

OT Horse 2025-26 - Study2 S1

S1.01 Characteristics of the sample

S1.01a Characteristics of the participants

Variable	Category	Count	Percent
Group	OT-ZOR Clinic	24	42.9
Group	OT-ZOR Equine	32	57.1
Cohort	Summer 2023	9	16.1
Cohort	Fall 2023	11	19.6
Cohort	Spring 2024	9	16.1
Cohort	Summer 2024	10	17.9
Cohort	Fall 2024	9	16.1
Cohort	Spring 2025	8	14.3
CS_Individual outpatient therapist	No	43	76.8
CS_Individual outpatient therapist	Yes	13	23.2
CS_Family therapist	No	49	87.5
CS_Family therapist	Yes	7	12.5
CS_Behavioral Specialist / ABA therapist	No	48	85.7
CS_Behavioral Specialist / ABA therapist	Yes	8	14.3
CS_Paraprofessional ABA	No	54	96.4
CS_Paraprofessional ABA	Yes	2	3.6
CS_Speech therapist- outpatient	No	42	75.0
CS_Speech therapist- outpatient	Yes	14	25.0
CS_Occupational therapist- outpatient	No	48	85.7
CS_Occupational therapist- outpatient	Yes	8	14.3
CS_Physical therapist- outpatient	No	52	92.9
CS_Physical therapist- outpatient	Yes	4	7.1
CS_Psychiatrist- outpatient	No	48	85.7
CS_Psychiatrist- outpatient	Yes	8	14.3
CS_Neurologist	No	55	98.2
CS_Neurologist	Yes	1	1.8
CS_Advocate	No	53	94.6
CS_Advocate	Yes	3	5.4
CS_Community Service Case Manager	No	51	91.1
CS_Community Service Case Manager	Yes	5	8.9
CS_Respite care	No	51	91.1
CS_Respite care	Yes	5	8.9
CS_School IEP or 504 Plan	No	9	16.1
CS_School IEP or 504 Plan	Yes	47	83.9
CS_Therapeutic support animal	No	55	98.2
CS_Therapeutic support animal	Yes	1	1.8
CS_Other	No	48	85.7

Variable	Category	Count	Percent
CS_Other	Yes	8	14.3
Ethnicity	Hispanic or Latino	13	23.2
Ethnicity	Not Hispanic or Latino	41	73.2
Ethnicity	Unknown or not reported	2	3.6
Gender	Female	16	28.6
Gender	Male	37	66.1
Gender	Other	3	5.4
Medications	No, not taking prescription medications	22	42.3
Medications	Yes, taking prescription medications	30	57.7
Race	Asian	4	7.1
Race	Black or African-American	2	3.6
Race	White	37	66.1
Race	More than one race	9	16.1
Race	Unknown or not reported	4	7.1
Sex	Female	18	32.1
Sex	Male	38	67.9
Waitlist	No	26	46.4
Waitlist	Yes	30	53.6
Season	spring	17	30.4
Season	summer	19	33.9
Season	fall	20	35.7

S1.01b Characteristics of the participants, cont.'d

	n	mean	sd	median	min	max
Child's age at goal-setting visit	56	8.92	1.68	8.9	6.26	11.87
Leiter International Performance Scale, Third Edition Nonverbal IQ Score	56	105.12	15.46	106.0	71.00	139.00
Social Communication Questionnaire Score	56	17.80	5.14	16.5	11.00	30.00
Adaptive Behavior Assessment Scale General Adaptive Composite Score	56	77.79	8.93	77.5	53.00	106.00

S1.01c Characteristics of the parents

Variable	Category	Count	Percent
Parent Education Level	High school or less	1	1.8
Parent Education Level	Some college	9	16.4
Parent Education Level	Associate's Degree	3	5.5
Parent Education Level	Bachelor's Degree	16	29.1
Parent Education Level	Graduate Degree	26	47.3
Parent Ethnicity	Hispanic or Latino	8	14.5
Parent Ethnicity	Not Hispanic or Latino	45	81.8
Parent Ethnicity	Unknown or not reported	2	3.6
Household Income	less than \$20,000	1	1.9
Household Income	\$21,000 - \$35,000	2	3.7
Household Income	\$36,000 - \$50,000	5	9.3
Household Income	\$51,000 - \$65,000	2	3.7
Household Income	\$66,000 - \$80,000	5	9.3
Household Income	\$81,000 - \$100,000	9	16.7
Household Income	\$101,000 - \$130,000	5	9.3
Household Income	\$131,000 - \$160,000	8	14.8
Household Income	Over \$160,000	17	31.5
Parent Race	Asian	3	5.5
Parent Race	Black or African-American	2	3.6
Parent Race	White	42	76.4
Parent Race	More than one race	4	7.3
Parent Race	Unknown or not reported	4	7.3
Parent Sex	Female	48	87.3
Parent Sex	Male	7	12.7

S1.02 Time-varying outcomes and covariates

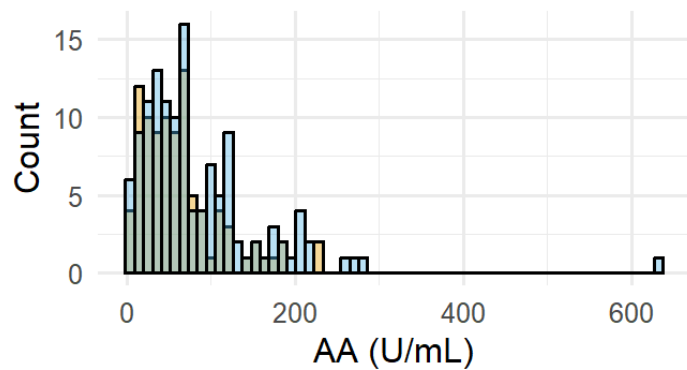
S1.02 Descriptive Statistics by Time Metric

