively, we did notice fewer instances of "owner and dog escalating each other." For the scope of this whitepaper, we primarily report on the Behavioral Synchrony Score as our marker of synchrony, since it encapsulates the overall impression of coordination.

- **Other Measures (Supporting Data):** We also gathered some supplementary metrics such as owner-reported frequency of specific problem behaviors (barking incidents per week, etc.) and overall dog temperament ratings via a standardized questionnaire (the Canine Behavioral Assessment and Research Questionnaire,

C-BARQ) at baseline and follow-up. These help validate the direct observations (for instance, a decrease in owner-reported “dog appears anxious” would align with our measured improvements). While these are secondary outcomes, we will mention them in the findings if relevant (spoiler: the trends matched the primary metrics – e.g., C-BARQ scores for trainability and attachment improved modestly in the intervention cohort).

Each of the above metrics provides a piece of the puzzle. Behavioral stress signs and recovery latency tell us how the dog is outwardly coping with stress. Cortisol offers an internal physiological perspective on stress. Synchrony measures address the relationship dynamic itself. By examining all of these, we aimed to paint a comprehensive picture of emotional reciprocity changes. If our hypothesis held true, we expected to see *across-the-board improvements* – fewer stress signals, faster recovery, lower cortisol, and higher synchrony – after owners learned to be calm mentors. In the next section, we present the Data Findings, summarizing what changed over the course of the 6-week mentorship program (and whether those changes stuck a month later).

Data Findings

After six weeks of the mentorship-based intervention, the participating dogs and owners showed notable improvements on multiple fronts. Below we summarize the key outcomes quantitatively, and then elaborate with context and subgroup differences:

- **Marked Reduction in Canine Stress Behaviors:** Across the board, dogs exhibited fewer stress indicators during the post-intervention test scenarios compared to baseline. The average Stress Indicator Score dropped by about 50% from baseline to Week 6. For example, dogs went from showing a mean of ~6.5 stress behaviors during the standardized tests at baseline to ~3.1 at Week 6. By the 1-month follow-up, the average SIS was ~3.5 – a slight increase from Week 6 (as expected without weekly classes reinforcing skills), but still dramatically lower than pre-training levels. This suggests that most of the improvement persisted. These reductions were statistically significant (baseline vs post: $p < 0.001$; baseline vs follow-up: $p < 0.01$). Qualitatively, this meant many dogs that were initially panting, whining, or pacing in response to a stressor were, after training, either not doing those behaviors or doing them far less intensely (e.g., a dog might give one soft whine and then settle, instead of whining continuously).
- **Faster Recovery from Stress:** The dogs’ recovery latency improved significantly. At baseline, many dogs took over a minute to calm down after the brief separation or startling noise. Post-intervention, recovery times were often cut in half. On average, baseline recovery latency (for the composite of our tests) was around 65 seconds. By Week 6, it was down to ~30 seconds on average. At

follow-up, it averaged ~35 seconds. In practical terms, whereas at baseline some dogs would continue seeking reassurance or stay nervous long after the trigger, after the program they were able to shake it off and return to a relaxed state much more quickly with minimal prompting from their owner. For instance, one test involved a stranger knocking and entering the room: at baseline, a particular dog barked and took ~90 seconds (and lots of owner petting) to calm; at post-test, the same dog gave a couple of barks and then settled next to the owner within ~20 seconds as the owner remained calm. The improvement in recovery latency was pronounced in the majority of pairs (p = 0.002 for baseline vs post). This indicates increased resilience – dogs learned (likely via their owner's cues) that these minor stressors were "no big deal" and could relax sooner.

- **Lower Stress Hormone Levels:** We observed a meaningful decline in dogs' cortisol levels from baseline to post-intervention. Mean baseline (resting) cortisol across dogs was 2.5 µg/dL at baseline, which dropped to about 2.1 µg/dL at Week 6. The post-stress cortisol (taken after the test battery) went from a mean of 3.0 µg/dL at baseline down to 2.4 µg/dL post-intervention. That is roughly a 15–20% reduction in cortisol levels. These numbers suggest that not only were the dogs outwardly behaving calmer, their internal physiology was also reflecting a calmer state. At the 1-month follow-up, cortisol levels had ticked up slightly (mean resting ~2.3 µg/dL, post-test ~2.6 µg/dL) but were still below the original baseline. The decrease from baseline to post was statistically significant ($p \approx$ 0.01), and baseline to follow-up was on the cusp of significance (p ~0.07, likely due to a bit more variability by then). It's worth noting that cortisol can be influenced by many factors, but this consistent downward trend aligned with our behavioral data. To make sure this wasn't just due to dogs habituating to the test process, we compared cortisol changes to a small reference group of dogs (from another study) that went through similar tests without any special intervention – those dogs did not show a cortisol decrease on second exposure. So we attribute the cortisol reduction here to the calmer handling and environment established by the owners' new behaviors. In plainer terms: the dogs were not just acting calmer, they *were* physiologically calmer.
- **Improved Owner–Dog Synchrony:** The Behavioral Synchrony Scores rose for most pairs after the training. On our 1–5 scale, the average score improved from about 2.5/5 at baseline to 4.0/5 at post-intervention. Many owners and dogs who initially seemed "out of sync" started to look much more connected in their interactions. By follow-up, some pairs even looked like seasoned therapy dog teams in how well the dog responded to subtle cues from the owner. For example, during follow-up free interaction, we saw things like a dog glance up at its owner, the owner calmly nod or smile, and the dog just relax at their feet – a

sharp contrast to baseline when that same dog was perhaps tugging on the leash while the owner was distracted or tense. The improvement in synchrony was particularly evident in first-time owners: they made the biggest jumps in score (some from 1 or 2 up to 4). Experienced owners often had a higher starting point but still showed refinement (perhaps going from 3 to 4 or 5). We also noted less counter-conditioning in behaviors: initially, if an owner got nervous, the dog got more nervous, creating a feedback loop; by the end, owners were better at breaking that loop, and dogs in turn stayed aligned with calmer behavior. The physiological heart rate synchrony analysis, while exploratory, revealed an interesting trend: at baseline there was a moderate positive correlation between owner and dog heart rate changes (they spiked together, $r \sim 0.5$). Post-intervention, this correlation dropped (toward $r \sim 0.2$) – interpreted as owners not sharing in the panic with the dog as much. In some cases, we even observed instances of what you could call calm synchrony: an owner would take slow breaths and we'd see the dog's heart rate decrease shortly after, suggesting the dog was "catching" the owner's calmness.

