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Development and Validation of a Basic Ground Skills Assessment for Equine-Assisted Services

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DEVELOPMENT AND VALIDATION OF A BASIC GROUND SKILLS ASSESSMENT FOR EQUINE-ASSISTED SERVICES

by

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ABSTRACT

Development and Validation of a Basic Ground Skills Assessment for Equine-Assisted Services

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Equine-assisted services incorporate the interaction of humans who face mental, physical, emotional, and/or social challenges and equines for therapeutic purposes. Recreational, physical, mental, social, and/or emotional goals are met through various equine-assisted services such as therapies, equine-assisted learning, and horsemanship. As recommended by those in the equine industry seeking to reduce equine-related human injuries, equines should be evaluated prior to participation in equine-assisted services. The Professional Association of Therapeutic Horsemanship International recommends the use of an unbiased equine assessment tool to conduct this evaluation; unfortunately, there are no validated methods that exist to meet this criterion. Therefore, the Basic Ground Skills Assessment has been developed and tested for reliability and validity to meet this recommendation. Equine-assisted services professionals scored an equine on each of the assessment competencies, as listed on the rubric. Through the collected data, it was found that the Basic Ground Skills Assessment had moderate to strong intra-rater

reliability ($\kappa = .667$; $p < .004$; $\kappa = .833$; $p < .001$) and weak to moderate inter-rater reliability ($\kappa = .491$; $p < .037$; $\kappa = .769$; $p < .018$). Additionally, an equine-assisted services professional scored 14 equines on each of the assessment competencies. These scores were correlated with the equine's physiological parameters of heart rate and serum cortisol, collected during assessment testing, to determine the validity of the assessment tool as an unbiased predictor of equine stress, and thus suitability for use in equine-assisted services ground-skill based programs. Results demonstrated that the assessment was valid when the average score was correlated to the average heart rate during assessment testing ($r = -.947$, $p < .001$). These results demonstrated the assessment's potential to be a standardized evaluation tool for equine-assisted services professionals. Additionally, a survey was distributed to Professional Association of Therapeutic Horsemanship International centers to better understand the equine evaluation procedures currently in practice. Questions and analysis revealed that centers do have mostly unbiased and effective evaluation procedures in place; though, centers may benefit from a validated assessment process, as we have developed, as there was not a common assessment process across centers.

(118 pages)

Keywords: adaptive horsemanship, assessment, equine, equine-assisted activities, equine-assisted services, equine-assisted therapies, evaluation, horse, Professional Association of Therapeutic Horsemanship International, safety, best practice standards

PUBLIC ABSTRACT

Development and Validation of a Basic Ground Skills Assessment for Equine-Assisted Services

Sarah J. Andersen

The equine-assisted services program at Utah State University produced and validated an assessment process used to test equines for suitability for equine-assisted services. Equine-assisted services incorporate the interaction of humans who face mental, physical, emotional, and/or social challenges and equines for therapeutic purposes. Recreational, physical, mental, social, and/or emotional goals are met through various equine-assisted services such as therapies, equine-assisted learning, and horsemanship.

Due to the potential for human injury while interacting with equines, it is important to ensure equines are assessed for safe behavior prior to participation in equine-assisted services. This is why our group developed and tested the Basic Ground Skills Assessment. It was found to be valid and moderately reliable. Use of this assessment in the industry may increase the safety of humans by ensuring only suitable equines are engaged in equine-assisted services.

Additionally, a survey was distributed to Professional Association of Therapeutic Horsemanship International centers to better understand the equine evaluation procedures currently in practice. The survey's results indicated that centers may benefit from a validated assessment process, as we have developed, as there was not a common assessment process currently in place.

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Sarah J. Andersen

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LIST OF ABBREVIATIONS AND DEFINITIONS

BGSA: Basic Ground Skills Assessment

Calm Behavior: signs of a calm equine include cocked hind foot, consistent head carriage (i.e., head at or below withers), consistent tempo, gentle blowing, head at or below the withers, loose tail that swings freely while in motion, low energy, relaxed nostrils, relaxed stance, soft eyes.

EAS: equine-assisted services; includes therapies that incorporate equines, equine-assisted learning, and adaptive horsemanship programs

EQM-2: Equine Welfare and Management standard number two from the PATH Intl. Standards for Certification and Accreditation 2018 manual of Therapeutic Horsemanship International

PATH Intl.: Professional Association of Therapeutic Horsemanship International

Tense Behavior: signs of a tense horse include flared or widened nostrils, head elevated beyond normal head carriage, inconsistent head carriage (i.e., head raising and lowering repeatedly), inconsistent tempo, pawing or stomping, pinned ears, stiff stance, tail that is tucked or flagged, tight or pinched muzzle, wide eyes.

Chapter I Introduction

Background and Setting

Equine-assisted services (EAS) is "an optimal unifying term to refer to multiple services in which professionals incorporate horses and other equines to benefit people. Services refer to work done for, or on behalf of others" (Wood et al., 2020). EAS includes the use of equines in therapy, equine-assisted learning, and adaptive horsemanship settings. In therapies such as psychotherapy, counseling, physical therapy, occupational therapy, and speech-language pathology, licensed and trained therapists incorporate the movement and/or interaction of an equine into their practice. Equine-assisted learning in education, organizations, and personal development utilizes equine interactions led by trained professionals to meet various learning-oriented goals. Adaptive horsemanship includes adaptive equestrian sports, adaptive riding, driving, and interactive vaulting facilitated by an equine professional trained in adapting sports for individuals with diverse needs (Wood et al., 2020).

It should be noted that EAS is a new term. Other terminology that indicates the use of equine-human relationships to meet human-oriented goals include, but are not limited to, equine-assisted activities, equine-assisted therapies, hippotherapy, equine-assisted psychotherapy, and therapeutic riding. For this paper, the term EAS will be used as recommended by the Professional Association of Therapeutic Horsemanship International (PATH Intl.), an international EAS organization (Wood et al., 2020). Distinctions between the different service categories—therapy, equine-assisted learning, and horsemanship—will be made as applicable.

Research examining the benefits of various EAS continue to make an appearance in the literature; however, more research is needed to validate the claims and prove efficacy (Stern & Chur-Hansen, 2019). Thus far, researchers have recorded physical, psychological, social, and quality of life benefits for a variety of diagnoses (Kendall et al., 2015; McDaniel & Wood, 2017; Rigby & Grandjean, 2016; Stergiou et al., 2017; Zadnikar & Kastrin, 2011). These benefits have been achieved through mounted (riding) and unmounted (on the ground) interactions.

PATH Intl. recognizes these benefits and supports the incorporation of equines in therapy, equine-assisted learning, and adaptive horsemanship. They bolster the EAS industry through education, certification programs, and best practice standards (PATH International, n.d.). Many of the PATH Intl. standards, found in the Professional Association of Therapeutic Horsemanship International Standards for Certification and Accreditation manual (2018), are designed to ensure equine and human safety.

Risks to human safety occur because equines are large animals with innate flight tendencies (Parker, 2008). This has led to documented injuries ranging from mild to extremely disabling as well as a number of fatalities (Camargo et al., 2018; Kiss et al., 2008; Guyton et al., 2013; Theodore et al., 2017; Thomas et al., 2006; Thompson & von Hollen, 1996). To reduce this risk, PATH Intl. has created the Equine Welfare and Management standard number two (EQM-2) (Professional, 2018, p. 74) (see Appendix A), which states, in part one of the standard, that EAS programs should have an evaluation process to determine the suitability of equines before they participate in activities or sessions. This screening process should use “an unbiased tool” to measure

the equines "abilities and suitability" (Professional, 2018, p. 74), thus ensuring their capacity to safely interact with EAS participants.

