Comparative Effectiveness of Recreational Therapy using Canines, Equines, and No-Animal Intervention

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Background: Significance

- By 2050, dementia is projected to affect over 115.4 million people globally (World Health Organization, 2018).

- Over 50% of long-term residents have dementia (US Census Bureau, 2014).

Background: Significance

70 to 90% of people living with dementia

have one or more of

these symptoms or distress reactions:
- Apathy,
- Depression,
- Withdrawal/lack of social engagement,
- Anxiety

Lack of the ability to express the feelings often compounds the reaction

Babulal, et al. 2022, Tierney et al., 2018; Koller et al. 2106

Background: Significance

Symptoms are linked to:
- **Poor health and quality of life**
- **Reduced engagement in leisure**
- **Difficulties with ADLS**

(Tierney et al. , 2018; Selbæk, Engedal, & Bergh, 2013)

Background: Why a non-pharmacological approach?

- Psychotropic medications have adverse drug effects.

- Nonpharmacological interventions are suggested to improve:
    - stress tolerance
    - levels of engagement
    - mood

  (Brodaty & Arasaratnam, 2012).

Background: Why AAI?

AAI has been shown to enhance well-being in older adults in LTC

- Depressive symptoms improved more with canine-assisted than reminiscence therapy (Friedman, et al., 2015)

- Cat improved loneliness (Huff-Mercer, 2015)

- Canine improved quality of life

  (Berry et al. 2012)

- Decrease in neuropsychiatric symptoms (Tournier et al., 2017)

What is known about Canine for PLWD

- Animal therapy reduced "distress reactions"
- Animals improved pro-social behaviors
- PLWD conversed longer in presence of animals
- Social response is similar to real or robot, but longer duration of interest with real dog

Yakimicki, M.L., Edwards, N.E., Richards, E.L., & Beck, A.M. (2019). Animal-Assisted Intervention and Dementia: A Systematic Review. *Clinical Nursing Research, 28*, 29 - 9.

Recent Research: Canine

- Significant differences in depression levels of PWD were identified between the intervention (AAI) and control groups (no AAI) (p < 0.001).

Batubara, S.O. , Tonapa, S.I., Saragih,I.D., Mulyadi, M., Lee, B.O. (2022) Effects of animal-assisted interventions for people with dementia: A systematic review and meta-analysis. *Geriatric Nursing* 43, pages 26-37.

- AAI is beneficial for people with dementia, further research needed.

 Babka,J.R., Lane,K.R., Johnson, R.A. (2021) Animal-Assisted Interventions for Dementia: A Systematic Review. *Research in Gerontological Nursing* 14:6, pages 317-324.

Equine Assisted Services

Dabelko-Schoeny, H., Phillips, G., Darrough, E., DeAnna, S., Jarden, M., Johnson, D. & Lorch, G. (2014) Equine-Assisted Intervention for People with Dementia, Anthrozoös, 27:1, 141-155, DOI: 10.2752/175303714X13837396326611

 A reduction in behavioral problems (disruptive behaviors) was found post intervention in contrast to the comparison group.

Equine Assisted Learning

Lassel et al. (2021) found improvement in people with dementia from EAL in gaze, position, movement, and participation. The perceived benefits of interacting with the horse

----social stimulation in a group setting,

----relaxation in outdoor environments,

----bonding with the horse,

----evoking positive memories.

  Lassel R, Fields B, Brusselman S, Hempel T, Wood W. A logic model of a dementia-specific program of equine-assisted activities. *Human-Animal Interaction Bulletin.* 2021; 9, No. 2.

EAS: Guided Interactions Social Connection

Horses provide opportunities for social engagement

- While interacting with the horse, human HR increased ($p < 0.05$) but HRV (SDRR) and %VLF of HRV power did not change.

- Sixteen horse-human pairs demonstrated synchronized HRV peak frequencies during sessions, suggestive of social connection.

- Participants used more positive than negative words describing their experience during exit interviews ($p < 0.05$).

Baldwin, A., Rector, B. & Alden, A. (2021) Physiological and Behavioral Benefits for People and Horses during Guided Interactions at an Assisted Living Residence. *Behavioral Sciences* 11:10, pages 129.

Gap in Research

No known research measures the difference in social responsiveness of older adults with dementia to different animals and "typical RT session."