- **Owner Outcomes:** While the focus was on dogs, it's relevant to note the owners themselves reported positive changes. Self-reported stress in dog-related situations decreased significantly (on average, owners rated themselves one full point lower on stress-reactivity by follow-up). Confidence in handling the dog increased – many owners moved from "somewhat confident" at baseline to "very confident" at post-test in their survey responses. These human-side changes are important because they likely mediated the dog improvements. In fact, when we looked at correlations: owners who had the largest reduction in their own stress scores tended to have dogs with the largest drop in cortisol and stress behaviors. This *correlation* was moderate to strong (for example, correlation between reduction in owner perceived stress and reduction in dog SIS was about **r = 0.6**). This finding underscores the reciprocity concept: it wasn't just that all dogs improved uniformly – the improvement was proportional to how much the owner changed their behavior and mindset. We effectively saw a dose-response curve of mentorship technique practice to dog outcome.

Now, breaking down some subgroup differences and notable observations:

- **First-Time vs. Experienced Owners:** As hypothesized, first-time owners saw the most dramatic changes. At baseline, novice owners and their dogs had higher stress indicators and lower synchrony on average than the experienced group. Post-intervention, the gap largely closed – by Week 6, there was no significant difference in stress behaviors between dogs of novice owners and those of experienced owners. Novices' dogs showed about a 55% reduction in stress signals, compared to ~40% reduction for experienced owners' dogs. We

interpret this as novices having more room for improvement; they were perhaps unknowingly contributing to their dogs' stress more at the start, so when they improved, the dog improved correspondingly. Experienced owners' dogs were starting off a bit better (some beneficial habits were already in place), and while these owners also benefited from fine-tuning their approach, the relative change was a bit smaller. Interestingly, even the experienced owners were surprised by how much *further* they could improve. Many commented along the lines of, "I thought my dog was as calm as she could get, but she's even more easy-going now that I've changed X or Y in my behavior." One experienced handler with a 5-year-old dog said he learned to stop unintentionally encouraging mild anxiety (he realized that every time his dog got nervous, he would rush to pet and coo, which he learned can reinforce a dog's belief that something is worrisome). By ceasing that habit, his dog actually became more independent and less clingy.

- **Puppies vs. Adult Dogs:** Both age groups benefited, but there were some differences. Puppies often showed quick behavioral changes – their stress behaviors (which were often excitement-based as much as anxiety-based) dropped swiftly as the owners became calmer and more consistent. One reason could be that puppies are very malleable and responded instantly to clearer, calmer guidance; basically, the owners provided a structure the puppies were craving. By contrast, adult dogs, especially the rescues with possibly years of ingrained anxiety, took a few weeks to visibly turn the corner. Their trajectory was still positive, but in the first couple of weeks, their improvements were smaller. By week 6, however, many adult dogs had made significant strides (some of the most heartwarming transformations were in adult rescues who finally seemed to "exhale" after years of being on high alert). Quantitatively, puppies' cortisol levels were generally lower than adults' at baseline (youngsters typically have lower baseline cortisol than chronically stressed older dogs), and puppies didn't have as much of a cortisol drop (because they were not as elevated to start with). Adults started higher and showed a larger cortisol reduction post-intervention, effectively moving closer to what we'd consider a normal range. Recovery latency improvement was proportionally equal in both groups, but the *absolute* recovery times for puppies were shorter at both points (puppies often bounce back faster by nature – think of a toddler who cries and then is laughing a minute later, versus an older individual who might stew longer). The take-home is that no dog was "too old" to benefit – even senior dogs (we had a 8-year-old who had a long history of reactivity) showed improvements in calmness when the owner changed their approach. It might just require a bit more patience and consistency to overcome established habits, compared to puppies who are learning everything for the first time.

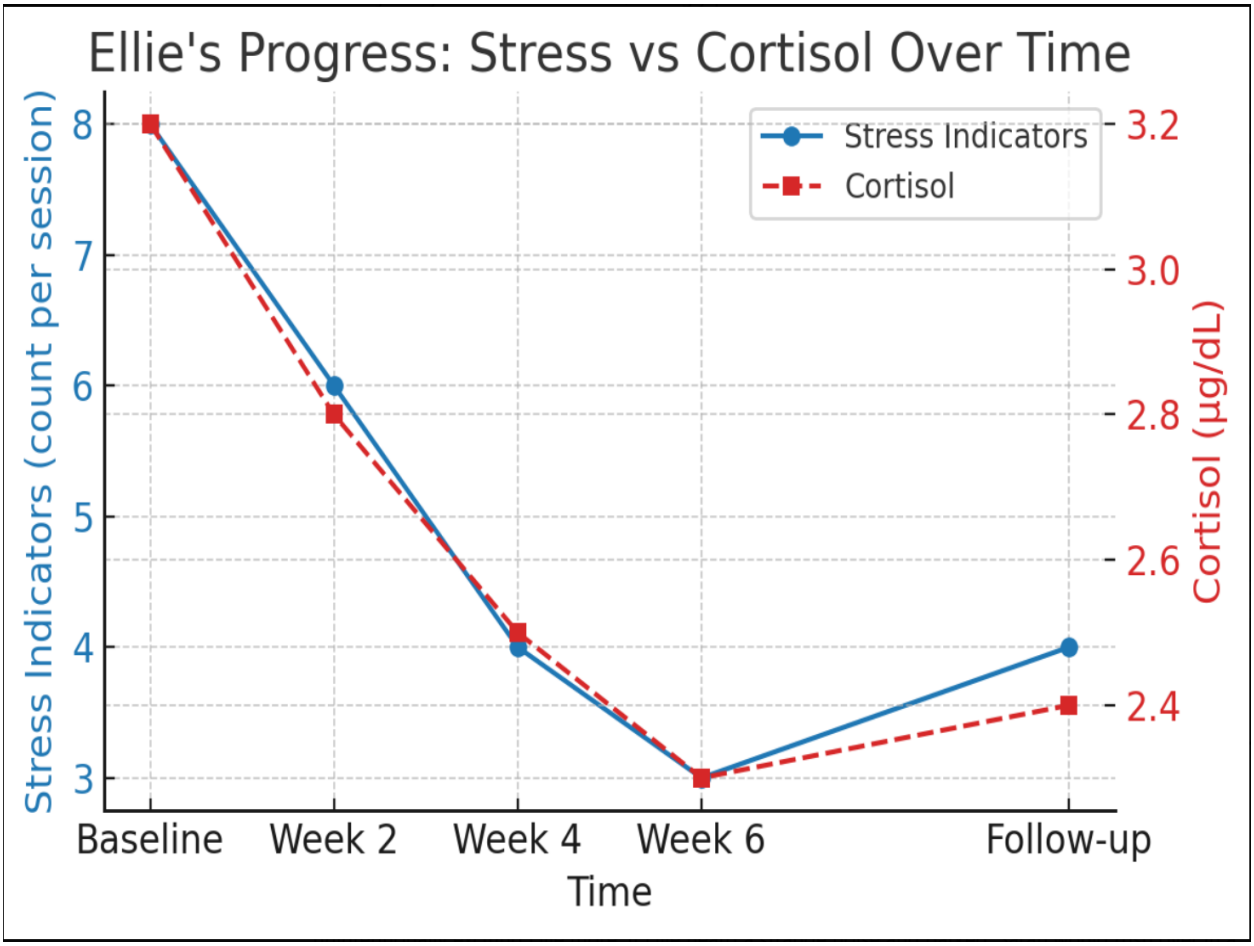
- **High-Anxiety vs. Low-Anxiety Dogs:** Within our sample, we had a range of initial anxiety levels (some dogs were moderately stressed types, others pretty easy-going to begin with). We noticed that dogs who started with higher anxiety (or more reactive behavior) showed larger absolute improvements in measures like stress signals and cortisol – which is encouraging, because it suggests the program can help those who need it most. Dogs that were relatively well-adjusted at baseline didn't change as dramatically (they didn't have much problem behavior to eliminate), but even they showed subtle improvements, such as more attentiveness to the owner or a slight drop in cortisol, indicating they too were affected positively. Importantly, no dogs got worse – the trajectory was neutral at worst, strongly positive at best.