Variable	Time Metric	Time	n	mean	sd	median	min	max	skew
AA.uml	Week	2	55	74.33	60.4	53.96	3.94	265.35	1.3
AA.uml	Week	6	56	75.14	61.33	55.76	5.08	282.41	1.33
AA.uml	Week	10	55	93.39	96.95	67.4	5.74	632.38	3.23
AA.uml	Timepoint	PreSession	56	75.29	55.86	62.75	8.08	290.36	1.52
AA.uml	Timepoint	InSession	56	93.29	76.1	71.89	10.22	399.46	1.78
AA.uml	Timepoint	PostSession	0	NA	NA	NA	NA	NA	NA
AA.uml	Timepoint	Post+20min	56	79.61	56.87	59.16	8.86	262.97	1.15
Any_Change	Week	2	56	0.43	0.5	0	0	1	0.28
Any_Change	Week	6	56	0.3	0.46	0	0	1	0.83
Any_Change	Week	10	56	0.3	0.46	0	0	1	0.83
Clock_12AMoffhrs	Timepoint	PreSession	56	14.74	1.12	14.6	13.08	16.2	-0.18
Clock_12AMoffhrs	Timepoint	InSession	56	15	1.12	14.88	13.33	16.47	-0.19
Clock_12AMoffhrs	Timepoint	PostSession	56	15.59	1.12	15.47	13.92	17.05	-0.18
Clock_12AMoffhrs	Timepoint	Post+20min	56	15.92	1.12	15.81	14.04	17.37	-0.21
Clock_Start	Week	2	55	14.77	1.14	14.58	13.08	16.22	-0.2
Clock_Start	Week	6	56	14.75	1.14	14.58	13.05	16.17	-0.18
Clock_Start	Week	10	56	14.66	1.13	14.58	13.07	16.23	-0.08
Clock_Start	Timepoint	PreSession	56	14.74	1.12	14.6	13.08	16.2	-0.18
Clock_Start	Timepoint	InSession	56	14.74	1.12	14.6	13.08	16.2	-0.18
Clock_Start	Timepoint	PostSession	56	14.74	1.12	14.6	13.08	16.2	-0.18
Clock_Start	Timepoint	Post+20min	56	14.74	1.12	14.6	13.08	16.2	-0.18
Cortisol.ugdl	Week	2	55	0.19	0.29	0.13	0.05	2.18	5.74
Cortisol.ugdl	Week	6	56	0.16	0.08	0.14	0.05	0.41	1.55
Cortisol.ugdl	Week	10	55	0.25	0.57	0.14	0.06	4.24	6.25
Cortisol.ugdl	Timepoint	PreSession	56	0.2	0.24	0.15	0.08	1.83	5.69
Cortisol.ugdl	Timepoint	InSession	0	NA	NA	NA	NA	NA	NA
Cortisol.ugdl	Timepoint	PostSession	56	0.13	0.06	0.11	0.04	0.38	1.62
Cortisol.ugdl	Timepoint	Post+20min	56	0.13	0.06	0.11	0.05	0.28	1.04
Horse_Change	Week	2	56	0.12	0.33	0	0	1	2.21
Horse_Change	Week	6	56	0	0	0	0	0	NA
Horse_Change	Week	10	56	0.07	0.26	0	0	1	3.24
Med_Change	Week	2	56	0.11	0.31	0	0	1	2.47
Med_Change	Week	6	56	0.07	0.26	0	0	1	3.24
Med_Change	Week	10	56	0.05	0.23	0	0	1	3.86
Routine_Change	Week	2	56	0.05	0.23	0	0	1	3.86
Routine_Change	Week	6	56	0.16	0.37	0	0	1	1.8
Routine_Change	Week	10	56	0.04	0.19	0	0	1	4.87

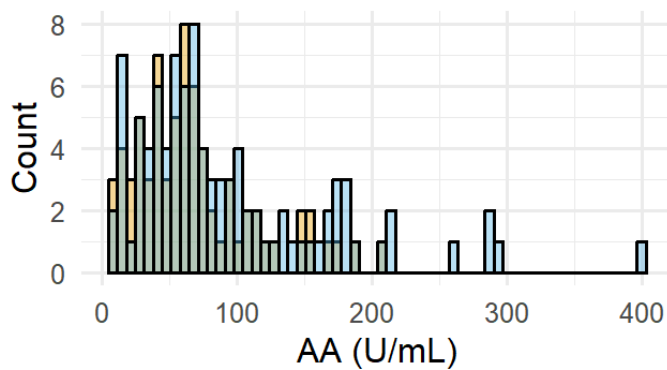
Variable	Time Metric	Time	n	mean	sd	median	min	max	skew
Therapist_Change	Week	2	56	0.18	0.39	0	0	1	1.63
Therapist_Change	Week	6	56	0.02	0.13	0	0	1	7.09
Therapist_Change	Week	10	56	0.07	0.26	0	0	1	3.24
Volunteer_Change	Week	2	56	0.09	0.29	0	0	1	2.8
Volunteer_Change	Week	6	56	0.09	0.29	0	0	1	2.8
Volunteer_Change	Week	10	56	0.12	0.33	0	0	1	2.21

S1.03 Histograms for outcomes

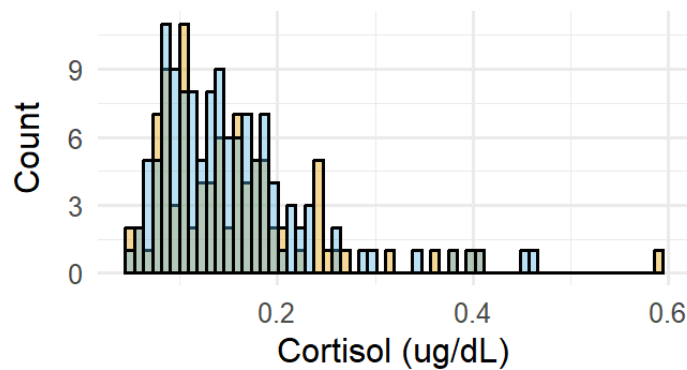
Alpha-amylase (by week)