To meet this standard, an evaluation tool for EAS equines has been developed called the Basic Ground Skills Assessment (BGSA) (see Appendix B). This assessment includes a list of ten basic ground skills that were deemed necessary for equines to have competently mastered to be successful in basic ground skills EAS programs at Utah State University (USU). Each competency includes a scoring rubric that contains detailed descriptions for a score of automatic failure (0), does not meet criteria (1), meets criteria (2), and exceeds criteria (3). The rubric descriptions were created through EAS experience, application of principles of equine behavior, and ethograms previously used in EAS research (Anderson, 2016; Anderson et al., 1998; Chen, 2017; Johnson et al., 2017; Kaiser et al., 2006, McDonald, 2017; Mendonça et al., 2019a; Mendonça et al., 2019b; Merkies et al., 2018; Nobbe, 2016; Ramagli, 2017; Turner, 2014).

Statement of the Problem

Despite PATH Intl.'s recommendation that all equines go through an evaluation process before participating in EAS sessions (Professional, 2018, p. 74), there is no defined and validated evaluation procedure. Previous studies have examined components necessary to develop such an evaluation procedure such as research on the stress responses of equines during therapeutic riding sessions (Chen, 2017), development of ethograms to quantify the behaviors seen in sessions (Turner, 2014), and attempts at understanding and defining the temperament of suitable EAS equines through reactivity tests (Anderson et al., 1998). Each of these studies add to the understanding of how EAS

affects equines, but more must be done to not only understand what EAS centers are currently doing to evaluate their equines, but to devise and validate an evaluation tool for equines that meets the PATH Intl. standard EQM-2.

An appropriate evaluation tool should meet PATH Intl. standard EQM-2, which states that the center must have a written procedure that includes 1) who will decide if the equine is suitable or not, 2) who performs the evaluations, and 3) "what specific criteria/behaviors an equine must demonstrate prior to being placed into [an EAS program]." These specific criteria should be based on skills the equines are expected to perform in EAS sessions, which may differ depending on the type of program.

Equine behavior and equitation science training principles should be used to develop the requested unbiased evaluation tool. A rubric format has been examined as a beneficial, objective, measurement tool in educational disciplines (Brookhart, 2018) and could thus be a strong platform to develop the needed evaluation tool. Once a skill and performance-based rubric is created, it should be tested for intra- and inter-rater reliability and overall validity. In addition, a better understanding of what PATH Intl. centers are currently doing to meet PATH Intl. standard EQM-2 and how evaluation processes impact horse and human safety is needed.

Objectives of the Study

A validated equine evaluation procedure is an important component of a safe EAS program (Professional, 2018, p. 74). This research aimed to better understand current equine evaluation procedures in PATH Intl. centers. It specifically looked at the relationship between evaluation procedures and the safety of equines and humans. In

addition, an evaluation rubric (the BGSA) that meets the PATH Intl. standard EQM-2 was developed. After development of the BGSA, it was tested for validity and reliability.

There are four research objectives:

1. Develop and assess a reliable rubric for EAS equine basic ground skills.
2. Develop and assess a valid rubric for EAS equine basic ground skills.
3. Define the equine evaluation procedures that PATH Intl. centers incorporate. Determine if procedures differ between PATH Intl. Premier Accredited Member Centers and PATH Intl. Member Centers.
4. Define the link, if any, between safety and equine evaluation procedures in PATH Intl. centers. Determine if there is a difference between PATH Intl. Premier Accredited Member Centers and PATH Intl. Member Centers.

Significance of the Study

Developing an understanding of PATH Intl. centers current equine evaluation procedures and the link to safety should assist in validating the need for the PATH Intl. standard. In addition, a standardized evaluation rubric that measures an equine's ability to perform a defined set of skills (the BGSA) will allow people in the EAS industry to assess equines in a valid and reliable way. This not only meets standard EQM-2 but supports many versions of the equine activity statutes implemented throughout numerous states in the United States. Utah's version, the Equine and Livestock Activity Liability Limitations (2006), states that individuals who own the equines used in activities may be liable for resulting injuries or death caused by the equine if they "failed to make reasonable efforts to determine whether the equine or livestock could behave in a manner

consistent with the activity with the participant" (Equine and livestock activity liability limitations, 2006). Implementation of the BGSA, which provides an objective scoring system, may ensure that measures have been taken to assess the equine's ability to behave appropriately during the activity for which they are intended.

Another benefit to validating the BGSA is that consistent implementation of the assessment will allow for use of a common scoring system in EAS programs. This could prove beneficial when pairing equines with individuals of various capabilities, purchasing or selling an equine, tracking an equine's training progress, or for use in future research when describing the training level of the equine. Regarding future research, the level of training an equine has may influence other factors being studied, such as stress or level of success in an EAS program. To make homogeneous groups of equines for observation, their level of training for EAS ground programs should be considered through an objective scoring system, such as the BGSA.

Limitations/Delimitations

This study is limited by the population available for sampling. To meet the third and fourth research objectives, a sample was drawn from a list of PATH Intl. centers listed on the PATH Intl. website. Only centers that had an email address listed and that stated they provide groundwork activities in their programs were considered. This excluded centers that fit the overall population parameters but did not have an email address listed. The response rate to the survey was small, further limiting the generalizability of the results. Only a small number of individuals assisted in testing the reliability of the BGSA. In addition, the equines used to test validity through

physiological measures came from the limited herd available to the researchers, thus restricting the sample size.

The study had a few delimitations. First, the population of PATH Intl. centers was narrowed down to centers that listed “groundwork” under activities offered. This parameter was chosen as the focus of the study was to examine ground evaluation procedures. Second, the assessment only looked at basic ground skills that may be used in an EAS setting. A wider scope that included advanced ground skills and riding skills would create a lengthy assessment, difficult to validate, and challenging to show reliability with a large sample. Third, only horses were used in the validation and reliability testing of the BGSA (i.e., mules, donkeys, and miniature horses were excluded) due to the population of equines available for testing. So, the study results may not reflect the validity and reliability of the BGSA with other equids.

Chapter II Literature Review

The Equine in EAS

The physical and mental health benefits of human-equine interactions have been explored since 600 BC (GoodTherapy, 2017; The Anxiety Treatment, n.d.). Since that time, use of equines in recreational, work, therapeutic, and therapy modalities has grown, resulting in a $122 billion industry in the United States economy (American Horse Council, n.d.). Equines have continued to be used in EAS due to their unique psychological and physiological traits (Arrazola & Merkies, 2020; The Anxiety Treatment, n.d.; Uchiyama et al., 2011).

On a basic biological level, equines are prey animals (Saslow, 2002). This results in sensitivity to their environment, as they must rely on their senses to avoid predators. The Equine Assisted Growth and Learning Association (EAGALA), an EAS organization that focuses on ground equine-assisted growth and learning programs, promotes a model that recognizes this sensitivity. In addition, they focus on the natural herd dynamic of equines, which includes the way equines use their body language as a main source of communication (Eagala, n.d.). It has been claimed that equines are aware of "incongruity, agitation, or increased autonomic activity in other animals (including humans)" (Wharton et al., 2019). This leads to situations that therapists, trained in both mental health and equine behavior, can utilize to meet participant outcomes.

Additionally, recent research has focused on the human-equine bond and its benefits. Lanning and Krenek (2013) claimed that the human-equine bond elicits benefits through a non-judgmental, authentic relationship that is different from what someone

would experience with just another person. The ability for the equine to bond with humans could be in part due to their ability to understand cues from human body language (Krueger et al., 2011) and read facial expressions (Smith et al., 2016).

Equine Selection Traits to Consider

Many of the traits that have been cited as positive EAS equine characteristics (e.g., sensitivity to their environment, use of body language for communication) are associated with the equine's ability to form an appropriate and meaningful human-equine bond, a fundamental component of EAS (Arrazola & Merkies, 2020). Equines should be calm, even with different stimuli; have a steadily pleasant temperament; be curious; and well trained (Anderson et al., 1998; DeBose, 2015). A survey conducted by DeBoer (2017) asked equine-assisted therapy professionals what qualities an equine-facilitated mental health horse or pony should possess. Findings showed the most desirable personality traits were curiosity, tolerance, calmness, sociability, and gentleness. Furthermore, the least desirable traits were unpredictability, anxiousness, excitability, and solitude. These traits helped shape the terms incorporated into the BGSA. Specifically, calmness was used to describe desirable equines and anxiousness (or tense behavior) was used to describe undesirable equines. Explanations, as used in the BGSA, of calm and tense behaviors can be found in the List of Definitions (p. xii).