This pilot study compared RT using canine, equine, and control to understand the effectiveness on apathy, heart rate variability (HRV), and engagement.
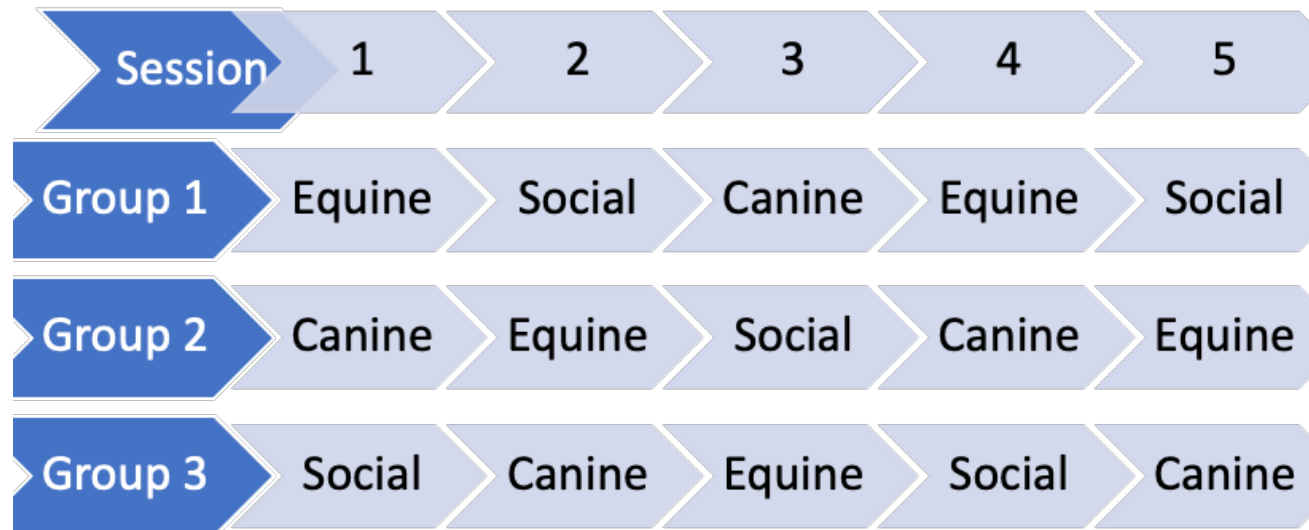
Research Question

Which type of intervention is the most effective in improving the social and engagement responsiveness of an older adult with dementia?

Method

Method:
Alternating Treatments Design with Random Assignment to Group

Session	1	2	3	4	5
Group 1	Equine	Social	Canine	Equine	Social
Group 2	Canine	Equine	Social	Canine	Equine
Group 3	Social	Canine	Equine	Social	Canine

- 5 sessions
- 2 hours
- 35 minutes each plus transitions

Participants: Convenience Sample

10 participants, all white, from 2 local skilled nursing facilities

Aged 60-92

Physician determined diagnosis of dementia

All used wheelchairs for ambulation, except 2

Informed consent

Procedures

Storm Harbor Equestrian Center (PATH, Intl. Premier Accredited)

18-stall Barn, Heated Arena, or Classrooms

Researchers separate from Facilitators

	Equine	Canine	Social
Facilitator	CTRS	CTRS	CTRS
Specialty Cert	PATH CTRI	Pet Partners Handler Cert	
First	Stroke/Groom	Stroke/Groom	Fine motor involvement
Second	Lead	Lead	Reminiscence discussion
Third	Treat	Treat	

Measures

Apathy Scale (Dementia Rating Scale)	EPASS Engagement in Preferred ActivitieS Scale (Nelson et al., 2018)	Targeted Behaviors (Richeson, 2003)	Heart Rate Variability (HeartMath Institute)
• compared prior and after entire 5 weeks	• Compare first 10 minutes with last 10 minutes • Duration, Attention, Attitude	• Freqency of social behaviors with animals (adapted from Richeson's (2003) scale	• Emwave pro HRV • % levels for low, med, high & coherence over time

Analysis

Wilcoxon Rank Sum Test

apathy index (likert scale) before and after the entire protocol;

engagement (duration, attention, attitude) for the first 10 minutes and last 10 minutes of each canine, equine, and control sessions.