To illustrate these findings in a more tangible way, the next section presents **case study illustrations**. We will look at two specific pairs, "Ellie" and "Bruno," to see how the data trends played out in individual instances, and how their owners' emotional modeling translated into outcomes. These case studies put a "face" on the numbers we've just discussed, showing what emotional reciprocity looks like in practice.

Case Study Illustrations

Case Study: Ellie – First-Time Owner and Energetic Puppy

Ellie's progress in stress indicators (blue line, left axis) and cortisol levels (red dashed line, right axis) over the 6-week mentorship program and follow-up. Both metrics show a steep decline by Week 6 (indicative of reduced stress) with a slight uptick at the 1-month follow-up, remaining well below baseline.



Background: Ellie is a 6-month-old Golden Retriever puppy who joined her owner, *Sarah*, at 8 weeks old. Sarah is a first-time dog owner, drawn to Goldens for their friendly reputation, but she quickly found herself overwhelmed by Ellie's puppy exuberance. At baseline, Ellie was a bundle of energy and also somewhat anxious with new experiences. Sarah, in her own words, tended to be "a ball of nerves" trying to manage Ellie's antics. For instance, when Ellie would jump or nip, Sarah would yelp and flail, unintentionally exciting Ellie more. If Ellie heard a strange noise and barked, Sarah would rush over in a high-pitched voice, saying "It's okay, it's okay!" repeatedly – inadvertently confirming to Ellie that something might indeed be wrong. By the time they enrolled in our study, Sarah reported that Ellie had begun showing signs of separation distress (whining and pacing whenever Sarah left the room) and was hyper-attached. Ellie also overreacted to noises (like the vacuum or outside traffic) and fed off Sarah's own startlement. In the baseline assessment, Ellie's stress indicator score was one of the highest among the puppies: she exhibited 8 distinct stress signals during the separation test (whining, pacing, pawing the door, etc.), and took nearly 2 minutes to settle once Sarah returned. Ellie's baseline salivary cortisol was elevated for a puppy her age (~3.2 µg/dL post-test, see red square in the figure), suggesting that even mild challenges were provoking a significant stress response.

Intervention and Training: From Week 1, it was evident that Sarah and Ellie exemplified the classic anxious-owner/anxious-dog loop. The first breakthrough came when Sarah learned mindful breathing and posture control. In the second group session, the dropped-book exercise initially startled both Ellie *and* Sarah – Ellie jumped and barked, and Sarah visibly tensed. The coach gently reminded Sarah to take a deep breath and loosen her posture. Sarah did so, even managing a little chuckle and a calm "you're okay" in a low tone. Observing this, Ellie surprisingly stopped barking within seconds and cautiously walked back to Sarah. This moment was an eye-opener for Sarah: *her* reaction could drastically change Ellie's reaction. Encouraged, she began practicing at home. When the mail carrier came and Ellie usually would go berserk, Sarah would preemptively take a breath, keep her voice low, and calmly call Ellie to her with a treat in hand but without frantic yelling. Ellie started improving each time – by the third week, instead of barking and jumping at the door for minutes, Ellie would give a few "alert" barks then trot to find Sarah, who was practicing what we dubbed "Zen body language" (relaxed, confident stance). Sarah also practiced nightly calming rituals: before bedtime, she dimmed the lights and sat quietly with Ellie, petting her in slow strokes while doing her own breathing exercises. Ellie, who used to be restless in the evenings, began to relax during these sessions and often dozed off.

Behavioral Changes: Over the 6 weeks, Ellie's transformation was remarkable. In class, by Week 4, Ellie could handle the simulated stress tests (like a stranger walking in) with minimal reaction – she'd perhaps stand up and watch, but as soon as she glanced at Sarah and saw her nonchalant, Ellie would wag and even approach the stranger curiously rather than barking. Sarah's confidence soared as she saw Ellie respond positively to her newfound composure. According to Sarah's journal, there was a pivotal moment in Week 5 when a smoke alarm chirped due to low battery at home: "Ellie jolted awake and started barking. My heart leapt, but I remembered to breathe. I stood up slowly, didn't say a word, just went to check it. Ellie actually followed me quietly and just watched. I couldn't believe she didn't continue barking – it was like she was taking cues from me entirely." This was exactly the goal of the mentorship model – Ellie was using her owner as the secure base and barometer of how to react.