Additionally, Wysocky (2014) discussed the traits to consider when selecting an EAS equine in their book, *Therapy Horse Selection*. These included size, width, soundness, gait/movement, age, training, temperament, personality, conformation, and the ability to tolerate EAS specific stimuli such as sidewalkers and toys/games. Equines

should be evaluated on all these characteristics to determine if they possess the necessary skills and attributes to be successful in an EAS setting.

Safety

While it is true that most human-documented injuries caused by equines occur during riding, there are a substantial number of injuries that occur while handling equines on the ground. In fact, non-mounted injuries range from 4.9% (Camargo et al., 2018) to 29.4% (Thomas et al., 2006) of the total documented equine-related injuries. This wide range arises due to the variance in sample size and populations the samples are drawn from (Camargo et al., 2018; Kiss et al., 2008; Theodore et al., 2017; Thomas et al., 2006).

The causes of these unmounted injuries vary. Although, most sources agree that the highest rated causes are due to equine behaviors such as spooking (Camargo et al., 2018; Thompson & von Hollen, 1996). In addition, injuries have been documented due to equines kicking, biting, trampling, stepping, pushing, pulling, bucking, and rearing (Kiss et al., 2008; Guyton et al., 2013; Theodore et al., 2017; Thomas et al., 2006).

There are varying opinions on injury prevention and reduction strategies. Kiss et al. (2018) recommended that protective equipment, such as helmets or body protectors, equine education, and supervision by a parent or teacher would reduce the severity and occurrences of injuries. Other researchers agreed that the use of protective equipment is a good injury severity reduction strategy (Guyton et al., 2013; Theodore et al., 2017; Thomas et al., 2006). Alternatively, Camargo et al. (2018) asserted that the focus should be placed on equine training, as 66% of the injuries recorded in their study were reported as “preventable” by the riders and handlers. Injuries that occur due to equine spooking

and other behaviors should, they argued, be prevented by improved equine training. Starling et al. (2016) agreed with this equine training focus.

Chapman and Thompson (2016) promoted an alternative proactive approach that included evaluating the equines before human interaction, thus reducing the occurrence of injuries and potentially dangerous situations. They claimed that an equine "assessment may capture dangerous behaviors elicited during an exposure to various stimuli and situational circumstances" (p. 5), thus allowing handlers to manage the risks.

A proactive approach (Chapman & Thompson, 2016; Camargo et al., 2018; Starling et al., 2016) combined with a reduction of injury severity approach, by use of protective equipment (Kiss et al., 2008; Guyton et al., 2013; Theodore et al., 2017; Thomas et al., 2006), is most likely the best approach to reduce human risk and injury while interacting with equines. Equine organizations and programs should take these recommendations into consideration when developing best practice protocols. PATH Intl. appears to have done so by requiring the utilization of an equine evaluation process (currently created and defined by each individual EAS center) to ensure only suitable equines participate in EAS (Professional Association of Therapeutic Horsemanship International [PATH], 2018). Other evaluative processes have been examined through research that studies ways to evaluate equine traits and behaviors, as discussed below.

Equine Evaluations

In consideration of safety and the desire to better quantify the human-equine relationship, tests have been conducted to evaluate equine traits such as pain (de Grauw & van Loon, 2016; Gleerup & Lindegaard, 2016; van Loon & Van Dierendonck, 2018),

stress and negative affective states (De Santis et al., 2017; König et al., 2017), and emotional states (Hall et al., 2018). Other topics that utilized assessment of the equine included welfare (Waran & Randle, 2017) and the ridden horse (Hall et al., 2013; Hall & Heleski, 2017). Many of these tests have been conducted while gathering behavioral and physiological data (Pierard et al., 2015). When it comes to quantifying behavioral data, many of the researchers created or adapted an already published ethogram, which is "a comprehensive list, inventory, or description of the behavior of an organism" (Merriam-Webster, n.d.).

Through a variety of reactivity tests, it has been found that a combination of behavioral observations and physiological parameters can be used to assess an equine's reactivity (Olsen & Klemetsdal, 2019; von Borstel et al., 2011; Young et al., 2012). This has proved applicable to EAS specific studies. Ethograms, behavioral observations, and physiological measures, as used in general equine studies, have also been used for EAS specific evaluation procedures (see Table 1).

EAS Specific Evaluations

Equines should be "fit for [their] purpose" (Safe Work Australia, 2014) and job. If "reasonable efforts to determine" this, specifically the equine's ability to "behave in a manner consistent with the activity with the participant," is not achieved, owners of the equine may be held liable according to Utah Code (Equine, 2006). In the field of EAS, equines should be evaluated in a standardized, objective way, as PATH Intl. recommends (PATH, 2018, p. 74). This evaluation process should be in place to prevent unsuitable

equines from participating in EAS, thus ensuring human and horse safety (Equine, 2006; PATH, 2018, p. 74).

Research. There is a paucity of peer-reviewed research focused on evaluation of EAS equine *prior* to their placement in an EAS program. This demonstrates the research gap related to the industry standard set by PATH Intl., which recommends the evaluation of equines before their interaction with the populations served in EAS programs (PATH, 2018, p. 74; Professional Association of Therapeutic Horsemanship International [PATH], n.d.). Research contained in this literature review included both peer reviewed articles and theses that assessed EAS equines for *any* reason, not just as an assessment tool to determine if the equine should be used in EAS programming or not (see Table 1).

Table 1

Summary of EAS Equine Evaluation Studies

Source	Sample	Goal(s)	Test(s)	Assessor(s): Behavioral	Assessor(s): Physiological
Anderson, 2016**	EAA/T horses from University of New Hampshire (n=11) EAA/T horses in groups from other farms (n=19)	Factors related to horse behavior towards humans	Mock EAA/T session (horse at liberty)	Ethogram	
Anderson et al., 1998*	TR horses (n=76) Non-TR horses (n=27)	Behavioral and temperament assessment	Reactivity tests (3) Temperament survey	Behaviorally defined rating scale	plasma cortisol; plasma norepinephrine; plasma epinephrine
Chen, 2017**	TR horses (n=17) University equine	Association between stress behaviors and	TR lesson	Ethogram	serum cortisol

Source	Sample	Goal(s)	Test(s)	Assessor(s): Behavioral	Assessor(s): Physiological
	program horses (n=25)	cortisol changes in horses	University riding class	Overall behavior score	
Gehrke et al., 2011*	EAT horses (n=9)	Determine baseline HRV values for EAT horses	24 hours of pasture turnout		HR; HRV
Howard, 2016**	EAAT horses (n=64) Control horses in Kentucky (n=75)	Effect of equine-facilitated therapeutic activities on the temperament of a horse	Horse Personality Questionnaire		
Johnson et al., 2017*	TR horses (n=5) Veterans with PTSD or TBI (n=5) Experienced riders (n=5)	Stress levels during TR program	TR session	Ethogram (Equine Behavior Scores)	serum cortisol; plasma ACTH; glucose
Kaiser et al., 2006*	TR horses (n=14) Riders of varying abilities (n=126)	TR compared to recreational riding on horse stress levels	Recreational riding lessons TR lessons	Ethogram	
McDonald, 2017**	Hunter seat riding horses (n=6)	Temperament assessment	Reactivity tests (3) EAAT suitability assessment	Behavioral defined adjectives (BDA) from a Horse Personality Questionnaire	HR
Mendonça et al., 2019a*	Dressage horse (n=9) Jumping horses (n=10) Eventing horses (n=13)	Effect of equine activity on behavioral and physiological responses to tests	Reactivity tests (5)	Ethogram	HR; HRV