Descriptive statistics(engagement score, heartmath coherence, targeted social behaviors)

RESULTS

Results: Apathy

Table 1. Dementia Interview Rating Scale (Apathy)					
Variable	Pre Baseline	Post Baseline	Mean Difference	Wilcoxon Value	Effect Size (n^2
Interested in things	3.360	3.450	0.090	.739	
Gets things done	2.730	2.550	-0.180	.527	
Initiates with others	2.90	2.09	-0.81	0.06	
Interested new exp.	2.82	3.90	1.080	.102	
Interested new things	2.81	2.54	-0.270	.334	
Puts little effort into anything**	1.73	2.45	0.720	.039*	12.56
Approaches life with intensity	2.27	2.91	0.640	.053	
Seeing a job to end	2.81	2.36	-0.450	.197	
Spends time items of int.	3.63	3.63	0.000	1.00	
Needs direction **	2.45	3.45	1.000	0.015*	12.57
Less concerned **	3.09	3.27	0.180	.414	
Has friends	3.00	3.36	0.270	.157	
Friends are impt	1.91	2.91	1.000	.013*	12.57
Excitement at good	3.34	3.45	0.110	.527	
Accurate understand self	1.81	2.45	0.640	.102	
Getting things done	2.27	2.73	0.460	.265	
Has initiative	2.81	3.0	0.190	.317	
Has motivation	3.0	3.18	0.180	.480	
* If p < .05 ** reverse coded items					

Apathy (Pre and Post All 5 Sessions)

Comparison pre / post 5 weeks, participants were significantly less apathetic (p<.05)

 --- "little effort" (p = .039)*

 ---"needs help" (p = .015)*

 --- "friends are impt to me" (p =.013)

 ---"intensity" (p =.053)

Trends: improvement in "interest," "excitement," and "motivation"

*reverse coded

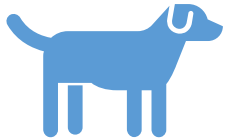# Engagement Scores

Table 2. Engagement in Preferred Activities Scale (EPASS) Averages					
	Variable	Pre Mean	Post Mean	Mean Difference	Wilcoxon Value * if <.05
Session 1	Duration Dog	74.5	80.5	6	0.2
	Duration Horse	72.2	64.1	-8.6	0.08
	Duration Social	82.3	88.2	5.9	0.18
	Attentive Dog	70.5	74.1	3.6	0.67
	Attentive Horse	71.4	65	-6.4	0.72
	Attentive Social	76.4	88.6	12.2	0.09
	Pos Attitude Dog	70	71.4	1.4	0.32
	Pos Attitude Horse	74.6	78.2	3.6	0.45
	Pos Attitude Social	73.6	70.9	-2.7	0.67
Session 2	Duration Dog	74	78.5	4.5	0.68
	Duration Horse	74.5	85.5	11	0.03*
	Duration Social	84.5	91.5	7	0.12
	Attentive Dog	76	79	3	0.38
	Attentive Horse	77	75.5	-1.5	0.92
	Attentive Social	86	84	-2	0.58
	Pos Attitude Dog	73	80.5	7.5	0.07
	Pos Attitude Horse	76.5	77	0.5	0.52
	Pos Attitude Social	72.5	78	5.5	0.09
Session 3	Duration Dog	84.5	85.9	1.4	0.68
	Duration Horse	74.1	83.6	9.5	0.06
	Duration Social	82.3	80.9	-1.4	0.6
	Attentive Dog	75.5	76.8	1.3	0.9
	Attentive Horse	80	88.2	8.2	0.04*
	Attentive Social	80.5	79.1	-1.4	0.9
	Pos Attitude Dog	73.6	78.6	5	0.9
	Pos Attitude Horse	66.4	79.1	12.7	0.01*
	Pos Attitude Social	79.5	78.6	-0.9	0.9
Session 4	Duration Dog	80	81.5	1.5	0.7
	Duration Horse	88	92.5	4.5	0.03*
	Duration Social	81	77	-4	0.67
	Attentive Dog	77.5	84.5	7	0.2
	Attentive Horse	86	90.5	4.5	0.05
	Attentive Social	80.5	88.2	7.7	0.06
	Pos Attitude Dog	77	79	2	0.67
	Pos Attitude Horse	80	87.5	7.5	0.02*
	Pos Attitude Social	80.5	76	-4.5	0.72
Session 5	Duration Dog	77.5	73	-4.5	0.83
	Duration Horse	77.5	73.5	-4	0.89
	Duration Social	77	79	2	0.5
	Attentive Dog	72	72	0	0.78
	Attentive Horse	72.5	81	8.5	0.67
	Attentive Social	78.5	80	1.5	0.18
	Pos Attitude Dog	72.5	77	4.5	0.69
	Pos Attitude Horse	73.5	80	6.5	0.67
	Pos Attitude Social	67.5	75.5	8	0.03*
Total	Total Engage Dog	75.20	78.15	2.95	
	Total Engage Horse	76.28	80.08	3.8	
	Total Engage Social	78.84	81.03	2.19	