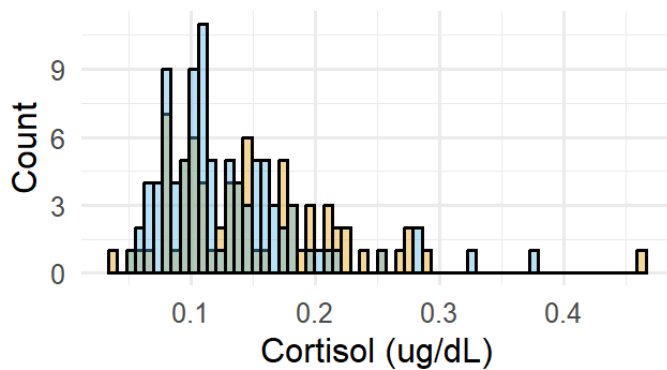
Alpha-amylase (by timepoint)



Cortisol (by week)



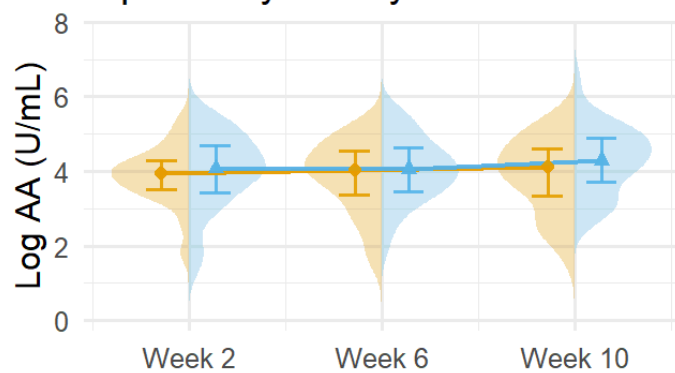
Cortisol (by timepoint)



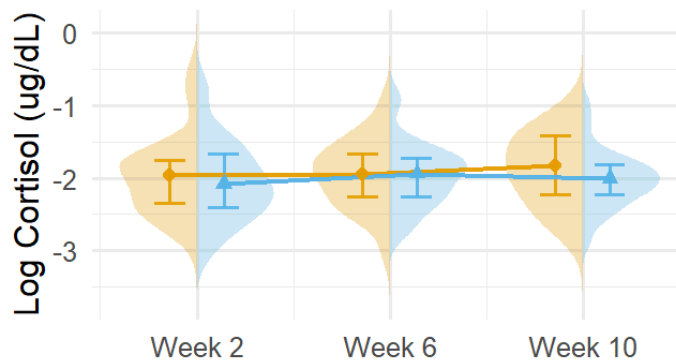
Group OT-ZOR Clinic OT-ZOR Equine

S1.04 Density plots for outcomes

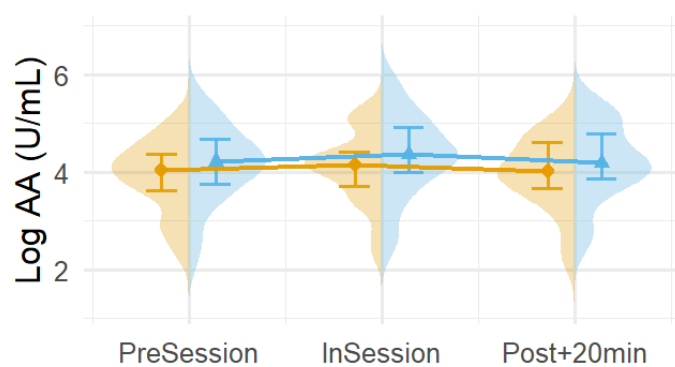
Alpha-amylase by scheduled week



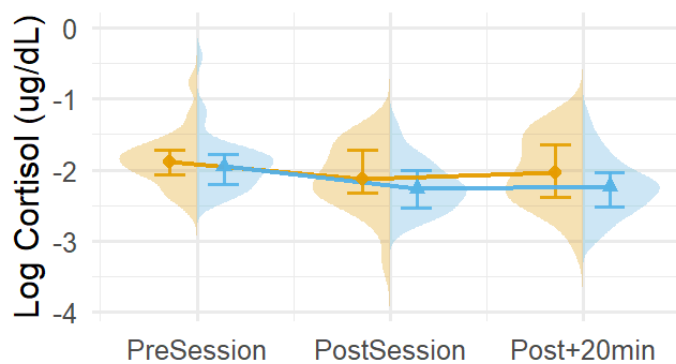
Cortisol by scheduled week



Alpha-amylase by session timepoint



Cortisol by session timepoint



Group — OT-ZOR Clinic — OT-ZOR Equine

S1.05 Tests for group differences at pre-intervention

S1.05 Group Differences at Pre

Variable	Test	Statistic	p
Sex	Chi-sq	0.00	1.000
Gender	Chi-sq	0.12	0.942
Child's age at goal-setting visit	t-test	1.20	0.235
Race	Chi-sq	3.28	0.512
Ethnicity	Chi-sq	0.13	0.936
Leiter International Performance Scale, Third Edition Nonverbal IQ Score	t-test	0.66	0.514
Social Communication Questionnaire Score	t-test	-0.18	0.862
Adaptive Behavior Assessment Scale General Adaptive Composite Score	t-test	-2.06	0.045
Parent Sex	Chi-sq	0.22	0.639
Parent Race	Chi-sq	8.13	0.087
Parent Ethnicity	Chi-sq	0.34	0.845
Household Income	Chi-sq	4.65	0.794
Parent Education Level	Chi-sq	2.56	0.633
Medications	Chi-sq	0.46	0.498
Season	Chi-sq	0.19	0.908

```
##
## Wilcoxon signed rank test with continuity correction
##
## data: d.difWk12$AA_diff_Wk2_Wk1
## V = 883, p-value = 0.1393
## alternative hypothesis: true location is not equal to 0
```

```
##
## Wilcoxon signed rank test with continuity correction
##
## data: d.difWk12$Cortisol_diff_Wk2_Wk1
## V = 813, p-value = 0.5467
## alternative hypothesis: true location is not equal to 0
```

```
## # Intraclass Correlation Coefficient
##
## Adjusted ICC: 0.953
## Unadjusted ICC: 0.953
```

S1.06 OT-ZOR Clinic vs. OT-ZOR Equine: Levels & changes in AA & Cortisol (by week)