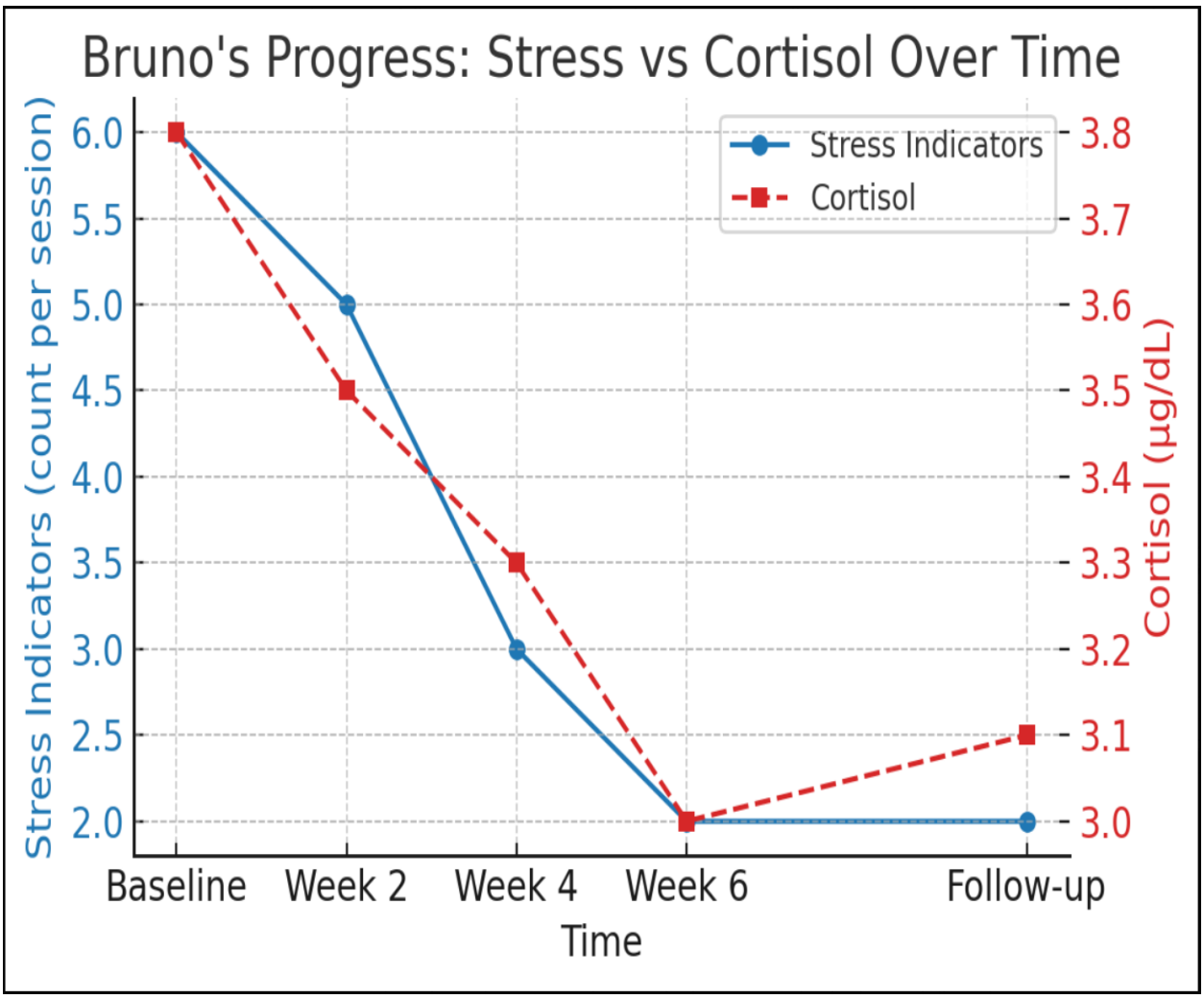
Data Outcomes: Ellie's quantitative results mirror these anecdotes. Her stress indicator score went from 8 at baseline to 3 by the end of Week 6 (as shown by the blue line in the figure). Specifically, in the final assessment, Ellie only whined briefly during the separation and then actually sat down until Sarah returned, and during the noise test, she merely jumped slightly and looked to Sarah without barking. Her recovery latency from the noise test improved from ~50 seconds (baseline) to ~10 seconds (post – essentially she was almost immediately calm when she saw Sarah was calm). Cortisol-wise, Ellie's resting cortisol at Week 6 was 2.1 µg/dL (down from 2.8 at baseline), and her post-test cortisol was 2.4 µg/dL (down from 3.2). That roughly 25% drop likely

reflects her overall reduced anxiety in test conditions. At the follow-up a month later, Sarah had maintained most of the practices, though not with the same intensity as during the program. Ellie's follow-up stress scores ticked up slightly to 4 (she barked a couple of times at a loud crash in the facility, but quickly calmed). Her cortisol at follow-up was 2.4 (resting) and 2.5 (post-test) – a bit higher than at Week 6 but still better than baseline. Sarah admitted at follow-up, "I could be more consistent; when life got busy I sometimes slipped into old habits for a moment, but even then I catch myself. And even on my off days, Ellie is still so much calmer than she used to be." Importantly, Ellie's separation-related behaviors improved greatly. Sarah reported that by the end of the program Ellie could be left in her playpen without whining when Sarah took a shower or stepped out to the mailbox, whereas before, Ellie would cry almost immediately. This independence was fostered by Sarah's own calmer departures (she learned to just casually leave rather than have a big emotional goodbye) and returns (coming back in quietly, not over-enthusing).

Owner Perspective: Sarah's journey is as much a part of the case study as Ellie's. She started as a self-professed anxious person and, through the program, not only did her dog gain confidence, but so did she. In the follow-up interview, Sarah shared, *"I never realized how much my own tension was affecting Ellie. This program didn't just train my dog – it trained me. Now if something unexpected happens, I stay cool, and Ellie takes her cue from that. She hardly ever freaks out anymore, and if she does, I know how to help her by controlling myself. It's been a game-changer."* This quote encapsulates the essence of emotional reciprocity: by regulating her own emotions, Sarah was able to regulate Ellie's. Ellie now is well on her way to growing into the classic calm, friendly Golden that Sarah hoped for, and Sarah has developed skills that will likely make the rest of Ellie's training and upbringing smoother. Ellie's case demonstrates how quickly a young, impressionable dog can respond to a mentorship approach – behaviors that might have become problematic (separation anxiety, noise phobias) were nipped in the bud by addressing the human–canine emotional dynamic early.

Case Study: Bruno – Experienced Handler and Anxious Rescue

Bruno's 6-week stress indicator (blue) and cortisol (red) trends. Bruno started at a moderately high stress level (SIS 6, cortisol ~3.8 µg/dL) but improved steadily to minimal stress behaviors (SIS 2) and lowered cortisol (~3.0 µg/dL) by Week 6, with sustained gains at follow-up.