Comparison: Engagement

Canine: no statistically significant improvement over time-stable

Control: statistical improvement in egagement

Session 5 attentiveness (p = .03)

Equine: statistical improvement in engagement

Session 2 duration (p =. 03)

Session 3 attentiveness (p = .04) and attitude (p= .01)

Session 4 duration (p=.03), attentiveness (p = .05), attitude (p= .02)

Results: Big Picture

1. high levels of engagement for all interventions (canine, equine, and social/control sessions) and only small differences overall.

2. Total scores (for all sessions added together)

- Total equine showed the most improvement from pre to post. Canine was stable over time.

- Social/control sessions started and ended with higher engagement overall than the animal assisted sessions.

Mean Frequency of Target Behaviors

| Table 3. Mean Frequency of Targeted Human Behaviors towards Animals												
Targeted Behavior Session	Mean Freq Dog 1	Mean Freq Horse 1	Mean Freq Dog 2	Mean Freq Horse 2	Mean Freq Dog 3	Mean Freq Horse 3	Mean Freq Dog 4	Mean Freq Horse 4	Mean Freq Dog 5	Mean Freq Horse 5	Mean Total Dog	Mean Total Horse
Looks at Animal	7.5	3.4	12.9	5.1	10.9	6.9	11	4.4	9.9	4.1	10.44	4.78
Touches Animal	6.9	2.5	8.3	2.6	6.7	3.5	6.5	3.7	5.9	3.4	6.86	3.14
Speaks to Animal	5.2	1.6	7.9	2.6	7.3	2.7	5.2	2.4	3.5	0.9	5.82	2.04
Remembers Animal's Name	0.6	0	0.3	0.1	0.1	0	0.2	0.2	0.4	0	.32	.06
Uses Animal's Name	0.4	0.2	0.5	0.3	0.3	0.2	0.2	0.3	0.6	0.1	.4	.22
Engages in Activity with Animal	2.8	1.5	2.9	3.1	2.3	3.5	2.2	3.4	2.9	2.2	2.62	2.74
Reminisces about Past Animals	1.7	0.5	1.6	0.4	0.8	0.7	0.7	0.4	0.5	1.5	1.06	.7
Looks at Animal Handler	3.5	2.2	5.8	3.7	4.5	5.3	4.9	4.5	5.5	4	4.84	3.94
Speaks to Animal Handler	6.7	5.5	7.8	7.4	6.7	7.4	6.5	8.1	7.5	6.7	7.04	7.02
Remembers Animal Handler's name	0	0	0	0	0	0	0	0	0	0	0	0
Refuses to Look at Animal	0	0	0	0	0	0	0	0	0	0.1	0	.02
Refuses to Interact with Animal	0.5	0.5	0.4	0.3	0.2	0.4	0.2	0.5	0.6	0.5	.38	.44
Smiles	4.5	2.6	6.7	3.7	5	3.5	3.4	3.6	4	2.5	4.7	3.18
Laughs	2.6	0.6	4.7	2.6	3.6	1.5	2	1.2	2	1.9	2.98	1.56

Targeted Social Behaviors CAS vs. EAS

Canine AS had higher frequency of targeted social behaviors (look at, touch, speaks to, remembers name, uses animal's name, reminisces, looks at handler, speaks to handler, smiles, and laughs).