S1.06a GLMM Summary Table (glmmTMB): Changes by Week

Outcome	Model	Effect	Estimate [95% CI]	Exp(Estimate) [95% CI]	p	Convergence	Singularity	Gamma shape
Alpha-amylase	a	Intercept	3.88 [3.55, 4.21]	48.52 [34.84, 67.56]	<.001	OK	OK	0.458
Alpha-amylase	a	Group: OT-ZOR Equine vs. OT-ZOR Clinic	0.25 [-0.17, 0.67]	1.28 [0.84, 1.96]	0.250			
Alpha-amylase	a	Week	0.02 [0.00, 0.05]	1.02 [1.00, 1.05]	0.036			
Alpha-amylase	a	Random intercept SD	0.75					
Alpha-amylase	b	Intercept	3.95 [3.60, 4.30]	51.96 [36.66, 73.64]	<.001	OK	OK	0.454
Alpha-amylase	b	Group: OT-ZOR Equine vs. OT-ZOR Clinic	0.13 [-0.33, 0.59]	1.14 [0.72, 1.80]	0.580			
Alpha-amylase	b	Week	0.01 [-0.03, 0.04]	1.01 [0.97, 1.04]	0.745			
Alpha-amylase	b	Group x Week	0.03 [-0.01, 0.07]	1.03 [0.99, 1.08]	0.184			
Alpha-amylase	b	Random intercept SD	0.76					
Alpha-amylase	c1	Intercept	3.93 [3.58, 4.29]	51.07 [35.84, 72.75]	<.001	OK	OK	0.454
Alpha-amylase	c1	Group: OT-ZOR Equine vs. OT-ZOR Clinic	0.16 [-0.31, 0.63]	1.17 [0.73, 1.88]	0.506			
Alpha-amylase	c1	Week	0.01 [-0.03, 0.04]	1.01 [0.97, 1.04]	0.747			
Alpha-amylase	c1	Group x Week	0.03 [-0.01, 0.07]	1.03 [0.99, 1.08]	0.182			
Alpha-amylase	c1	Random intercept SD	0.75					
Alpha-amylase	c2	Intercept	3.82 [1.32, 6.33]	45.64 [3.73, 559.16]	0.003	OK	OK	0.453
Alpha-amylase	c2	Group: OT-ZOR Equine vs. OT-ZOR Clinic	0.13 [-0.33, 0.59]	1.14 [0.72, 1.81]	0.577			
Alpha-amylase	c2	Week	0.01 [-0.03, 0.04]	1.01 [0.97, 1.04]	0.743			
Alpha-amylase	c2	Group x Week	0.03 [-0.01, 0.07]	1.03 [0.99, 1.08]	0.183			
Alpha-amylase	c2	Random intercept SD	0.76					
Alpha-amylase	c3	Intercept	3.94 [3.58, 4.29]	51.25 [35.87, 73.22]	<.001	OK	OK	0.453
Alpha-amylase	c3	Group: OT-ZOR Equine vs. OT-ZOR Clinic	0.13 [-0.33, 0.59]	1.14 [0.72, 1.80]	0.578			
Alpha-amylase	c3	Week	0.01 [-0.03, 0.04]	1.01 [0.97, 1.04]	0.721			
Alpha-amylase	c3	Group x Week	0.03 [-0.01, 0.07]	1.03 [0.99, 1.08]	0.187			
Alpha-amylase	c3	Random intercept SD	0.76					
Alpha-amylase	c4	Intercept	4.19 [3.75, 4.63]	66.05 [42.44, 102.80]	<.001	OK	OK	0.454
Alpha-amylase	c4	Group: OT-ZOR Equine vs. OT-ZOR Clinic	0.15 [-0.29, 0.59]	1.16 [0.74, 1.80]	0.515			
Alpha-amylase	c4	Week	0.01 [-0.03, 0.04]	1.01 [0.97, 1.04]	0.700			
Alpha-amylase	c4	Group x Week	0.03 [-0.02, 0.07]	1.03 [0.98, 1.08]	0.204			
Alpha-amylase	c4	Random intercept SD	0.71					
Cortisol	a	Intercept	-1.82 [-2.07, -1.57]	0.16 [0.13, 0.21]	<.001	OK	OK	0.518
Cortisol	a	Group: OT-ZOR Equine vs. OT-ZOR Clinic	-0.03 [-0.33, 0.27]	0.97 [0.72, 1.30]	0.837			
Cortisol	a	Week	0.01 [-0.01, 0.04]	1.01 [0.99, 1.04]	0.331			
Cortisol	a	Random intercept SD	0.47					
Cortisol	b	Intercept	-1.88 [-2.15, -1.61]	0.15 [0.12, 0.20]	<.001	OK	OK	0.517
Cortisol	b	Group: OT-ZOR Equine vs. OT-ZOR Clinic	0.07 [-0.29, 0.43]	1.07 [0.75, 1.54]	0.697			
Cortisol	b	Week	0.03 [-0.01, 0.07]	1.03 [0.99, 1.07]	0.166			
Cortisol	b	Group x Week	-0.03 [-0.08, 0.03]	0.97 [0.93, 1.03]	0.324			
Cortisol	b	Random intercept SD	0.47					
Cortisol	c1	Intercept	-1.89 [-2.16, -1.61]	0.15 [0.12, 0.20]	<.001	OK	OK	0.517
Cortisol	c1	Group: OT-ZOR Equine vs. OT-ZOR Clinic	0.08 [-0.28, 0.45]	1.09 [0.75, 1.57]	0.657			
Cortisol	c1	Week	0.03 [-0.01, 0.07]	1.03 [0.99, 1.07]	0.172			
Cortisol	c1	Group x Week	-0.03 [-0.08, 0.03]	0.98 [0.93, 1.03]	0.332			
Cortisol	c1	Random intercept SD	0.47					
Cortisol	c2	Intercept	-1.06 [-2.96, 0.85]	0.35 [0.05, 2.33]	0.276	OK	OK	0.518
Cortisol	c2	Group: OT-ZOR Equine vs. OT-ZOR Clinic	0.06 [-0.29, 0.42]	1.06 [0.75, 1.52]	0.729			
Cortisol	c2	Week	0.03 [-0.01, 0.07]	1.03 [0.99, 1.07]	0.181			
Cortisol	c2	Group x Week	-0.03 [-0.08, 0.03]	0.97 [0.93, 1.03]	0.327			
Cortisol	c2	Random intercept SD	0.46					
Cortisol	c3	Intercept	-1.90 [-2.19, -1.62]	0.15 [0.11, 0.20]	<.001	OK	OK	0.516
Cortisol	c3	Group: OT-ZOR Equine vs. OT-ZOR Clinic	0.07 [-0.28, 0.43]	1.08 [0.75, 1.54]	0.686			
Cortisol	c3	Week	0.03 [-0.01, 0.07]	1.03 [0.99, 1.07]	0.157			
Cortisol	c3	Group x Week	-0.03 [-0.08, 0.03]	0.97 [0.93, 1.03]	0.326			
Cortisol	c3	Random intercept SD	0.47					