Source	Sample	Goal(s)	Test(s)	Assessor(s): Behavioral	Assessor(s): Physiological
	EAA/T horses (n=9)				
Mendonça et al., 2019b*	EAT horses (n=9) Patients (n=51) Patient-horse pairs (n=58)	Effect of humans with psychological only expectations and psychological and physical exceptions on equine behavior and physiological response	EAT session (included grooming, leading and/or riding)	Ethogram	HRV
Merkies et al., 2018*	EAT horses (n=17) Humans with PTSD (n=4) Neurotypical Humans (n=4)	Effect of EAT on equine stress	Mock EAT ground sessions (at liberty)	Behavioral observation	salivary cortisol; HR
Nobbe, 2016**	TR/EAAT horses (n=8)	Effect of EAAT lessons on the horse.	EAAT riding lessons (included grooming and tacking)	Ethogram	HR
Ramagli, 2017**	TR horses (n=13)	Personality assessment	TR lesson (short term obedience) Handler evaluation (long term potential) Parelli Horsenality Profiling system questionnaire	Obedience/ behavior score	

Source	Sample	Goal(s)	Test(s)	Assessor(s): Behavioral	Assessor(s): Physiological
Turner, 2014**	TR horses (n=12)	Determine practical ways to assess a horse's suitability for TR	Behavioral tests (3) Riding lesson	Ethogram	salivary cortisol; HR; HRV
Wires, 2017**	Mounted patrol horses (n=6) EAAT horses (n=6) Show horses (n=6)	Compare horse reactivity and habituation	Reactivity tests (3)		HR; step count

Note. TR=Therapeutic riding; EAAT= equine assisted activities and therapies; HR= heart rate; HRV= heart rate variability

*article from a peer reviewed journal or publication; **thesis

These studies incorporated a mixture of behavioral and physiological evaluation tools. Behaviors were quantified with ethograms (Anderson, 2016; Chen, 2017; Johnson et al., 2017; Kaiser et al., 2006; Mendonça et al., 2019a; Mendonça et al., 2019b; Nobbe, 2016; Turner, 2014), a Horse Personality Questionnaire (Howard, 2016; McDonald, 2017) and general behavioral observations and scores (Anderson et al., 1998; Merkies et al., 2018; Ramagli, 2017). The most common physiological traits measured were cortisol levels (i.e., plasma, serum, and salivary; Anderson, 2016; Chen, 2017; Johnson et al., 2017; Merkies et al., 2018; Turner, 2014), heart rate (HR), and heart rate variability (HRV) (Gehrke et al., 2011; McDonald, 2017; Mendonça et al., 2019a; Mendonça et al., 2019b; Merkies et al., 2018; Nobbe, 2016; Turner, 2014; Wires, 2017). These evaluation tools were used to quantify one of two things: 1) the effect of EAS on the equines

(Howard, 2016; Johnson et al., 2017; Kaiser et al., 2006; Mendonça et al., 2019a; Mendonça et al., 2019b; Merkies et al., 2018; Nobbe, 2016); and 2) the traits, temperaments, or personalities common to successful EAS equines (Anderson et al., 1998; McDonald, 2017; Ramagli, 2017; Turner, 2014; Wires, 2017).

While the effect EAS has on equines is important to consider for their welfare and safety, the focus of this thesis is on the *systems* used to evaluate the suitability of equines for their intended EAS job. Reactivity tests are a common way to complete such an evaluation by assessing the behavior of the equine (Anderson et al., 1998; McDonald, 2017; Mendonça et al., 2019a; Wires, 2017). Anderson et al. (1998) found, through the introduction of three novel stimuli to both therapeutic riding and non-therapeutic riding equines, that therapeutic riding equines had some of the highest reactivity scores. It was suggested, due to these results and the comparison of a temperament survey filled out by instructors, that these temperament and reactivity tests may not be the best tools to objectively determine an equine's suitability for therapeutic riding. An additional problem identified was the lack of instructors' consensus on the temperament survey, specifically an average of only 33% agreement on how they rated each equine's temperament. This suggested the need for a more predictive, objective measure that can be reliably used by multiple instructors to accurately assess EAS equines and meet PATH Intl. standard EQM-2 (PATH, 2018, p. 74).

McDonald (2017) also utilized a reactivity test, in conjunction with an equine-assisted activities and therapies (EAAT) suitability assessment, to evaluate the suitability of EAS equines. They concluded that while using unknown object exposure is effective

in testing equine temperament, it is recommended that equine reactivity be tested through objects they must encounter in their everyday working environment. In addition, Turner (2014) discovered differences in therapeutic riding equine behavior during behavioral reactivity tests and riding lessons, suggesting that just because an equine works well in session, it does not mean they will demonstrate the same behaviors in separation and novel object tests. This all indicates that to ensure participant safety, equines should behave appropriately (i.e., safely) while performing the required skills necessary for the program they will be placed in, just as PATH Intl. suggests (PATH, 2018, p. 74).

Non-validated Evaluations. To demonstrate the objectivity of an evaluation instrument, it should be tested for validity (i.e., how accurately the instrument or tool measures what it is supposed to measure) and reliability (i.e., how consistent the results are; Middleton, 2019). There are some published resources used to evaluate EAS equines that meet the PATH Intl. requirement (PATH, 2018, p. 74) by listing the specific criteria and behaviors an equine must demonstrate before being implemented in session, but they have yet to be validated (Pipoly, 2020; Wysocky, 2014).

PATH Intl. Advanced Instructor and founder of Hoof Falls and Footfalls, Pipoly (2020), published a "Training Checklist" that can be used to evaluate EAS equines. It listed the specific criteria, such as haltering, flyspray, grooming, leading, lunging, loud noises, abnormal objects, and more, that equines should be assessed on. During the evaluation, the equine will be assessed using a "poor, fair, good, or excellent" rating scale (Pipoly, 2020).

In addition, Wysocky (2014) discussed the selection process and criteria for EAS equines. They gave a resource in the appendix of their book called the *Horse Assessment Form* (pp. 139-140). This resource listed many skills the EAS equine should be evaluated on, including, but not limited to, walking through gates, catching and haltering, trotting, and backing. This form used a one to five rating scale with one corresponding to "not performed" and five corresponding to "perfect," but did not give descriptions as to what behaviors fall into each performance level.

While both resources appeared to meet the PATH Intl.'s standard of evaluation, there are still improvements to be made by checking the documents for validity and reliability, important concepts for defining a credible assessment tool (Sullivan, 2011). To improve reliability of the evaluations, a detailed rubric (rather than a rating scale) that explicitly states the behaviors expected for each score on each criterion is recommended (Brookhart, 2018). This would reduce the variability that comes from different people's subjective meanings of what a "good" score (Pipoly, 2020) or a score of "3" (Wysocky, 2014) means, as therapeutic riding instructors have been shown to have high rates of disagreement when it comes to evaluating equine temperament (Anderson et al., 1998).

Conclusion

There are many benefits of EAS including physical, mental, emotional, and social benefits (e.g., Kendall et al., 2015; McDaniel & Wood, 2017; Rigby & Grandjean, 2016; Stergiou et al., 2017; Zadnikar & Kastrin, 2011). Despite this, it must be recognized that equines are prey animals and interacting with them results in "inherent risk" (Equine, 2006). To reduce the risks associated with the instinctual nature of equines, equines

should be evaluated with a researched, validated, and reliable tool for their ability to safely interact with humans (De Santis et al., 2017). This evaluation should focus on the specific skills needed for EAS programs, thus meeting PATH Intl.'s best practice standard, EQM-2 (PATH, 2018, p. 74).

Chapter III Methodology

Purpose and Objectives

The purpose of this study was to meet the first part of the best practice standard, EQM-2, laid out by PATH Intl. that calls for an objective suitability evaluation of equines before they enter EAS programs to ensure a safe human-equine interaction (PATH, 2018, p. 74). This purpose was fulfilled by developing an assessment procedure for EAS equines, specifically the BGSA, which was based on equine behavior. The BGSA was tested for reliability and validity. In addition, a survey, sent to PATH Intl. centers, was used to collect data on equine evaluation methods currently in practice.