Equine AS had a slightly higher frequency in engaging in activity with animal and refuses to look at or interact with animal
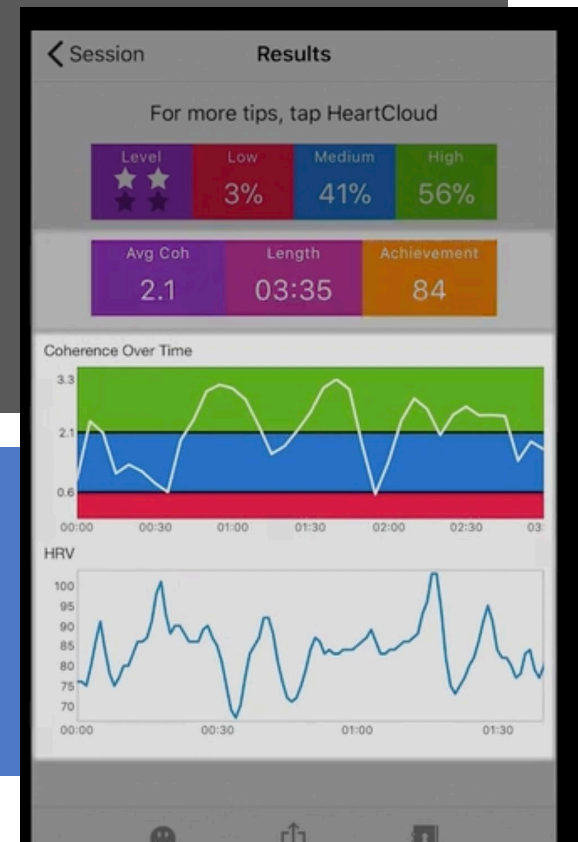
Talking to handler was the same.

CAS vs. EAS Targeted Social Behaviors
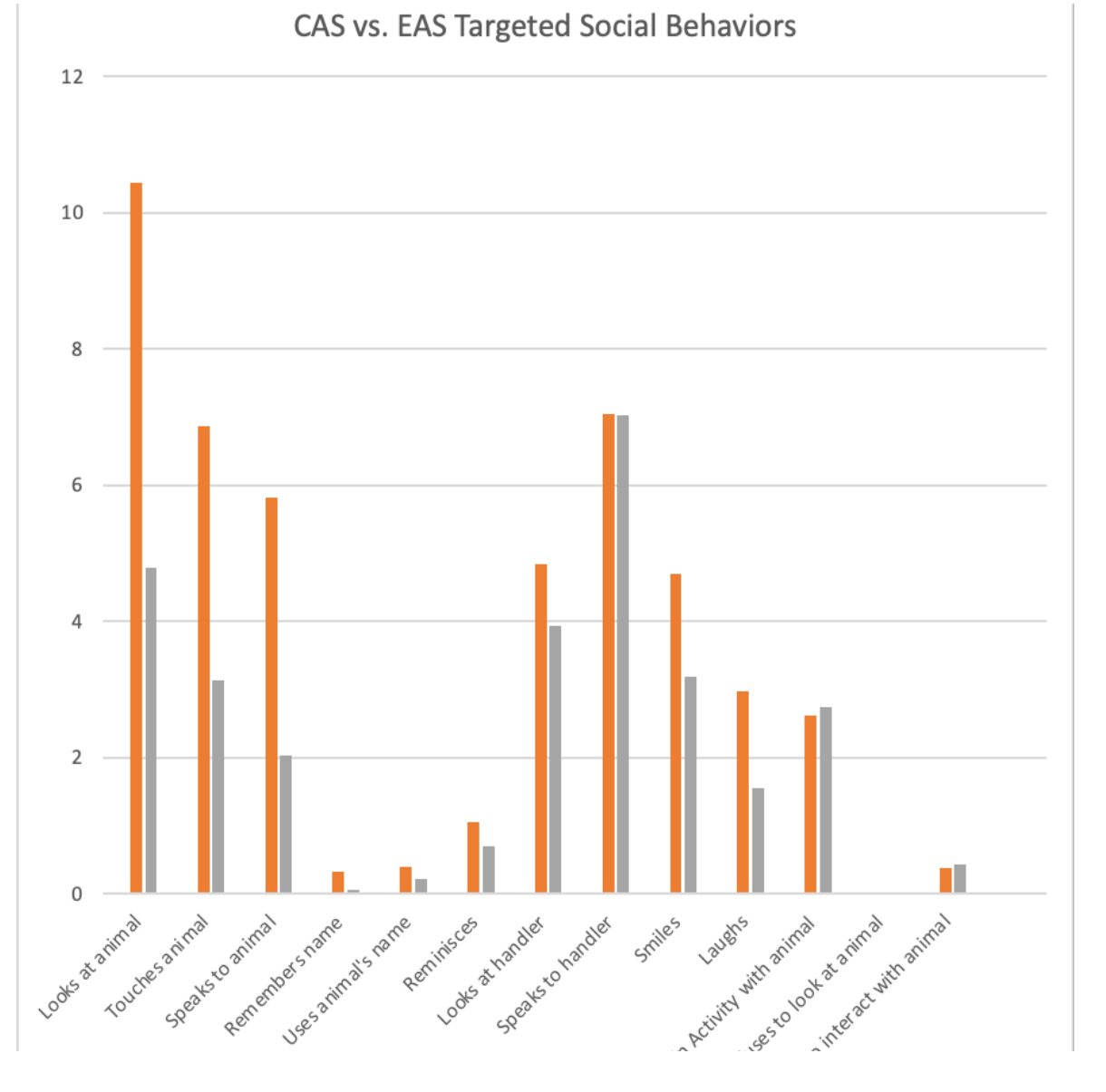
Heart Rate Variability