Outcome	Model	Effect	Estimate [95% CI]	Exp(Estimate) [95% CI]	p	Convergence	Singularity	Gamma shape
Cortisol	c4	Intercept	-1.85 [-2.19, -1.51]	0.16 [0.11, 0.22]	<.001	OK	OK	0.517
Cortisol	c4	Group: OT-ZOR Equine vs. OT-ZOR Clinic	0.07 [-0.28, 0.43]	1.07 [0.75, 1.53]	0.694			
Cortisol	c4	Week	0.03 [-0.01, 0.06]	1.03 [0.99, 1.07]	0.182			
Cortisol	c4	Group x Week	-0.02 [-0.07, 0.03]	0.98 [0.93, 1.03]	0.349			
Cortisol	c4	Random intercept SD	0.46					

S1.06b GLMM Covariates Effects (glmmTMB)

	Term	Estimate	Std..Error	z.value	Pr...z..
alph.c2	Clock_Start.Wk	0.009	0.085	0.102	0.918
alph.c3	Any_Change.Wk	0.032	0.091	0.357	0.721
alph.c4.4	seasonsummer	-0.587	0.255	-2.303	0.021
alph.c4.5	seasonfall	-0.145	0.252	-0.574	0.566
cort.c2	Clock_Start.Wk	-0.055	0.065	-0.854	0.393
cort.c3	Any_Change.Wk	0.051	0.102	0.505	0.613
cort.c4.4	seasonsummer	0.072	0.185	0.392	0.695
cort.c4.5	seasonfall	-0.150	0.182	-0.825	0.409

S1.07 OT-ZOR Clinic vs. OT-ZOR Equine: Levels & changes in AA & Cortisol (by timepoint)