The following are the four research objectives:

1. Develop and assess a reliable rubric for EAS equine basic ground skills.
2. Develop and assess a valid rubric for EAS equine basic ground skills.
3. Define the equine evaluation procedures that PATH Intl. centers incorporate. Determine if procedures differ between PATH Intl. Premier Accredited Member Centers and PATH Intl. Member Centers.
4. Define the link, if any, between safety and equine evaluation procedures in PATH Intl. centers. Determine if there is a difference between PATH Intl. Premier Accredited Member Centers and PATH Intl. Member Centers.

Objective 1

Develop and assess a reliable rubric for EAS equine basic ground skills.

Research Design

To be an accurate measurement tool, evaluation instruments must be reliable, meaning the tool produces consistent results (Sullivan, 2011). There are two kinds of reliability that the BGSA was tested on: inter-rater reliability and intra-rater reliability. Inter-rater reliability means different raters get the same score consistently. Intra-rater reliability means the same rater gets the same score consistently (Sullivan, 2011).

Correlational research was used to determine the BGSA's reliability. To start, a video was taken of a handler leading a horse through the various competencies listed on the BGSA. This video was then shown to two raters who scored the horse according to the BGSA's scoring rubric. The decision to engage only two raters was based on Jonsson and Svinby's (2007) statement that "two raters are, under restrained conditions, enough to produce acceptable levels of inter-rater agreement." To ensure quality raters, raters were required to be a current PATH Intl. Certified Therapeutic Riding Instructor (CTRI) and/or a PATH Intl. Equine Specialist in Mental Health and Learning (ESMHL). This credential requirement was chosen because it signifies a consistent base level of training. Part of the criteria to become a CTRI and an ESMHL includes the ability to demonstrate an understanding of horse behavior, training, and selection for EAS (see Appendix D for a list of the criteria). These are skills needed to accurately assess a horse using the BGSA.

In addition, in application of the BGSA, it is recommended that each equine be assessed by two individuals prior to entering program to reduce bias that may be present with only one individual rating the equine. Rating of an equine by more than two raters could prove difficult for small programs in terms of staffing and time. The video format

was chosen to ensure the participants were able to observe the exact same behavior. The individual participant scores were compared to each other to determine the inter-rater reliability. After a period of two weeks, the participants watched the same video and again scored the horse. The individual participant scores were compared to their prior scores to determine intra-rater reliability.

Subjects

Two participants were chosen from a convenience sample of PATH Intl. CTRIs and/or ESMHLs who are not currently familiar with USU's horses. The participants were asked to participate through email correspondence. The participants who agreed to take part in the study held a combination of multiple PATH Intl. certifications which included CTRI, Advanced Instructor, Master Instructor, Driving Instructor, and ESMHL. They each have held at least one certification with PATH Intl. for 18 to 20 years.

The horse videoed for the reliability test was randomly chosen from a convenience sample of 10 EAS horses that are owned by USU. The horse selected was an 11-year-old quarter horse mare.

Instrumentation

The BGSA was developed utilizing a multi-phase approach (see Figure 1). It started out as a list of ten basic ground skills that were deemed necessary for horses to be competent in to be successful in basic ground skills programs in USU's EAS program. Horses were initially evaluated on each competency on a one to five rating scale. Through use by students and staff, it was decided that a rubric format would better ensure appropriate and consistent scoring of horses.

This led to the development of a rubric where each competency was scored on a scale from zero to three. A score of zero resulted in an automatic failure and was given to equines that demonstrated dangerous behaviors, such as extreme fight or flight responses, or pain responses, such as unsoundness. A score of one, two, and three corresponded to the horse not meeting criteria, meeting criteria, and exceeding criteria, respectively. Each of these scores included a detailed description of the behaviors expected of a horse at that level for the listed competency.

The descriptions were developed by the researchers through EAS experience and an application of principles of equine behavior. Ethograms and behavior scores for equines engaged in EAS were consulted to determine appropriate wording and definitions (Anderson, 2016; Anderson et al., 1998; Chen, 2017; Johnson et al., 2017; Kaiser et al., 2006, McDonald, 2017; Mendonça et al., 2019a; Mendonça et al., 2019b; Merkies et al., 2018; Nobbe, 2016; Ramagli, 2017; Turner, 2014). The decision to fail horses that demonstrated dangerous behaviors or pain responses was made for the safety of the horse, handler, and future participants. Dangerous behaviors are indicative of the fight or flight response, confusion, frustration, and pain (Starling et al., 2016). These should be resolved in training prior to passing an equine on the BGSA and engaging them in EAS.

The BGSA was piloted by USU's EAS program employees and students during the fall of 2020. Corrections were made to descriptions that appeared ambiguous. Additionally, a panel of experts reviewed the BGSA for face and content validity. To ensure the quality of the panel, members were chosen based on their "consistent ability to demonstrate proficiency" in equines and/or evaluation methods (Judd-Murray, 2019). In

addition, emphasis was put on the panel members' professional careers and certifications to ensure they contributed a specialist point of view. Hsu and Sandford (2007) recommended, when choosing subjects for a Delphi study, that individuals be knowledgeable and able to share helpful insights. Furthermore, panel individuals should be "top management decision makers" and/or "professional staff members" (Hsu & Sandford, 2007). While this is not a Delphi study, the principles of effective panel member recruitment hold true.

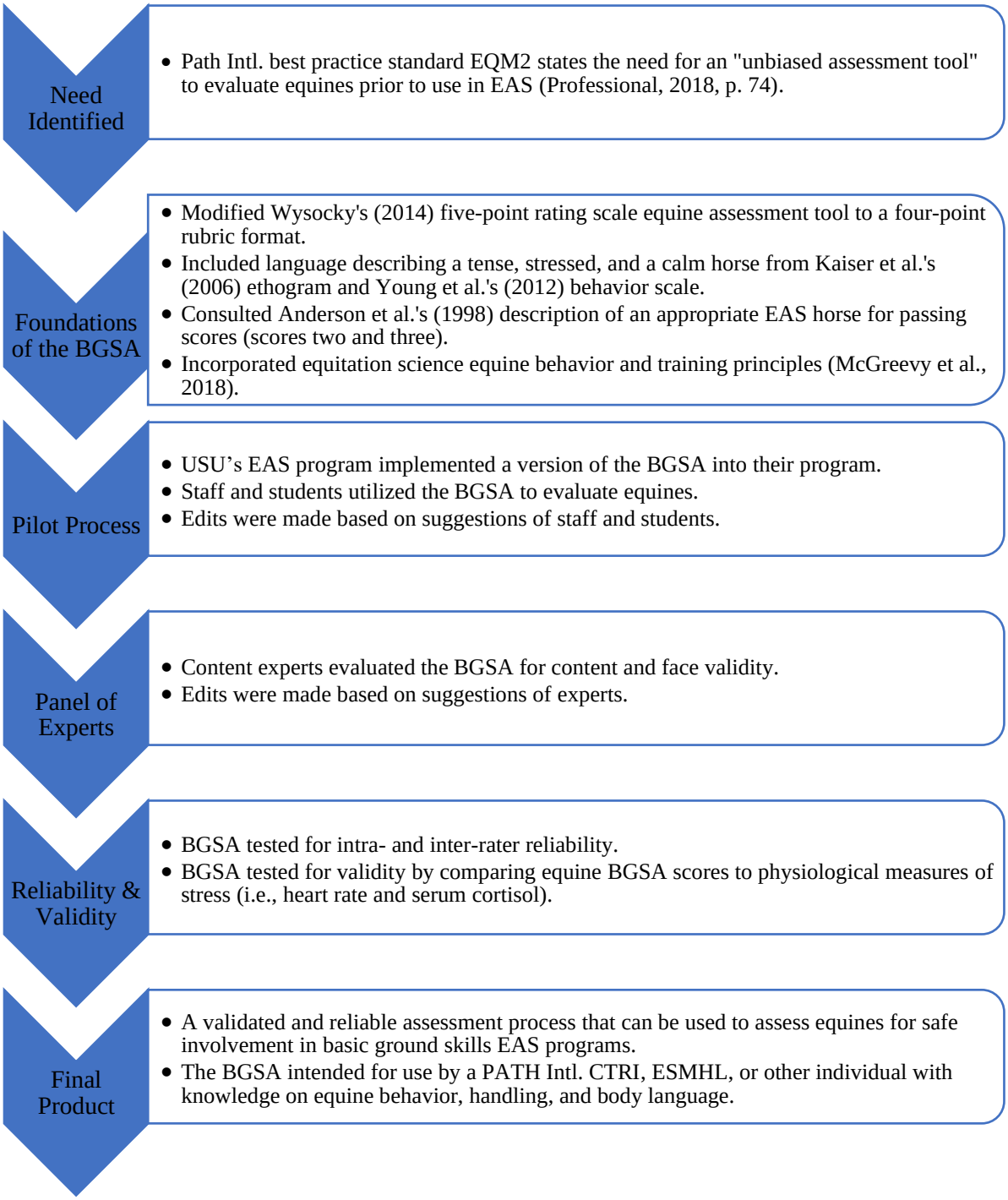
Four experts were chosen to review the BGSA, as follows. An EAS expert was chosen who holds PATH Intl. CTRI and ESMHL certifications. This expert focused on examining the BGSA's ability to properly judge an equine for placement in an EAS ground skills program, including appropriate wording and inclusion of all necessary ground skills. An equine expert was chosen who teaches about equines professionally, understands equine behavior, and recognizes how equine behavior relates to safety. This expert examined the BGSA to determine if the language was appropriate and if the scale appeared to fit such that a safe and well-behaved equine was described for the "meets criteria" scale. A licensed veterinarian was consulted to validate the description of pain and ill-health behaviors. Finally, an assessment specialist examined the entire assessment document to ensure its format fit within common assessment guidelines. Edits were made based on the experts' suggestions prior to the reliability and validity testing phases of the research.