Table 4. Mean Heartrate Variability Levels

	Canine	Equine	Social
Low % Mean	19.33	18.83	20.37
Medium % Mean	24.87	25.45	24.37
High % Mean	55.8	55.73	55.27
Total Average Coherence over time	1.35	1.31	1.34

Discussion

There is a cumulative impact on apathy scores related to a 2 hours multi-factor program for 5 weeks at the Equestrian Center.

Apathy

**O'Haire59 found a similar decline in social withdrawal behaviors with school-age children on the autism spectrum who received canine-assisted activities over eight weeks

Comparative Engagement

- Extremely high percentage of engagement for all interventions (> 70%)

- RT using canines and social intervention: remained stable (started high and ended high)

- RT using equines: the engagement improved significantly (started low and ended high)

Kemeny et al. (2021) found a similar response to the current study in cortisol levels with youth on the autism spectrum. Higher cortisol is related to poor social engagement.

Targeted Animal-Assisted Social Behaviors

There was a much higher frequency of targeted social behaviors with RT using canines rather than using equines.

Higher frequency of physically engaging in an activity with a horse compared to dogs

HRV

The heart rate variability coherence levels over time coincide with this interpretation as the participants were slightly more relaxed or in a coherent state with the dogs and social than equines.

However, the differences were not statistically or clinically significant.

Why is there a difference?

- Client preference and life history of "pets" or farm-life.

- Clients are more likely to have dogs as pets.

- A person may be more likely to recall memories that have emotion attached to them.

- Comfort level with size of the animal, if not familiar

Why is there a difference?

- Dog is Face-level with wheelchair height (eye contact, touch, social response)

- Higher frequency of physical engagement with horse might relate to the greater gross motor involvement and focused attention needed with grooming, leading, and even feeding the horse whereas interacting with the dog may feel more natural and take less physical effort.

- No formal measurement of reminiscence comments except ancedotal: "he reminds me of my dog" "that's a nice quarter horse, like I had"

Limitations and Future Research

Small number of participants

Hard to isolate the impact of each intervention

Need to collect autobiographical information prior to study

Need a more sensitive instrument to see differences as they were engaged in all three