S1.07a GLMM Summary Table (glmmTMB): Changes by Session Timepoint

Outcome	Model	Effect	Estimate [95% CI]	Exp(Estimate) [95% CI]	p	Convergence	Singularity	Gamma shape
Alpha-amylase	a	Intercept	3.95 [3.65, 4.25]	51.87 [38.36, 70.13]	<.001	OK	OK	0.258
Alpha-amylase	a	Group: OT-ZOR Equine vs. OT-ZOR Clinic	0.23 [-0.16, 0.62]	1.26 [0.85, 1.87]	0.248			
Alpha-amylase	a	Timepoint 2 vs. pre-session	0.20 [0.10, 0.29]	1.22 [1.10, 1.34]	<.001			
Alpha-amylase	a	Timepoint 3 vs. pre-session	0.07 [-0.03, 0.16]	1.07 [0.97, 1.18]	0.168			
Alpha-amylase	a	Random intercept SD	0.73					
Alpha-amylase	b	Intercept	3.94 [3.63, 4.25]	51.48 [37.82, 70.08]	<.001	OK	OK	0.258
Alpha-amylase	b	Group: OT-ZOR Equine vs. OT-ZOR Clinic	0.24 [-0.16, 0.65]	1.28 [0.85, 1.92]	0.241			
Alpha-amylase	b	Timepoint 2 vs. pre-session	0.20 [0.06, 0.35]	1.22 [1.06, 1.42]	0.007			
Alpha-amylase	b	Timepoint 3 vs. pre-session	0.08 [-0.06, 0.23]	1.09 [0.94, 1.26]	0.265			
Alpha-amylase	b	Group x Timepoint 2	-0.01 [-0.21, 0.18]	0.99 [0.81, 1.20]	0.916			
Alpha-amylase	b	Group x Timepoint 3	-0.03 [-0.22, 0.17]	0.97 [0.80, 1.18]	0.775			
Alpha-amylase	b	Random intercept SD	0.73					
Alpha-amylase	c1	Intercept	4.13 [2.40, 5.87]	62.38 [11.01, 353.53]	<.001	OK	OK	0.258
Alpha-amylase	c1	Group: OT-ZOR Equine vs. OT-ZOR Clinic	0.26 [-0.17, 0.68]	1.29 [0.85, 1.97]	0.234			
Alpha-amylase	c1	Timepoint 2 vs. pre-session	0.20 [0.05, 0.35]	1.22 [1.06, 1.42]	0.007			
Alpha-amylase	c1	Timepoint 3 vs. pre-session	0.08 [-0.06, 0.23]	1.09 [0.94, 1.26]	0.266			
Alpha-amylase	c1	Group x Timepoint 2	-0.01 [-0.20, 0.18]	0.99 [0.81, 1.20]	0.918			
Alpha-amylase	c1	Group x Timepoint 3	-0.03 [-0.22, 0.17]	0.97 [0.80, 1.18]	0.776			
Alpha-amylase	c1	Random intercept SD	0.73					
Alpha-amylase	c2	Intercept	4.66 [2.11, 7.22]	105.91 [8.25, 1359.77]	<.001	OK	OK	0.257
Alpha-amylase	c2	Group: OT-ZOR Equine vs. OT-ZOR Clinic	0.24 [-0.17, 0.64]	1.27 [0.84, 1.91]	0.257			
Alpha-amylase	c2	Timepoint 2 vs. pre-session	0.21 [0.06, 0.36]	1.24 [1.06, 1.44]	0.006			
Alpha-amylase	c2	Timepoint 3 vs. pre-session	0.14 [-0.11, 0.39]	1.15 [0.90, 1.47]	0.265			
Alpha-amylase	c2	Group x Timepoint 2	-0.01 [-0.20, 0.19]	0.99 [0.82, 1.21]	0.938			
Alpha-amylase	c2	Group x Timepoint 3	-0.03 [-0.22, 0.17]	0.97 [0.80, 1.18]	0.788			
Alpha-amylase	c2	Random intercept SD	0.72					
Alpha-amylase	c3	Intercept	4.13 [3.74, 4.52]	62.47 [42.31, 92.23]	<.001	OK	OK	0.258
Alpha-amylase	c3	Group: OT-ZOR Equine vs. OT-ZOR Clinic	0.25 [-0.13, 0.63]	1.28 [0.88, 1.88]	0.200			
Alpha-amylase	c3	Timepoint 2 vs. pre-session	0.20 [0.06, 0.35]	1.22 [1.06, 1.42]	0.007			
Alpha-amylase	c3	Timepoint 3 vs. pre-session	0.08 [-0.06, 0.23]	1.09 [0.94, 1.26]	0.271			
Alpha-amylase	c3	Group x Timepoint 2	-0.01 [-0.21, 0.18]	0.99 [0.81, 1.20]	0.912			
Alpha-amylase	c3	Group x Timepoint 3	-0.03 [-0.22, 0.17]	0.97 [0.80, 1.18]	0.786			
Alpha-amylase	c3	Random intercept SD	0.67					
Cortisol	a	Intercept	-1.74 [-1.93, -1.56]	0.17 [0.15, 0.21]	<.001	OK	OK	0.263
Cortisol	a	Group: OT-ZOR Equine vs. OT-ZOR Clinic	-0.09 [-0.32, 0.14]	0.91 [0.73, 1.15]	0.437			
Cortisol	a	Timepoint 2 vs. pre-session	-0.33 [-0.43, -0.23]	0.72 [0.65, 0.79]	<.001			
Cortisol	a	Timepoint 3 vs. pre-session	-0.32 [-0.42, -0.22]	0.73 [0.66, 0.80]	<.001			
Cortisol	a	Random intercept SD	0.40					
Cortisol	b	Intercept	-1.83 [-2.02, -1.64]	0.16 [0.13, 0.19]	<.001	OK	OK	0.256
Cortisol	b	Group: OT-ZOR Equine vs. OT-ZOR Clinic	0.05 [-0.20, 0.30]	1.05 [0.82, 1.35]	0.705			
Cortisol	b	Timepoint 2 vs. pre-session	-0.24 [-0.39, -0.10]	0.78 [0.68, 0.91]	0.001			
Cortisol	b	Timepoint 3 vs. pre-session	-0.17 [-0.31, -0.02]	0.85 [0.73, 0.98]	0.026			
Cortisol	b	Group x Timepoint 2	-0.15 [-0.34, 0.05]	0.86 [0.71, 1.05]	0.134			
Cortisol	b	Group x Timepoint 3	-0.27 [-0.46, -0.07]	0.77 [0.63, 0.93]	0.007			
Cortisol	b	Random intercept SD	0.40					
Cortisol	c1	Intercept	-1.55 [-2.55, -0.55]	0.21 [0.08, 0.58]	0.002	OK	OK	0.256
Cortisol	c1	Group: OT-ZOR Equine vs. OT-ZOR Clinic	0.07 [-0.19, 0.33]	1.07 [0.82, 1.39]	0.615			
Cortisol	c1	Timepoint 2 vs. pre-session	-0.24 [-0.39, -0.10]	0.78 [0.68, 0.91]	0.001			
Cortisol	c1	Timepoint 3 vs. pre-session	-0.17 [-0.31, -0.02]	0.85 [0.73, 0.98]	0.026			
Cortisol	c1	Group x Timepoint 2	-0.15 [-0.34, 0.05]	0.86 [0.71, 1.05]	0.134			
Cortisol	c1	Group x Timepoint 3	-0.27 [-0.46, -0.07]	0.77 [0.63, 0.93]	0.007			
Cortisol	c1	Random intercept SD	0.40					
Cortisol	c2	Intercept	-0.65 [-2.12, 0.82]	0.52 [0.12, 2.27]	0.387	OK	OK	0.256

Outcome	Model	Effect	Estimate [95% CI]	Exp(Estimate) [95% CI]	p	Convergence	Singularity	Gamma shape
Cortisol	c2	Group: OT-ZOR Equine vs. OT-ZOR Clinic	0.04 [-0.21, 0.28]	1.04 [0.81, 1.33]	0.777			
Cortisol	c2	Timepoint 2 vs. pre-session	-0.18 [-0.34, -0.01]	0.84 [0.71, 0.99]	0.039			
Cortisol	c2	Timepoint 3 vs. pre-session	-0.07 [-0.26, 0.11]	0.93 [0.77, 1.12]	0.430			
Cortisol	c2	Group x Timepoint 2	-0.14 [-0.34, 0.05]	0.87 [0.71, 1.05]	0.144			
Cortisol	c2	Group x Timepoint 3	-0.26 [-0.46, -0.07]	0.77 [0.63, 0.93]	0.008			
Cortisol	c2	Random intercept SD	0.39					
Cortisol	c3	Intercept	-1.86 [-2.11, -1.61]	0.16 [0.12, 0.20]	<.001	OK	OK	0.256
Cortisol	c3	Group: OT-ZOR Equine vs. OT-ZOR Clinic	0.05 [-0.21, 0.30]	1.05 [0.81, 1.35]	0.717			
Cortisol	c3	Timepoint 2 vs. pre-session	-0.24 [-0.39, -0.10]	0.78 [0.68, 0.91]	0.001			
Cortisol	c3	Timepoint 3 vs. pre-session	-0.17 [-0.31, -0.02]	0.85 [0.73, 0.98]	0.026			
Cortisol	c3	Group x Timepoint 2	-0.15 [-0.34, 0.05]	0.86 [0.71, 1.05]	0.134			
Cortisol	c3	Group x Timepoint 3	-0.27 [-0.46, -0.07]	0.77 [0.63, 0.93]	0.007			
Cortisol	c3	Random intercept SD	0.40					

S1.07b GLMM Covariates Effects (glmmTMB)