To test the BGSA's reliability, a handler was filmed leading the randomly chosen horse through the BGSA competencies one and three through ten. Competency two,

catching in a large area, was omitted due to the logistics of filming. A detailed script (see Appendix C) that depicted the order of each competency, arena set up, camera/videographer placement, handler placement, and assistant tasks was followed. Once the video was recorded, it was split into segments based on the rubric competencies to allow for easy viewing and scoring. To obtain the participant scores on the horse for each competency, the rubric was transformed into an online format using Google Forms (version March 2021).

Figure 1

Development of the BGSA



Data Collection

The Institutional Animal Care and Use Committee (IACUC) approval was obtained for the research and data collection methods under protocol #11636. The Institutional Review Board (IRB) determined that this portion of the research did not fall under human subjects research and thus did not need IRB approval.

The researcher met with the two participants via online conferencing (i.e., Zoom, version 5.1.3). Due to scheduling conflicts, the meetings were held at different times. The researcher used the same short BGSA training presentation for both participants to ensure they were presented with the same information. The training information included an overview of how to use the BGSA, the definitions of the terminology used, and the format of the videos. They were also given the opportunity to ask questions about the rubric and scoring process. Questions about the research project that may skew the results were not answered until after the second meeting with the participants.

After explaining how to use the BGSA scoring system, the participants watched the competency videos through the use of Zoom's screen share feature (i.e., the researcher broadcasted the videos from their screen to the participant's screen) (version 5.1.3). Videos were not paused and were not replayed. After the participants watched a video, they scored the equine on the BGSA using Google Forms (version March 2021). Then they watched the next video and repeated the process. The nine videos watched ranged from 32 seconds to six minutes and four seconds in length. The meeting took approximately 45 minutes.

Two weeks after the initial meeting, the participants and researchers met again. The same format as above was followed. After completing the second meeting, participants received a $25 gift card to thank them for their time.

Data Analysis

Google Forms (version March 2021) was used to gather the BGSA score data from the reliability participants. The scores were then entered into IBM SPSS Statistics (version 27.0.1). Each score was coded by criterion and participant. Cohen's Kappa (κ) was used to determine the inter- and intra-rater reliability. Kappa values were interpreted as indicated in Table 2, based on recommendations from McHugh (2012).

Table 2

Kappa Score Interpretations

Kappa Score (κ)	Level of Agreement
0-.20	None
.21-.39	Minimal
.40-.59	Weak
.60-.79	Moderate
.80-.90	Strong
Above .90	Almost Perfect

Objective 2

Develop and assess a valid rubric for EAS equine basic ground skills.

Research Design

For an assessment tool to be a useful source of information, it must be valid. That is, the scores derived from the assessment tool must demonstrate appropriate "meaning" and lead to "action implications [that] hold across person or population groups and across settings or contexts" (Messick, 1995). For the assessment tool in question, the BGSA, this translates to its ability to accurately assess an equine for inclusion or exclusion from basic ground skills EAS programs. Correlational research was used to quantify the validity of the BGSA.

Construct validity was analyzed by filming 14 horses from USU being led through the rubric competencies by an experienced handler following a detailed script (see Appendix C). Heart rate and serum cortisol levels were collected during this time, as they are indicators of stress (Borstel et al., 2017; Olcazk, 2016; Young et al., 2012). High levels of stress can lead to inappropriate behavior, decreased health, and compromised equine welfare (Chen, 2017); because of this, stress is a good indicator of an equine's behavior and thus suitability for EAS.

At the conclusion of recording, the videos were watched by a rater. To ensure a quality rater, the rater was required to be a current PATH Intl. CTRI and/or a PATH Intl. ESMHL. This credential requirement was chosen because it signifies a consistent base level of training. Part of the criteria to become a CTRI and an ESMHL included the ability to demonstrate an understanding of horse behavior, training, and selection for EAS (see Appendix D for a list of the criteria). These are skills needed to accurately assess a horse using the BGSA.

The rater watched each video and scored the horses on the competencies according to the BGSA, entering all scores into a Google Form (version March 2021). These scores were analyzed against the previously collected physiological data to determine correlations between each horse's average BGSA score (a value between zero and three), HR, and serum cortisol. The goal was to accurately assess a horse's stress level, and thus suitability or unsuitability for EAS, through the BGSA score by comparing it to the physiological measures that have already been proven as indicators of stress levels (Borstel et al., 2017; Olcazk, 2016; Young et al., 2012).

Limitations. The lack of a random sample potentially affected the ability to generalize the results to the broader population of EAS horses and professionals. To decrease confounding factors, the horses were handled by the same person in the same environment. During the day of their testing, the horses were only involved in normal daily activities (e.g., eating, drinking, sleeping, living in their normal environment) and not in training, activity, or therapy sessions.

Subjects

The participant was chosen from a convenience sample of PATH Intl. CTRIs and/or ESMHL professionals. The participant was asked to participate through email correspondence. The participant who agreed to take part in the study held the PATH Intl. ESMHL certification.

The horses videoed for the validity test included the 10 USU EAS program horses available for testing. Excluded were horses in the herd that had adverse reactions to blood

draws. An additional four horses were selected from USU's academic program herd to increase the sample size. Table 3 contains a list of the horses selected for testing.

Table 3

Tested Horse Demographics

Horse Name	Age	Breed	Sex
Buck	17	Grade Pony	gelding
Chick-a-dee	9	American Quarter Horse	mare
Diesel	8	Thoroughbred	gelding
Dooley	19	Friesian	gelding
Josie	10	Grade Horse	mare
Kenna	16	American Quarter Horse	mare
Missy	11	American Quarter Horse	mare
Olaf	13	Norwegian Fjord	gelding
Rebel	14	Appendix	gelding
River	5	Mustang	mare
Snip	8	Grade Horse	gelding
Sven	15	Norwegian Fjord	gelding
Tango	20	Dutch Warmblood	gelding
Trixie	19	American Paint	mare

Instrumentation

To measure the physiological indicators of stress, the Polar Equine Heart Rate Monitor for Riding H10 was used with the Polar Unite fitness watch. Polar Equine heart rate monitors have been used in numerous equine studies and been proven effective (McDonald, 2017; Mendonça, et al., 2019a; Mendonça et al., 2019b; Merkies et al., 2018; Nobbe, 2016; Turner, 2014; Wires, 2017). HR data was obtained from the horse using the Polar Equine H10 monitor attached to the equine by an electrode belt. The belt was placed around the barrel of the horse, with the electrodes sitting approximately 10 cm behind the elbow on the left side of the horse. To allow for appropriate electrode connection, the belt and horse's skin was wetted down with water and then electrode contact gel was applied. HR data was transmitted during the baseline and testing phases through Bluetooth to the Polar Unite fitness watch.