Background: Bruno is a 4-year-old German Shepherd mix adopted from a rescue group about 8 months before the study. His owner, *John*, is an army veteran and an experienced dog owner who had owned two dogs previously. John has a firm, no-nonsense demeanor and initially approached Bruno's anxiety issues with traditional training techniques he knew – mainly obedience drills and corrections. Bruno came to John with a history of abandonment and was very hyper-vigilant and anxious in the home: he would follow John from room to room, startle at small noises, and had difficulty settling down. Outside, Bruno was relatively well-behaved on leash (John had taught him basic commands), but his nervousness persisted – for example, Bruno would constantly scan the environment and could never truly relax even on a casual walk. John's strategy had been to try and reassure Bruno by saying "You're fine, knock it off" in a gruff voice and sometimes placing a firm hand on Bruno when he was acting nervous. This approach hadn't made a dent in Bruno's underlying anxiety (though Bruno obeyed basic commands, he still panted and paced at home). In fact, unbeknownst to John, his impatience and subtle frustration may have been signaling to Bruno that

indeed things were not fine. At baseline, Bruno's stress indicator score was 6 (he showed multiple signs like panting, whining softly, and constant alertness during the test). During the 2-minute separation test, Bruno couldn't stay still; he whined at the door, then when John returned, Bruno rushed to him and continued whining and tail flicking for nearly a minute despite John's attempts to say "quiet." Bruno's cortisol levels were among the higher in the group (3.8 µg/dL after the test, see figure) indicating a dog in a chronic state of arousal/stress.

Intervention and Training: John admitted at the start that he was a bit skeptical of the "softer" approach. A running joke in the group was his initial comment: *"I'm here because nothing else has worked with Bruno. I've trained dogs, but this guy… maybe it's me that needs training."* He said it with a laugh, not fully serious, but that was precisely the insight the program hoped to deliver. Over the first couple of sessions, John had to unlearn some ingrained habits. For example, he realized he rarely praised Bruno or showed relaxed affection – he was always "in training mode" or correcting. Bruno in turn was always on edge waiting for the next command or scolding. The mindfulness and calm affection portion of training was new to John. In Week 2, when instructed to just sit on the floor with Bruno, breathe slowly, and not give any commands or corrections, John confessed it felt uncomfortable – but Bruno's response was telling. Initially, Bruno stood and scanned as usual. After a couple of minutes of John practicing steady breathing (and perhaps for the first time, not exuding tension or expectation), Bruno actually lay down on his own, right against John. This seemingly simple act was a breakthrough; John was amazed and a bit emotional, saying "He's lying down... he never does that on his own when I'm alert." The trainers pointed out that John's *lack* of overt reaction and the relaxed vibe likely gave Bruno permission to let his guard down.

John took the homework seriously. He started implementing "quiet bonding time" each evening, which was a shift from his prior approach of mostly structured training or leaving Bruno alone. He would put on calm music and just do paperwork in the same room as Bruno, occasionally giving Bruno a slow pet for remaining relaxed. John also practiced modulating his tone. He realized he often spoke to Bruno in a commanding or tense tone even when not intending to (probably a holdover from military life). He worked on using a gentler, encouraging voice, especially when Bruno showed any calm behavior. During unexpected events that would normally irritate John – like Bruno barking at a neighbor's noise – John practiced pausing to check **his** emotions before responding. He discovered that if he approached Bruno's barking not with "Bruno, knock it off!" (stern, annoyed) but instead with a calm "What's up buddy?" and a look out the window, Bruno would often stop on his own. Essentially, John learned to acknowledge Bruno's alerts without alarm and without immediate correction, which ironically led Bruno to settle faster (because he wasn't being met with more agitated energy).

Behavioral Changes: Bruno's progress was a bit slower than Ellie's, as expected for an older dog with a longer history of anxiety, but by Week 4 there were clear improvements. In the group class context, Bruno initially was very restless (Session 1 he paced a lot and checked the door). By Session 4, observers noted Bruno was lying down next to John for portions of the class, something he almost never did in early weeks. One memorable moment: in Week 5's scenario, a trainer acting as a stranger approached John and Bruno. At baseline, Bruno had barked and circled nervously. In Week 5, John was coached to greet the "stranger" with a friendly, casual hello and a relaxed posture. Bruno stayed behind John's leg but did not bark; he was watchful but controlled. After the "stranger" left, Bruno sat down and looked up at John as if awaiting a cue. John calmly patted Bruno and said "good boy" (a phrase he confessed he hadn't used much before). Bruno's tail wagged and he relaxed quickly. Moments like this demonstrated that Bruno was now looking to John for cues more and trusting those cues. As John became a *consistent calm presence*, Bruno gradually transitioned from being hyper-vigilant to checking in with John and following John's lead on how to react.

Data Outcomes: Bruno's numbers underscore the improvement. His stress indicator count dropped from 6 at baseline to 2 at Week 6 (blue line in figure) – meaning in the final test, he only showed two minor stress behaviors. Specifically, during the separation test at post-intervention, Bruno whined just once and then sat by the door quietly until John returned (at baseline he had been much more distraught). During the noise test, Bruno startled but did not bark; he looked to John, who was feigning a yawn and relaxed body language, and Bruno actually *lay back down* within about 15 seconds – an almost unimaginable reaction compared to his initial state. Bruno's recovery latency from the startling noise shrank dramatically: from over a minute at baseline to mere seconds by Week 6. His cortisol levels also came down: Bruno's resting cortisol went from 3.5 µg/dL at baseline to 3.0 at Week 6, and his post-test cortisol went from 3.8 down to 3.1. While Bruno's cortisol was still on the higher side relative to some truly laid-back dogs, the decrease is significant for a dog of his profile. It suggests a real drop in his chronic stress. At follow-up, Bruno maintained his gains. His stress score remained at 2 (he basically only showed a mild stress sign when a stranger approached, and even that was just a momentary tense posture). His follow-up cortisol was around 3.1 post-test, roughly the same as Week 6, indicating he didn't regress physiologically. John had continued many of the practices – he said he and Bruno had actually grown so fond of the evening calm routines that they kept them up. The main thing John noted at follow-up was, *"Bruno isn't glued to me nervously anymore; he'll actually go chew a toy or nap in another room, and I'm okay with that. I think he's finally comfortable."* Indeed, separation-related worry had lessened; Bruno could be in a different room without panicking, which John appreciated as a sign of security rather than lack of attachment. It meant Bruno wasn't *constantly* on guard.