	Term	Estimate	Std..Error	z.value	Pr...z..
alph.c1	Adaptive Behavior Assessment Scale General Adaptive Composite Score	-0.003	0.012	-0.221	0.825
alph.c2	Clock_12AMoffhrs.TP	-0.049	0.087	-0.558	0.577
alph.c3.5	seasonsummer	-0.576	0.230	-2.500	0.012
alph.c3.6	seasonfall	-0.003	0.228	-0.014	0.989
cort.c1	Adaptive Behavior Assessment Scale General Adaptive Composite Score	-0.004	0.007	-0.560	0.576
cort.c2	Clock_12AMoffhrs.TP	-0.079	0.050	-1.583	0.113
cort.c3.5	seasonsummer	0.079	0.142	0.554	0.580
cort.c3.6	seasonfall	0.034	0.141	0.241	0.810

S1.08 Biomarker/behavior change-change associations

S1.08 Biomarker/Behavioral Change Correlations (Spearman's rho, p-value)

Variable	AA.uml.Dif.Wk	Cortisol.ugdl.Dif.Wk	AA.uml.Dif.TP	Cortisol.ugdl.Dif.TP
edi_react_t_chgTR	0.043 (0.760)	0.156 (0.260)	0.217 (0.107)	0.131 (0.336)
edi_dys_t_chgTR	-0.018 (0.898)	0.235 (0.087)	0.131 (0.335)	0.189 (0.164)
abc_irr_raw_chgTR	0.165 (0.238)	0.075 (0.589)	0.210 (0.121)	0.019 (0.888)
abc_hyp_raw_chgTR	0.101 (0.473)	0.103 (0.458)	0.147 (0.281)	0.187 (0.169)
srs_total_t_chgTR	-0.057 (0.686)	0.235 (0.087)	0.074 (0.589)	0.231 (0.086)
srs_cog_t_chgTR	-0.023 (0.871)	0.111 (0.424)	0.127 (0.351)	0.235 (0.082)
srs_com_t_chgTR	-0.141 (0.314)	0.163 (0.238)	-0.041 (0.765)	0.182 (0.180)

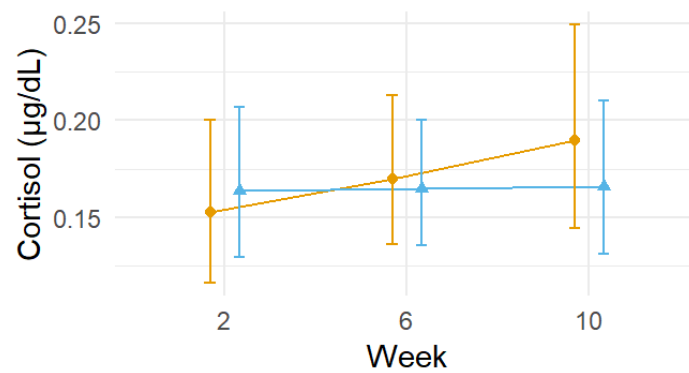
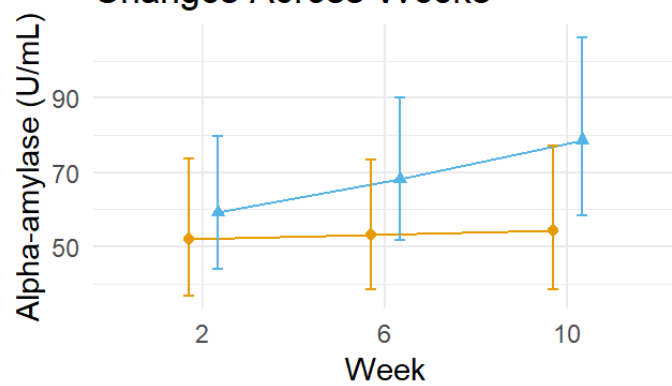
S1.09 Group differences in AA at Week 2 vs. Week 10 (model-based contrasts)

Follow-up (AA only): OT-ZOR Equine vs OT-ZOR Clinic at Weeks 2 and 10. Ratios on response scale.

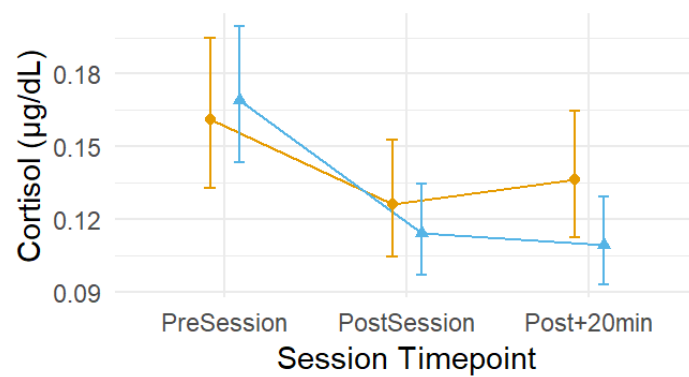
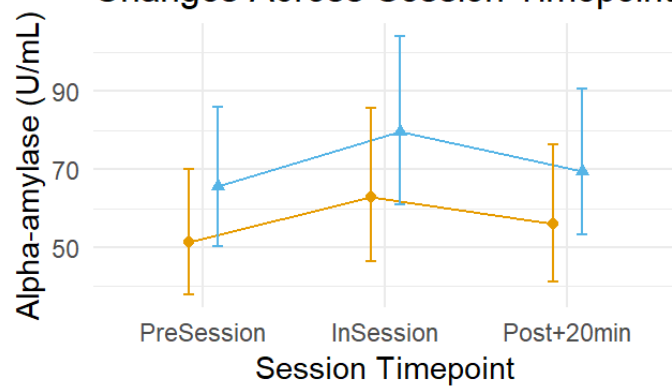
Outcome	Week 2 - Ratio [95% CI]	Week 10 - Ratio [95% CI]	Week 2 - p.holm	Week 10 - p.holm
AA	1.14 [0.72, 1.80]	1.45 [0.91, 2.29]	0.580	0.115

S1.10 Plots of estimated effects

Changes Across Weeks



Changes Across Session Timepoints



Group — OT-ZOR Clinic — OT-ZOR Equine

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S1.11a Weekly changes

Table 3a. Week schedule: model-adjusted geometric means (back-transformed). Columns are Group–W2/W6/W10. Units: AA U/mL; Cortisol µg/dL.