The second physiological measure of stress collected was serum cortisol levels, both pre- and post-test. Blood was drawn from the jugular vein into a red-topped tube. Samples were transported to a laboratory on USU's campus to be centrifuged and frozen. Once all testing was completed, the frozen samples were transported on dry ice to the Utah Veterinary Diagnostic Laboratory (UVDL) in Logan, Utah, for analysis. The laboratory performed the serum "Pre/Baseline Cortisol" test.

Horses were video recorded being led through the BGSA competencies one and three through ten, according to a detailed script (see Appendix C). Competency two, catching in a large area, was omitted because when turned out in the arena for catching, the horses would often increase their speed (and thus their heart rate) and roll (affecting

the HR monitor set up). Two of the 14 horses (both of which came from the non-EAS herd) were unable to complete all of the BGSA competencies due to high levels of stress and displays of dangerous behaviors. The handler completed as many of the competencies as they saw fit but omitted competency seven and ten for one horse and competency ten for the other horse. The script followed depicted the order of each competency, arena set up, camera/videographer placement, handler placement, and assistant tasks. Once the video was recorded, it was split into segments based on the rubric competencies to allow for easy viewing and scoring. To obtain the participant scores on the horse for each competency, the rubric was transformed into an online format using Google Forms (version March 2021).

Data Collection

IACUC approval was obtained for the research and data collection methods under protocol #11636. The IRB determined that this portion of the research did not fall under human subject research and thus did not need IRB approval.

Data was collected on the horses over a period of six days. Testing was completed on a Tuesday, Thursday, and Saturday. Baseline heart rates were recorded on a Wednesday, Friday, and Sunday. Horses were assigned to each day based on their job duties throughout the week to ensure that the research did not interfere with their weekly duties. The order of the horses on each day was randomized.

Horses were caught from their normal living environment (either a stall or an outdoor paddock). The initial time the horse was caught was recorded. The horse was then led outside of their stall or outdoor paddock. Pre-test blood was drawn from the

jugular vein for cortisol testing. The horses were then led into the barn from the outdoor paddocks or led to the other half of the barn, if living in a stall. All horses were put in cross ties and fitted with the PolarH10 monitor.

HR data collection was started, and the horse was led by an experienced handler through the various competencies listed on the BGSA, following a detailed script (see Appendix C). All rubric components were filmed continuously. Immediately following completion of the BGSA competencies, the HR monitor was deactivated, and filming ceased. Five to ten minutes after the conclusion of the test, post-test blood was drawn from the jugular vein for cortisol testing. Blood samples were transported to a lab on USU main campus for processing. After clotting at room temperature for 30-60 minutes, the samples were centrifuged at 2500 RPM for 15 minutes to separate the serum from the blood clot. Serum was subsequently transferred to cryovials and frozen in a deep freezer. Once all samples were collected, they were transported on dry ice to the Utah Veterinary Diagnostic Laboratory (UVDL) for analysis. UVDL used the IMMULITE 1000 cortisol chemiluminescent enzyme immunoassay to determine the cortisol present in each sample (Siemens, 2018).

Baseline HR data was obtained by attaching the HR monitor to each horse for the same amount of time, during the same time of day, as they were filmed being led through the BGSA. They were loose in their normal living environment for the entirety of the data collection period. This occurred the day after their testing. The only exception was with River, who was placed in a stall, instead of her paddock, three days after her initial BGSA testing. This change was necessary because when fitted with the HR monitor and

turned out in her paddock, she tried to roll with the monitor, thus upsetting the connection.

The researcher met with the participant via online conferencing (i.e., Zoom, version 5.1.3). The researcher used the same short BGSA training presentation as used for the reliability participants. The training information included an overview of how to use the BGSA, the definitions of the terminology used, and the format of the videos. They were also given the opportunity to ask questions about the rubric and scoring process. Questions about the research project that may skew the results were not answered until after the final meeting with the participant.

After explaining how to use the BGSA scoring system, the participant watched the competency videos through the use of Zoom's screen share feature (i.e., the researcher broadcasted the videos from their screen to the participant's screen) (version 5.1.3). Videos were not paused and were not replayed. After the participant watched a video, they scored the equine on the BGSA using Google Forms (version March 2021). Then they watched the next video and repeated the process. The 123 video clips watched ranged from 0:18 to 6:35 minutes in length. Four 1.25-hour to 1.75-hour long meetings were held over the course of two weeks to watch all the videos. After completing the final meeting, the participant received a $75 gift card to thank them for their time.

Data Analysis

IBM SPSS Statistics (version 27.0.1) was used to analyze the collected data. The data collected included the following for each horse: horse demographic data; score for

each BGSA competency; average BGSA score; average, maximum, and minimum HR for both baseline and testing; and pre-test and post-test serum cortisol levels.

Increases in HR are indicative of stress in horses (Hall et al., 2018). A healthy horse's resting HR is between 28-40 beats per minute (bpm) (Scott & Martin, n.d.). During work, the HR can increase up to 80 bpm while walking, 130 bpm while trotting, 180 bpm while cantering, and 240 bpm while galloping (Kentucky Equine Research, 2010). HR above anticipated resting and walking values during data collection were assumed to be caused by stress.

Monk et al. (2014) recorded resting serum cortisol levels of 14 healthy adult horses over five days and found the levels ranged from 3.9-6.0 ug/dL. The Utah Veterinary Diagnostic Lab reference range for serum cortisol levels is 2.0-9.0 ug/dl (S. M. Zimmerman, personal communication, December 9, 2020). The collected serum cortisol levels from each horse were analyzed to see if they fall within "normal" ranges. In addition, each horse's pre- and post-test cortisol concentrations were compared. We were most interested in a change of cortisol concentrations as a rise in levels indicated stress.

The collected data was analyzed using various statistical analyses including paired *t*-test, Pearson's correlation, and two independent samples *t*-test. A *p* value of $p < .05$ for the *t*-tests indicated a statistically significant level of relationship. The Pearson correlation coefficient, *r*, values lie between -1 and +1. The *r* values were interpreted as indicated in Table 4 (Laerd Statistics, n.d.).

Table 4

r Value Interpretations

Correlation	Coefficient, *r*
None	0
Small	+/- 0.1-0.29
Medium	+/- 0.3-.49
Large	+/- .5-1.0
Perfect	+/- 1.0

Objectives 3 and 4

Define the equine evaluation procedures that PATH Intl. centers incorporate. Determine if procedures differ between PATH Intl. Premier Accredited Member Centers and PATH Intl. Member Centers.

Define the link, if any, between safety and equine evaluation procedures in PATH Intl. centers. Determine if there is a difference between PATH Intl. Premier Accredited Member Centers and PATH Intl. Member Centers.

Research Design

The purpose of the Equine Evaluation Procedures in PATH Intl. Centers survey was to describe the equine evaluation methods incorporated in PATH Intl. centers and to determine if there is a difference between premier accredited centers and member centers. It also explored the link between safety and equine evaluation procedures in PATH Intl.

centers and determined if there was a difference between premier accredited centers and member centers. The survey utilized a mixture of quantitative and qualitative questions. It was administered online through Qualtrics (version March 2021).

