

## Final report – Horses and Humans Research Foundation

*Can horses distinguish between neurotypical and mentally traumatized humans?*

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### 1. Full summary of research project results and findings.

The benefits to humans of equine-assisted activities (EAA) has been well-researched, however, very few studies have analyzed these interactions from the viewpoint of the horse. It is crucial to understand how differing physical and mental states of humans can affect the behaviour and response of the horse. Four treatment humans clinically diagnosed and under current treatment with a psychotherapist for Post Traumatic Stress Disorder (PTSD) were matched physically to four neurotypical humans and individually subjected to each of 17 therapy horses loose in a familiar round pen. A professional acting coach instructed the control humans in emulating the physical movements of their paired PTSD subject. Both horses and humans were equipped with a heart rate (HR) monitor recording HR every 5secs. Salivary samples were collected from each horse 30min before and after each trial to analyze cortisol concentrations. Each trial consisted of 5min of baseline observation of the horse alone in the round pen after which the human entered the round pen for 2min, followed by an additional 5min of the horse alone. Behavioural observations indicating stress in the horse (gait, head height, ear position, body position, distance from the human, latency of approach to the human, vocalizations, and chewing) were retrospectively collected from video recordings of each trial and analyzed using a repeated measures GLM. Sidak's multiple comparisons analyzed differences between treatments and time periods. In general, horses moved slower ( $p < 0.0001$ ), carried their head lower ( $p < 0.0001$ ), vocalized less ( $p < 0.0001$ ), chewed less ( $p < 0.0001$ ), and decreased HR ( $p < 0.0001$ ) when any human was present with them in the round pen. When compared to control subjects, horses carried their heads higher ( $p < 0.0044$ ) when with PTSD subjects. Since two of the PTSD/control human pairs were experienced with horses and two were not, a post-hoc analysis showed that horses approached quicker ( $p < 0.006$ ), stood closer ( $p < 0.0025$ ), and oriented their ears ( $p < 0.0003$ ) more toward humans who were experienced with horses. Horse HR was lower when with inexperienced humans ( $p < 0.0001$ ) whereas inexperienced human HR was higher ( $p < 0.0031$ ). Horse salivary cortisol did not differ when exposed to humans with PTSD or controls ( $p > 0.24$ ), nor when alone versus with a human ( $p > 0.81$ ). Horses who had been used in a therapy setting for less than one year vocalized more than horses who had been used for more than one year ( $p < 0.013$ ). Overall, behavioural and physiological responses of horses to humans is more pronounced based on human experience with horses than whether the human is diagnosed with a mental disorder. Therefore, in future studies, separate human treatment groups based on human emotional conditions in equine-assisted activities may not be necessary. Horses appear to be more attuned to experienced horse people, perhaps in the expectation of work, and horses have a lower heart rate when around humans with little horse experience. Thus, practitioners of equine-assisted activities should be aware of how horses respond to humans more familiar with horses.

2. Summary suitable for posting to the research page of the HHRF web site (if different than #1)

Equine-assisted activities rely on appropriate pairing of a horse with a human participant to extract applicable learning opportunities that enable the participant to benefit fully from the interaction with the horse. Facilitators need not only to know the temperament of the horses at their disposal, but also to understand how certain human traits or actions affect the behaviour of the horses. Some criticisms of research studies in this area target the (unproven) assumption that horses will respond differently to humans with psychological/emotional issues (eg. PTSD) than to humans not experiencing any psychological trauma – the implicit belief that the horse “intuits” the needs of the emotionally-challenged human and responds benevolently. As a foundational pilot study to expand research of behavioural responses of horses in equine-assisted settings, this project paired four humans with clinically-diagnosed PTSD to four neurotypical control humans similar in age, height, weight and familiarity with horses. The PTSD subjects interacted in a round pen for two minutes with each of 17 different therapy horses. Following an instructional session with a professional acting coach, the control humans then interacted with each of the therapy horses, moving their bodies in the same manner as their paired PTSD subject. Both horses and humans wore a heart rate monitor, and all sessions were video-taped for retrospective analysis of horse behaviours. Results showed that horses carried their head higher with PTSD subjects (a behaviour related with stress), but otherwise did not respond differently to PTSD subjects compared to control. However, the presence of any human caused horses to move slower, vocalize less, chew less and decrease heart rate – all signs of a more relaxed state. The length of time a horse had been used in a therapy setting only affected vocalizations, with less experienced horses vocalizing more. Interestingly, horses approached quicker, oriented their ears toward and stood closer to humans who were more experienced with horses, although horse heart rate was lower when with inexperienced humans. This could indicate that horses are more attentive toward experienced humans, perhaps in the expectation of work, whereas horses can be more relaxed when with inexperienced humans. These results are useful to inform practitioners of behavioural responses of horses used in equine-assisted activities, as well as to justify experimental protocols for future research in this area.