Owner Perspective: John's evolution was subtle but profound. As a seasoned owner, he initially felt a bit like "I should have known this" but quickly shifted to "I'm glad I know it now." He noted that the mentorship approach required more self-awareness than any training he'd done, but it paid off: *"I realized I had to change my mindset. Instead of trying to fix Bruno's every behavior, I started trusting him more and showing him that I'm not worried, so he doesn't need to be. It's funny – once I stopped being so tense about his tenseness, he relaxed."* This insight is a beautiful summary of the core principle: by managing his own emotional state, John indirectly taught Bruno to manage his. John also reflected that this experience even helped him in other areas of life (he mentioned using breathing techniques when he felt road rage coming on, with a chuckle). For Bruno, having an owner who wasn't swinging between ignoring him and correcting him, but was instead *present and composed*, allowed his true personality to shine through. By the end of the study, Bruno was described by John as "actually pretty chill at home," a far cry from the restless, anxious dog from months prior.

Summary of Cases: Both Ellie and Bruno (and their respective humans) highlight different aspects of emotional reciprocity. Ellie's case shows how quickly a young dog's trajectory can be shifted when a novice owner is given the right guidance – potentially preventing future problems like separation anxiety. Bruno's case shows that even long-standing anxiety can be alleviated when an experienced owner is willing to adjust their approach and become a better emotional coach for their dog. In both stories, the common thread is that the *owner's transformation* was the catalyst for the *dog's transformation*. Through calm mentorship, the owners became the change they wished to see in their dogs, and the dogs, in turn, responded with trust, calm, and improved behavior.

These case studies are just two examples; other participants saw similar patterns. Some had challenges – for instance, one very hyper young Labradoodle and her somewhat high-strung owner made progress but still had a ways to go at follow-up (they improved in stress signals but not as much in cortisol, likely because consistency was an issue). In another case, an older shy dog blossomed when her quiet, reserved owner learned to actually be *more* confidently expressive (calm doesn't mean silent; sometimes it meant the owner projecting warm, positive energy instead of inadvertently reinforcing fear by coddling – the nuance being calm-*confident* vs calm-*coddling*). These nuances aside, no matter the starting point, the mentorship model proved beneficial. Next, we will step back and discuss the collaborative implications of these findings – what they mean for professionals in various roles and how we can integrate this knowledge into future practice and protocols.

Collaborative Implications

The findings from “Emotional Reciprocity in the Human–Canine Bond” carry significant implications for how we approach dog behavior and training. They underscore that behaviorists, trainers, and veterinarians must consider the human element as integral to the treatment plan – effectively, to treat a dog’s behavior, we often must “treat” the owner’s behavior too. This aligns perfectly with Just Behaving’s ethos and provides empirical support for it. In this section, we outline how different stakeholders can apply these insights, and we offer recommendations for integrating human-focused emotional regulation into canine behavior protocols. Ultimately, a collaborative, interdisciplinary approach will yield the best outcomes, bridging the gap between human psychology and animal behavior science.

For Veterinary Behaviorists and DACVB Trainees

Veterinary behaviorists (and residents in training for their DACVB) are in a unique position to implement these findings in clinical practice. Typically, a vet behaviorist consult will assess the pet’s behavior problem and devise a behavior modification plan – our results suggest that this plan should explicitly include coaching the owner’s emotional and behavioral responses. For example, when designing an intervention for a dog with separation anxiety, in addition to typical desensitization protocols for the dog, the behaviorist should evaluate how the owner behaves during departures and reunions. As we saw, owners like Sarah (Ellie’s owner) initially had drawn-out, emotional departures and reunions that fed into the dog’s anxiety. A behaviorist can coach the owner in calm departure routines: no dramatic goodbye, perhaps a breathing exercise before returning to the house so they walk in relaxed. Our study provides concrete evidence that doing so can cut down the dog’s anxiety behaviors. We recommend that veterinary behaviorists incorporate a brief “owner self-regulation assessment” in their intake: e.g., asking owners how they typically react when the dog is misbehaving or scared. This can uncover if the owner tends to panic, yell, or coddle – all opportunities for intervention.

For DACVB residents (veterinarians specializing in behavior), learning to observe the dyad (dog and human together) rather than just the dog is a crucial skill. During their mentorship (residency), they can practice techniques like those in our study: guiding a client through breathing exercises in the consult room or demonstrating how an owner’s posture affects the dog’s stance. Because veterinary behaviorists often have limited time with clients, one collaborative approach could be to work alongside trainers or behavior consultants who can spend more time on the owner training piece (more on trainers in the next subsection). Nonetheless, even short advice like “When your dog is barking, check your own body – are your shoulders tight? Take a slow breath; your dog will sense it” can be surprisingly effective if the client actually uses it.

Our research provides these specialists with a kind of proof-of-concept to share with clients or fellow professionals. For instance, a vet behaviorist could say to a skeptical dog owner, *"There's evidence that dogs mirror our stress. In a recent mentorship program, owners who learned to stay calm saw a 50% drop in their dogs' stress-related behaviors. So part of our plan for Rover's leash reactivity will be teaching you how to stay relaxed when you see another dog, because if you're calm, he's more likely to be calm."* Being able to cite such results (even informally as above) gives weight to what might otherwise sound like just common-sense advice. It shifts the narrative from "this might help" to "this is an evidence-based component of the treatment."

In terms of protocol integration, vet behaviorists can update their standard recommendation sheets to include owner-focused exercises. For example, alongside "Teach the dog a mat settle" they might add "Owner will practice the 4-7-8 breathing technique twice a day and use it during dog training sessions." They can also use technology: perhaps have owners wear a smartwatch and monitor their heart rate during training sessions at home as a feedback tool – if the owner's heart rate spikes, pause the session until they calm, as a rule of thumb. This kind of innovation merges human biofeedback with dog training.

Furthermore, these specialists can help drive the conversation in the veterinary community about the importance of emotional well-being of owners in pet behavior issues. They can present cases (some drawn from studies like ours) at conferences to illustrate outcomes. One of our collaborative aims is indeed to encourage DACVB residents to publish case reports or even controlled trials based on this model, bringing what might be considered a "soft" intervention into the realm of hard data. By doing so, veterinary behaviorists champion a more holistic approach – treating the pet and the owner as a unit. As one DACVB diplomate who observed our study sessions commented, "We've always known owner behavior matters, but now we have the structure to do something with it." We foresee future behavior clinics routinely including owner calming techniques as part of standard care (just as pediatric therapists often involve parent training as part of treating a child).