Application
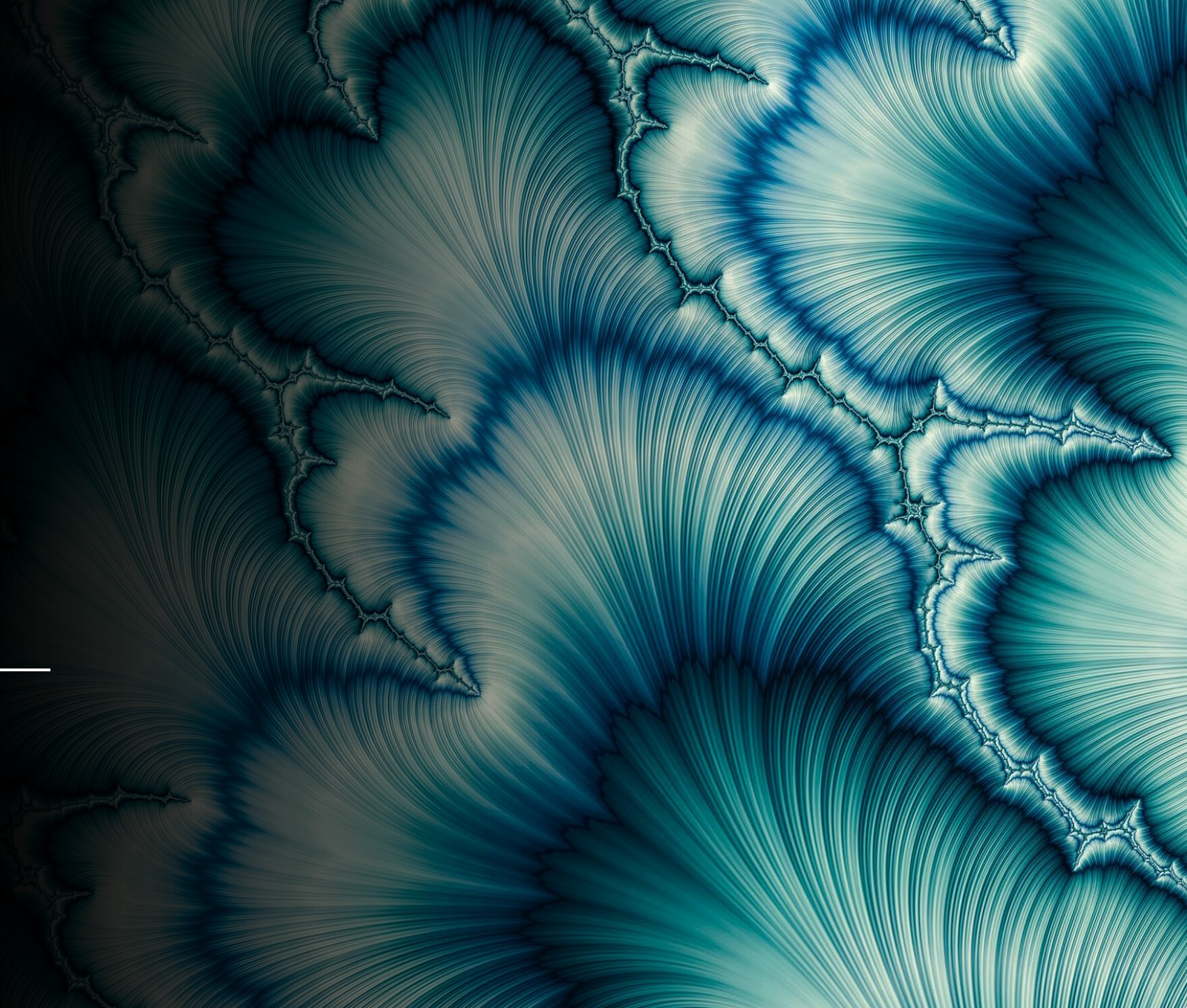
"Goodness of Fit": Assess Both Animal and Person

The RT is responsible for assessing the "goodness of fit" of the animal for that particular therapy situation by **assessing** the animal for:

1) physical and sensory function;

2) social functioning;

3) adaptability; and

4) psychological functioning.