Many thanks to Sunrise Therapeutic Riding and Learning Centre for the use of their horses and facilities, and to all the volunteers who made this research possible.

3. State both your final conclusions and how you feel these findings should inform/influence equine assisted activity practices.

In summary, horses do not appear to respond differently to humans with PTSD, which validates such equine-assisted activities. Any behaviours the horse portrays are based on the human as an individual and the horse does not single out people with mental illnesses. Furthermore, future research in the field of horse-human interaction as applies to equine-assisted activities can utilize appropriate human subjects without the necessity of needing to utilize subjects with a mental illnesses.

4. Time line, show completed items and any changes/difficulties in completing the listed items from the original application noted and explained.

<b>Milestones</b>	<b>Proposed date of completion</b>	<b>Actual date of completion</b>	<b>Notes</b>
Selection of humans (4) with mental disabilities in consultation with psychotherapist	February 2016	May 2016	Although there were many people who expressed interest in participating in the project, when it came to the time commitment, many backed out, despite the offered honorarium. We actively tried recruiting from many organizations involved with people with PTSD (e.g. veteran's units, police force, community health organizations). All of the four participants contacted the PI directly because of media articles about the research and not through any of the aforementioned channels.
Recruitment of human volunteers (4) matched in age, size and gender with the four treatment humans	April 2016	August 2016	We could not recruit for our controls until we had secured our PTSD participants in order to know their physical features. The final participant took longer to find but eventually we did have all four matches to our PTSD participants.
Data collection for the four treatment humans	May 2016	June 2016	We completed data collection on the four treatment humans once we had secured those participants.
Review of videos of treatment sessions by control humans and acting coaching to re-enact similar physical behaviours	June 2016	August 2016	Our first acting coach reviewed videos of two of the treatment humans. Unfortunately our acting coach fell ill, and we had to find another acting coach who reviewed the videos of the two remaining treatment humans.
Data collection for the four control humans	July 2016	August 2016	We completed data collection on the four control humans once we had secured those participants. We were also constrained by availability of the therapy horses which accounts for the delay in data collection.

Data analysis	September 2016	November 2016	Data analysis completed by PI once all data had been collected and properly coded
Manuscript submission to peer-reviewed journal (eg. Journal of Applied Psychology)	December 2016	TBC	Rough draft of manuscript completed December 2016. Full manuscript will be completed and submitted to JAP by May 2017. This will allow presentation of results at the EAGALA conference in March and the Equine Science Society conference in May (it is not acceptable practice to present results that have already been published).

5. Budget: final budget expenditures, with any variations from the original submitted application budget noted and explained.

Budget item	Amount requested	~CDN\$ converted from USD (30%)	Amount spent CDN\$	Difference CDN\$	Notes: as of January 10, 2017
Personnel	Research assistant: 60 hours @ \$20 = \$1200	\$1560	\$1558.57	+\$1.43	10% of one summer student
	Sunrise Therapeutic Learning and Riding Centre (STLRC) staff (two staff required to be present during testing per farm policy): 30 hours @ \$20 x 2 = \$1200	\$1560	\$1500	+\$60	Less hours required
	Statistician: 4 hours @ \$120 = \$480	\$624	\$624	\$0	Statistical analysis took more than 4 hours
Consumables	Spectra gel for heart rate monitors: 2 tubes @ \$15 = \$30	\$39	-	+\$39	Used stock on hand
	Batteries for heart rate monitors: \$50	\$65	\$122.03	-\$57.03	HRM required to be shipped back to manufacturer (Polar) as we were unable to open the battery casings, and they were required to be replaced.