Model	Outcome	Spec	OT-ZOR Clinic– W2	OT-ZOR Clinic– W6	OT-ZOR Clinic– W10	OT-ZOR Equine–W2	OT-ZOR Equine–W6	OT-ZOR Equine– W10
T1-AA.a	AA	group + time	48.52 [34.84, 67.56]	53.29 [38.68, 73.42]	58.53 [41.94, 81.68]	62.22 [46.50, 83.25]	68.33 [51.81, 90.12]	75.05 [56.19, 100.23]
T1-AA.b	AA	group × time	51.96 [36.66, 73.64]	53.14 [38.53, 73.30]	54.36 [38.32, 77.10]	59.16 [43.83, 79.84]	68.22 [51.68, 90.06]	78.68 [58.32, 106.15]
T1-C.a	Cortisol	group + time	0.16 [0.13, 0.21]	0.17 [0.14, 0.21]	0.18 [0.14, 0.23]	0.16 [0.13, 0.20]	0.16 [0.14, 0.20]	0.17 [0.14, 0.22]
T1-C.b	Cortisol	group × time	0.15 [0.12, 0.20]	0.17 [0.14, 0.21]	0.19 [0.14, 0.25]	0.16 [0.13, 0.21]	0.16 [0.14, 0.20]	0.17 [0.13, 0.21]

S1.11a Weekly changes

Table 3b. Week schedule: effects shown as exponentiated ratios with 95% CI (2 d.p.) and p (3 d.p.).

Model	Outcome	Spec	Group - Ratio [95% CI]	Group - p	Time (per week) - Ratio [95% CI]	Time (per week) - p	Group×Time - Ratio [95% CI]	Group×Time - p
T1-AA.a	AA	group + time	1.28 [0.84, 1.96]	0.250	1.02 [1.00, 1.05]	0.036	NA	NA
T1-AA.b	AA	group × time	1.14 [0.72, 1.80]	0.580	1.01 [0.97, 1.04]	0.745	1.03 [0.99, 1.08]	0.184
T1-C.a	Cortisol	group + time	0.97 [0.72, 1.30]	0.837	1.01 [0.99, 1.04]	0.331	NA	NA
T1-C.b	Cortisol	group × time	1.07 [0.75, 1.54]	0.697	1.03 [0.99, 1.07]	0.166	0.97 [0.93, 1.03]	0.324

S1.11b Session timepoint changes

Table 4a. Session-phase: model-adjusted geometric means (back-transformed; 2 d.p.). Columns are Group–Phase with OT first. Units: AA U/mL; Cortisol µg/dL.

Model	Outcome	Spec	OT-ZOR Clinic– PreSession	OT-ZOR Clinic– InSession	OT-ZOR Clinic– PostSession	OT-ZOR Clinic– Post+20min	OT-ZOR Equine– PreSession	OT-ZOR Equine– InSession	OT-ZOR Equine– PostSession	OT-ZOR Equine– Post+20min
T2- AA.a	AA	group + time	51.87 [38.36, 70.13]	63.09 [46.66, 85.31]	NA	55.50 [41.05, 75.04]	65.35 [50.26, 84.99]	79.49 [61.12, 103.38]	NA	69.93 [53.77, 90.95]
T2- AA.b	AA	group × time	51.48 [37.82, 70.08]	63.00 [46.28, 85.76]	NA	56.00 [41.13, 76.24]	65.71 [50.31, 85.82]	79.57 [60.91, 103.95]	NA	69.47 [53.19, 90.74]
T2- C.a	Cortisol	group + time	0.17 [0.15, 0.21]	NA	0.13 [0.10, 0.15]	0.13 [0.11, 0.15]	0.16 [0.14, 0.19]	NA	0.11 [0.10, 0.13]	0.12 [0.10, 0.14]
T2- C.b	Cortisol	group × time	0.16 [0.13, 0.19]	NA	0.13 [0.10, 0.15]	0.14 [0.11, 0.16]	0.17 [0.14, 0.20]	NA	0.11 [0.10, 0.13]	0.11 [0.09, 0.13]

S1.11b Session timepoint changes

Table 4b. Session-phase: effects as exponentiated ratios with 95% CI (2 d.p.) and p (3 d.p.).

Model	Outcome	Spec	Group - Ratio [95% CI]	Group - p	Time: InSession - Ratio [95% CI]	Time: InSession - p	Time: PostSession - Ratio [95% CI]	Time: PostSession - p	Time: Post+20min - Ratio [95% CI]	Time: Post+20min - p	Group×Time: InSession - Ratio [95% CI]
T2- AA.a	AA	group + time	1.26 [0.85, 1.87]	0.248	1.22 [1.10, 1.34]	<.001	NA	NA	1.07 [0.97, 1.18]	0.168	NA
T2- AA.b	AA	group × time	1.28 [0.85, 1.92]	0.241	1.22 [1.06, 1.42]	0.007	NA	NA	1.09 [0.94, 1.26]	0.265	0.99 [0.81, 1.20]
T2- C.a	Cortisol	group + time	0.91 [0.73, 1.15]	0.437	NA	NA	0.72 [0.65, 0.79]	<.001	0.73 [0.66, 0.80]	<.001	NA
T2- C.b	Cortisol	group × time	1.05 [0.82, 1.35]	0.705	NA	NA	0.78 [0.68, 0.91]	0.001	0.85 [0.73, 0.98]	0.026	NA

S1.11c Within-session to Post-session +20 minutes recovery of alpha-amylase

Table 4c. Follow-up contrasts of within-session to post-session +20-minute alpha-amylase recovery.

Analysis	Ratio [95% CI]	p
Overall recovery	0.88 [0.80, 0.97]	0.010
OT-ZOR Clinic	0.89 [0.77, 1.03]	0.119
OT-ZOR Equine	0.87 [0.77, 0.99]	0.038
Group difference in recovery	1.02 [0.84, 1.24]	0.857