Training

For therapists, additional training in animal-assisted interventions and animal behavior is essential unless therapist partners with expert
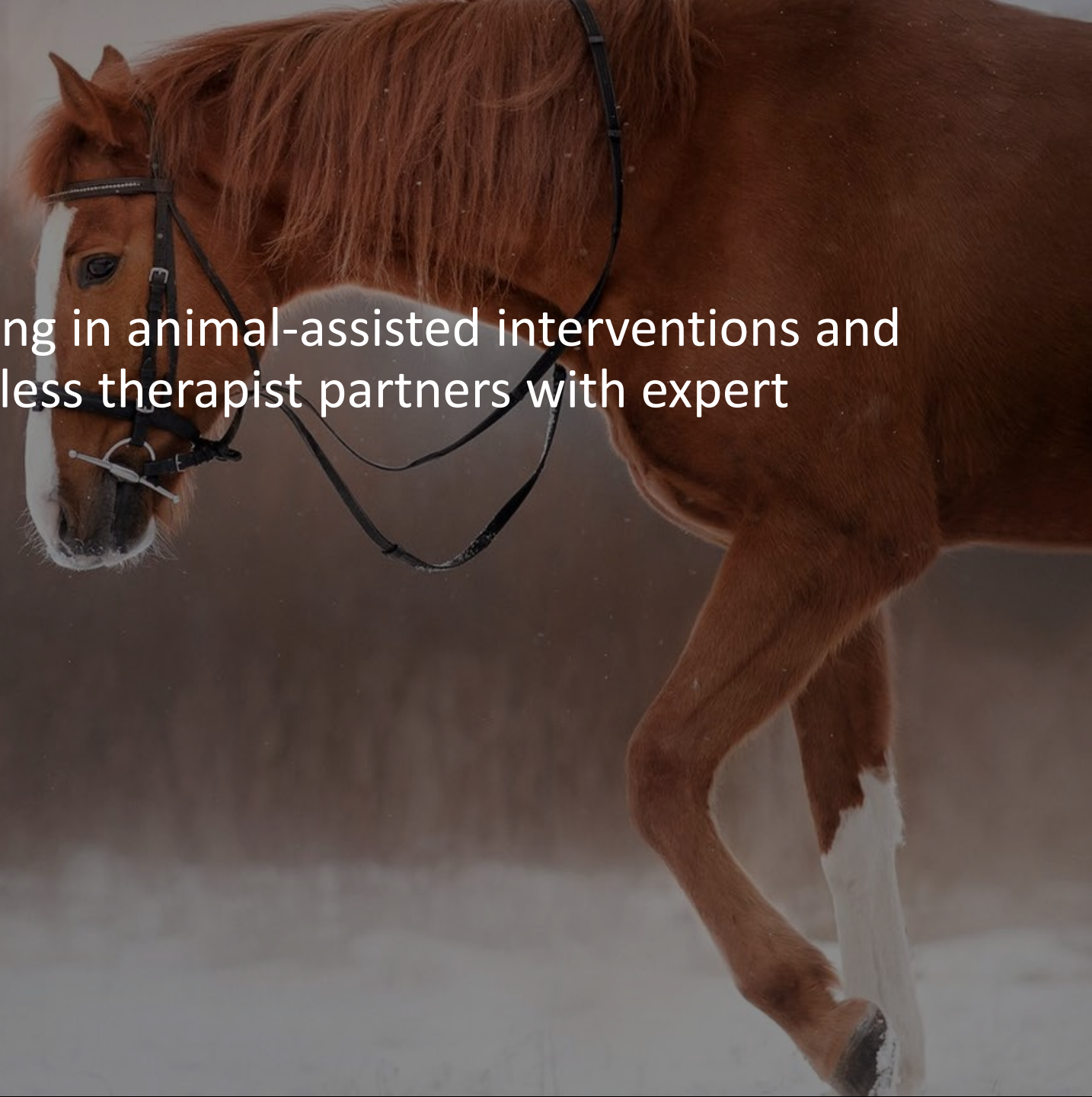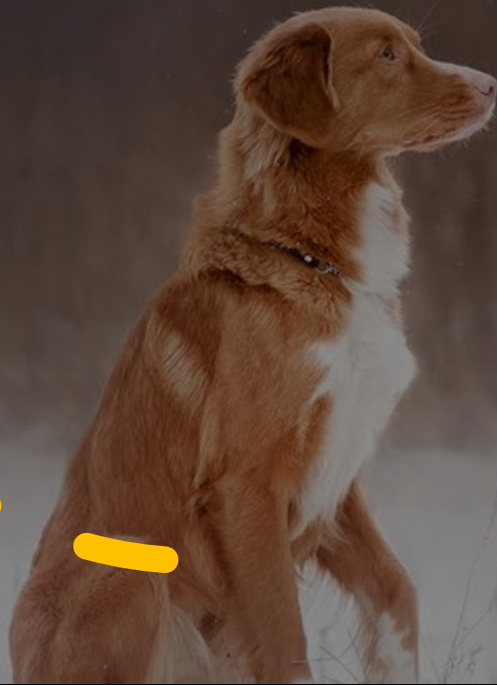
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Questions

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