	Salivette tubes for saliva sampling: \$150/box 100 x 4 = \$600	\$780	\$226.34	+\$533.66	Found a cheaper supplier (Sarstedt)
	Salivary cortisol analyses: 320 samples @ \$5 = \$1600	\$2080	\$1330	+\$750	Only 266 samples due to fewer horses available
	Stationary/printing/office supplies: \$50	\$65	\$59.99	+\$5.01	Shipping charges (Sarstedt; \$4.13); printing \$55.86
Consultant costs	Psychotherapist – required to assist in recruiting and recommendation of treatment humans: 4 hours @ \$200 = \$800	\$1040	-	+\$1040	Psychotherapist we had contacted went on sick leave just prior to the start of our study. All treatment humans contacted the PI independently, so psychotherapist ended up not being needed.
	Acting coach – to provide instruction to control humans in acting out treatment human behaviours: 4 hours @ \$50 = \$200	\$260	\$500	-\$240	Extra cost for acting coach due to having to engage a second coach at a higher cost (see interim report)
Travel	Travel to STLRC for subjects: average 50km roundtrip @ \$0.43/km x 32 trips (4 trips/subject) = \$688	\$895	\$894.22	-\$0.78	Includes travel for research team, participants and volunteers
	Workgroup meeting – prior to start of research trials; psychotherapist, EAT staff, acting coach, research team: 50km roundtrip @ \$.43/km x 8 = \$172	\$223	\$161.66	+\$61.34	Travel for acting coach
Client-related expenses	Honorarium paid to all human participants: 8 participants @ \$100 (will require 30 minutes of their time on four separate testing occasions plus training and travel time)	\$1040	\$800	+\$240	8 subjects paid @ \$100
Horse-related expenses	20 horses @ \$60/horse = \$1200. Each horse will be employed for 8 tests of 10 minutes (total time of 3 hours including preparation and removal of equipment and salivary	\$1560	\$1005	+\$555	only used 16 horses

	cortisol testing time)			
<b>Total expenditure to date</b>		<b>\$8781.81</b>		
<b>Total paid by HHRF to date</b>		<b>-\$1075.41</b>		
		<b>\$14.43</b>		Difference of \$14.43 due to exchange rate on first installment request of \$821.62USD
<b>Amount to be paid by HHRF</b>		<b>\$7720.83</b>		

6. Summary of any complications or challenges that have been encountered and how they have been or are being addressed. Minor challenges encountered included the difficulty in securing PTSD participants (psychotherapist took sick leave; people would contact the PI expressing interest, sign the consent forms, and then not show up for the trials); scheduling issues at STRLC; loss of our acting coach due to illness. STRLC only had 17 horses available for us to use, and they further lost one horse during the trials which reduced our total number of trials. All challenges were dealt with accordingly and the research was completed within the projected timeframe.

7. Share detailed plans for submitting material for publication; summaries of findings with the public.

An abstract may be submitted for a poster presentation at the EAGALA annual conference March 21-24, 2017 (depends upon student researcher availability and funding to attend this conference). This will be a fitting platform for disseminating research results to those people directly working with therapy horses and equine-assisted activities.

An abstract for an oral presentation has been submitted to the Equine Science Society biennial conference May 30 – June 1, 2017. This will allow dissemination of research results to a scientific audience for potential collaboration on future research projects.

An original research article will be submitted to the Journal of Applied Psychology in May, 2017. It generally takes 3-6 months for publication of scientific journal articles. This again will reach an audience of scientists for citation in their own work or to spark other research projects.

Lay articles will be published in local and national lay publications such as our Equine Guelph Research magazine (in press), Horses Canada, etc. There was a lot of media attention surrounding this research project with the announcement of the HHRF funding and it is expected that those media will also be interested in publishing the results. Furthermore, numerous individuals and organizations contacted the PI personally and a summary of the findings will be sent to those people directly.

8. Invoice signed by grant manager for expenses incurred (for remaining 50% of grant award)

Please see attached invoice from the University of Guelph Financial Services.

9. Photos from research project activities that can be used in HHRF public marketing and outreach materials (such as newsletters, annual report, press release, etc.) Include a photo release form from all participants that includes HHRF in the listing of those permitted to use the photos for public outreach (sample can be supplied upon request).

3362, 3386 – photo of one of the therapy horses, Luke, showing the set-up of the round pen and the horse heart rate monitor.

Note that this is a staged photo with one of the members of the research team. Due to the sensitive nature of the research project, no photos will be released of any of the actual participants. Photo release is attached.