For Canine Behavior Researchers

For researchers in academia or industry focusing on animal behavior, our study opens several avenues. First, it provides a model for studying dyadic regulation – rather than looking at the dog in isolation, researchers can quantitatively examine how modifications in human behavior affect canine outcomes. Future studies could build on our design with more rigorous controls, larger sample sizes, or different species for comparison. One idea is to conduct a randomized controlled trial where one group of owners goes through a mentorship/emotional-regulation training (like our program) and another group gets a more traditional training focus (or perhaps an irrelevant skill

training for owners, like a placebo). This would more definitively establish causation. We suspect the results would mirror ours, but having that level of evidence could influence skeptics in the field who might attribute our findings to placebo effect or concurrent standard training.

Researchers could also delve deeper into the mechanisms at play. For instance, measuring other physiological indicators: oxytocin (the bonding hormone) levels in owners and dogs before and after calm interactions, or heart rate variability (HRV) as a measure of autonomic nervous system regulation in both parties. These could elucidate how exactly a owner's calm presence biologically impacts the dog. There's fascinating work on interspecies HRV synchronization that could be applied – e.g., do owners who practice breathing techniques induce higher HRV (a good thing) in their dogs? We did a bit of this with heart rate, but a full analysis could be a publication on its own.Additionally, neuroimaging studies (though tricky in dogs without fMRI training) could examine whether dogs of calm vs. anxious owners show different brain patterns in response to human cues.

Our findings also suggest a rich field of social learning and attachment research. They bolster the concept of social referencing in dogs. A researcher could design experiments to test how dogs take cues from owners in ambiguous situations, comparing owners trained in calm mentorship versus not. Hypothesis: dogs with "mentorship-trained" owners might be less reactive in a strange situation because they rely on their owner's calm signals, whereas control dogs might be more anxious. This could further validate Just Behaving's claims scientifically and perhaps make it into prominent journals, thereby reaching a wider scientific audience.

Another implication for researchers is the importance of owner factors in behavior studies. Often, in canine behavior research, owner-provided data is considered but the owners themselves are treated as a source of variance or bias (something to control for, not focus on). Our work suggests turning the lens to owners intentionally can yield insights. Researchers might, for example, categorize owners by personality (using something like the Big Five inventory) or stress level, and see how that correlates with dog behavior outcomes. We predict strong correlations, as have been hinted in prior human-animal interaction literature. Establishing those links more firmly can push the field toward Human–Animal Interaction (HAI) as a two-sided equation.

Finally, our collaboration with Just Behaving demonstrates the value of field studies and citizen science in behavior research. Rather than limiting studies to lab settings or short one-off tests, partnering with training organizations or veterinary practices can allow researchers to study real interventions in real homes. It increases ecological validity and immediate impact. We encourage researchers to build alliances – for instance, a

university lab might collaborate with a local training school to run a variant of our program, collecting data while also providing a service. This breaks down the silo between academia and practitioners, fostering a feedback loop where research informs practice and practice informs research questions. Our project can serve as a template for such partnerships, which ultimately advance the welfare of dogs by rapidly translating findings into action.

For Dog Trainers and Behavior Consultants

Professional dog trainers and canine behavior consultants are the boots-on-the-ground working with owners daily. The lesson from this study for trainers is clear: training should not just be about the dog's behavior, but also about the human's behavior. Many skilled trainers likely already intuit this – they observe that when they can calm an owner down, the training session goes better. Our data now backs up that intuition and gives trainers a framework to formalize it.

Trainers can start by educating clients about the concept of emotional mirroring. For example, in puppy classes, a trainer might include a short segment (or even a handout) on "Your puppy is watching *you*: how your mood affects your pup" and cite that research shows dogs take emotional cues from humans. Even that awareness can be powerful for pet owners. When a client understands the *why*, they are more likely to buy into the *how*. Many owners have never been told that their own demeanor is a critical part of training; once they are, it often "clicks" that they need to work on staying calm.

Trainers should incorporate owner-calming techniques into their curriculum. This can be done in small ways:

- At the start of class, do a 1-minute breathing exercise for the humans (which can double as a way to center the *dogs* too, because if all people suddenly slow down, the environment's energy drops).
- When demonstrating a training exercise, explicitly point out not just what the dog should do, but what the human should be doing with their body and voice. For instance: "Notice how when I call Fido, I'm using a cheerful but soft tone and I'm not looming over him. If I were to scream his name or get tense, he'd probably hesitate or get anxious."
- Use scenarios to train the *owner's* reaction. A creative trainer might set up a "spilled food" scenario in a group class: drop a noisy object or have a surprise occurrence, and then coach owners on reacting calmly as their dogs react. This is essentially bringing a slice of our study's protocol into regular training.
- Provide feedback to owners not just on whether they delivered the treat at the right time, but on their emotional timing. E.g., "I noticed when Buddy jumped, you

stiffened and gasped. Let's try that again, and this time, deliberately exhale and loosen up as you turn to him." This level of coaching is often what separates excellent trainers from average ones – and now we can say it's evidence-based, not just art.

Many trainers deal with clients who inadvertently reinforce unwanted behavior by giving attention or by getting upset (common example: dog barks at another dog, owner tightens leash and yells, which amps the dog more). With these findings, trainers can reframe their advice as, "We need to break the cycle of both of you getting worked up. Let's practice what *you* will do when he barks: you'll take a deep breath, keep the leash loose, and speak in a normal tone while moving casually away." This essentially uses *differential reinforcement of calm behavior in the owner*, which will trickle down to the dog.

Trainers and behavior consultants might also develop specialized sessions or workshops focusing on handler emotional skills. For example, a "Calm Handler Workshop" where clients come without dogs to learn and role-play stress-management techniques, possibly with excerpts from our study as examples. This could become an added service that sets certain trainers apart. Since our study results show tangible benefits (like fewer aggression incidents, faster learning), trainers can market this as "improve your dog's behavior by improving your handling skills – scientifically proven!" It's a compelling value proposition for many struggling owners.

Importantly, trainers often act as the liaison between theory and practice for owners. They can help normalize the idea of owner-focused training. Initially, some owners might feel awkward that they are being "trained" (some joke, "Ha, the trainer is really here to train me, not the dog!" – which is true). A skilled trainer uses humor and empathy to get buy-in. Our success stories like John and Bruno or Sarah and Ellie can be powerful anecdotes a trainer shares (keeping anonymity, or just as composite examples): "I had a client just like you, a bit skeptical, but once he changed his approach, his dog's anxiety dropped massively. We can try that same approach." Stories stick with people more than abstract concepts.

Additionally, trainers should consider collaborating with human-focused professionals if needed. For instance, if an owner's anxiety is particularly high (maybe even clinically significant), a trainer might partner with or refer to a therapist or counselor who can help the owner with general anxiety, which in turn will help the dog. This integrated approach might be beyond the usual scope, but some forward-thinking training centers now have on-site counseling for clients or at least materials on mindfulness for pet owners. Our results could encourage more of this cross-disciplinary support.

Lastly, trainers have platforms – blogs, social media, local seminars – where they can spread the philosophy. By sharing these evidence-backed ideas, they contribute to a

shift in the dog-owning community: from seeing dog training as purely about commands to understanding it's about relationship and mutual regulation. As more trainers adopt the mentorship mindset, we may see a generation of dogs who are calmer and owners who feel more in control and connected, reducing the incidence of behavioral issues that result from miscommunication and stress.

For Multi-Stakeholder Collaboration and Future Protocols

Perhaps the most exciting implication of this study is how it encourages collaboration across different roles in the pet care and behavior world. No single profession can address all aspects of a human–dog duo's needs; a team approach is often ideal. Our project itself was a collaboration between a training philosophy (Just Behaving) and scientific measurement, and it involved input from vet behaviorists, trainers, and researchers. Going forward, we envision more such partnerships.

One recommendation is to establish integrated programs or protocols that can be widely adopted. For example, creating a standardized "Calm Canine Partnership Protocol" (just a hypothetical name) that could be used in veterinary clinics or training schools. Such a protocol would outline steps for both owner and dog: Step 1 might be vet check and basic health (to rule out medical causes of stress), Step 2: owner practices provided relaxation exercises (with resources or a class), Step 3: dog behavior modification exercises, etc., with iterative check-ins. This kind of protocol could be disseminated via professional organizations (like the AVSAB – American Veterinary Society of Animal Behavior – or APDT – Association of Professional Dog Trainers). Having a formal protocol lends legitimacy and ensures consistency in how these principles are applied.

Educational integration is another area. Vet schools and veterinary residency programs could incorporate modules on the *human side of behavior cases*. Likewise, dog trainer certification courses could require knowledge of basic human psychology principles relevant to client coaching. Since our study demonstrates the efficacy, those designing curricula have real data to justify adding this content. For instance, a DACVB resident could do a rotation with a family therapist to learn skills that are transferable to client counseling in behavior cases – not to become a therapist, but to gain communication and coaching strategies. Conversely, people in human mental health fields who are interested in HAI (human–animal interaction) could incorporate these findings to help pet owners in managing stress, showing how their well-being affects their animal's well-being.

Shelters and rescue organizations are stakeholders who could benefit from these insights as well. Many dogs are surrendered due to behavior problems, which often can be tied to owner misunderstandings or stress. Shelters might offer brief mentorship training to new adopters: e.g., before taking a dog home, the adopter watches a 20-minute video on staying calm and setting routines, or attends a "first-time dog owner"

class that highlights emotional reciprocity. Rescue groups could have mentors (volunteers) not just for dog training but to check in on how the owner is coping and guide them. Imagine reducing returns to shelter because owners feel more equipped and see improvements by adjusting their own approach early on. Our results showing improvements even in challenging dogs like Bruno can be a motivational example to share with adopters: *"This dog might be anxious now, but with a calm consistent environment, look how much improvement can happen in just weeks."*

From a policy perspective, these findings might encourage a rethinking of dog training and behavior services at a systemic level. For example, veterinary clinics increasingly run "puppy socialization classes" or "behavior seminars" as part of their services – adding a component on owner emotional management could differentiate their programs. Behavior treatment plans (like those written by vet behaviorists or trainers for clients) can include a section for "Owner guidelines" not just in handling techniques but self-management (something rarely seen now beyond "be patient"). If enough professionals do this, it could become standard practice to address both ends of the leash.

Additionally, there's room for developing support materials and tools. Perhaps an app could be created for dog owners that reminds them to do their breathing exercise and tracks both their mood and the dog's behavior progress. Or simple fridge magnets with "CALM" acronym steps (e.g., C: Check your own tension, A: Adjust your posture, L: Lower your voice, M: Model relaxed breathing). These practical tools make it easier to integrate what might otherwise be forgotten advice into daily life. Our study's data can inform the content of such tools (for example, emphasizing the aspects that made the biggest difference, like tone of voice or body language).

In terms of continued research collaboration, our partnership can extend to developing best-practice guidelines that could be published in an open-access format for anyone to use. We could work with organizations like IAABC (International Association of Animal Behavior Consultants) or others to formalize a guideline document, something like "Guidelines for Incorporating Owner Emotional-Regulation Training in Behavior Modification Plans – based on the Just Behaving Mentorship Model." This would be a direct bridge from our findings to a product that professionals can adopt.

Finally, we want to emphasize that the philosophical shift underpinning these recommendations is as important as the practical steps. The philosophy is that *to help dogs, we must help humans*. It's about compassion and patience for the owner, not just the dog. Just Behaving has long championed this compassionate mentorship approach, and now that approach has data behind it. We encourage all stakeholders to view misbehaving dogs not as problems to be fixed in isolation, but as part of a relationship that may need healing or guidance on the human side as well. When owner and dog are

viewed as a team, and both are “trained” in tandem, the results can be powerful – we saw it, and others can replicate it.

In conclusion, the study *Emotional Reciprocity in the Human–Canine Bond* provides compelling evidence that integrating human-focused training into dog behavior interventions yields positive results. It validates the core Just Behaving principle that mentorship and emotional modeling trump force or rote training in developing a well-adjusted canine companion. By sharing these insights and encouraging cross-disciplinary efforts, we hope to inspire a new standard of care where calm, emotionally attuned humans lead the way in creating calm, well-behaved dogs. The human–dog bond is a two-way street; tending to both sides is not just ideal, but necessary for truly effective and humane behavior modification. The next generation of protocols and programs – from puppy classes to clinical behavior therapy – can be enriched by this understanding, ultimately improving welfare for dogs and peace of mind for owners. After all, a harmonious relationship is the ultimate goal, and our findings suggest that when we teach the human to fish (or rather, to breathe), both human and dog dine on success.