Subjects

The survey targeted PATH Intl. centers who provided groundwork activities and/or therapies. All PATH Intl. centers were listed on PATH Intl.'s website directory. Only centers with a listed email were considered for inclusion in the sample. There was a total of 536 centers that met these criteria, as of September 2, 2020. Utilizing a random sample generator, a sample size of 250 was chosen. This sample size was chosen by using the Qualtrics sample size calculator at a 5% margin of error rate (Qualtrics, 2020). After emailing the survey to this sample, it was found that five of the center's emails were "undeliverable" and thus the sample size was reduced to 245.

Instrumentation

The survey was created by the researchers and distributed through the online platform, Qualtrics (version March 2021) (see Appendix E). Prior to distributing the survey, it was examined by the research committee to determine if the questions were appropriate to meet the research objectives. It was also piloted by USU's EAS program. The survey format was chosen because it is a common method used to gather information on the attitudes and opinions of individuals (Ponto, 2015). It is a good way to gain descriptive information from a wide sample of people.

Data Collection

IRB approval was obtained for the research and data collection methods under protocol #11170. The online survey link was then emailed to participants during the spring of 2021. Consent was assumed if the survey was completed. The initial email to each PATH Intl. center included written directions to fill out the survey, a brief overview of the survey and research purpose, and the principal investigator's contact information for questions. A seven-week window was available to submit the survey. Multiple follow-up emails were sent, reminding the PATH Intl. centers to respond.

Response rate was calculated by dividing the number of respondents by 245. To potentially increase the response rate, those who were given the survey were offered a chance to be entered into a drawing for a $20 gift card incentive. The impact of the COVID-19 pandemic on PATH Intl. centers may have reduced the response rate.

Data Analysis

Data from the participants were collected through Qualtrics (version March 2021) and then transferred into IBM SPSS Statistics (version 27.0.1) for analysis. The qualitative, open-ended questions were coded using inductive coding (Medelyan, 2020). The data was analyzed with descriptive statistics. In addition, relationships between variables were compared using the Chi Square statistic. Analysis focused on describing the difference in responses between premier accredited centers and member centers.

Chapter IV Results

Objective 1

Develop and assess a reliable rubric for EAS equine basic ground skills.

Intra- and Inter-rater Reliability

Cohen's Kappa was used to determine the intra- and inter-rater reliability of the BGSA through comparison of two rater's scores.

The BGSA's inter-rater reliability was weak ($\kappa = .491$; $p < .037$). The raters differed on three competencies (i.e., competency 1: catching in a small area; competency 4: standing tied; and competency 7: backup) by one point. When the scores were classified as a "passing" score (i.e., scores two and three) and a "failing" score (i.e., scores zero and one), inter-rater reliability increased to moderate agreement ($\kappa = .769$; $p < .018$) with only one difference between raters (i.e., competency 4: standing tied).

Intra-rater reliability was moderate ($\kappa = .667$; $p < .004$) to strong ($\kappa = .833$; $p < .001$). The raters differed their answers from their initial scoring by one point on two competencies and by one point on one competency, respectively.

Objective 2

Develop and assess a valid rubric for EAS equine basic ground skills.

Validity

The horse demographic, heart rate, serum cortisol, and BGSA score data was analyzed using various statistical analyses including the paired *t*-test, Pearson's correlation, and two independent samples *t*-test.

There was not a significant difference in average BGSA scores of mares compared to geldings ($p < .059$). There was not a significant correlation between each horse's average BGSA score and their age ($r = .312$, $p < .277$).

All cortisol levels were within normal parameters (i.e., 2.0-9.0 ug/dl) (S. M. Zimmerman, personal communication, December 9, 2020). There was a statistically insignificant small negative correlation between average BGSA scores and the amount of change in cortisol levels from pre- to post-testing ($r = -.195$, $p < .504$) (see Figure 2).

The average HR during testing was significantly higher than the average HR baseline ($p <. 009$). There was a statistically insignificant correlation between average BGSA scores and minimum HR during testing ($r = .197$, $p < .449$). There was a large negative correlation between average BGSA scores and maximum HR during testing ($r = -.794$, $p < .001$) (see Figure 3). There was a large, near perfect, negative correlation, between average BGSA scores and average HR during testing ($r = -.947$, $p < .001$) (see Figure 4).

Figure 2

Serum Cortisol and Average BGSA Score Correlation Graph

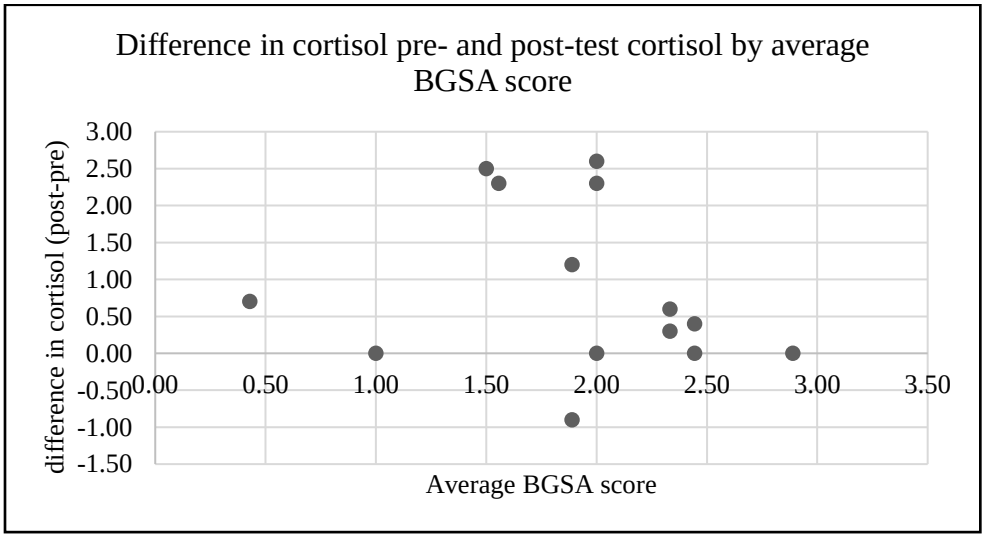


Figure 3

Testing Maximum HR and Average BGSA Score Correlation Graph

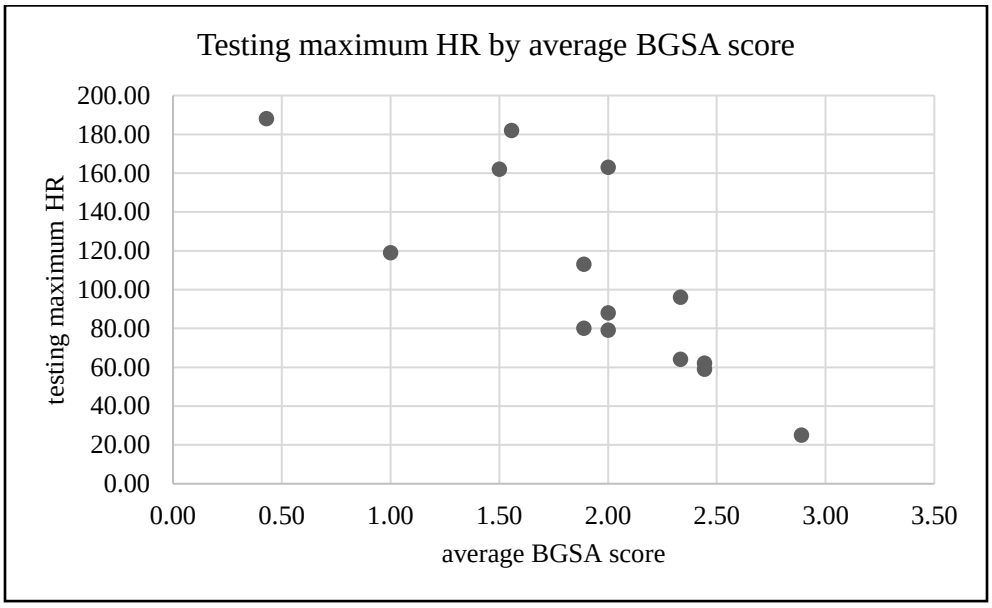
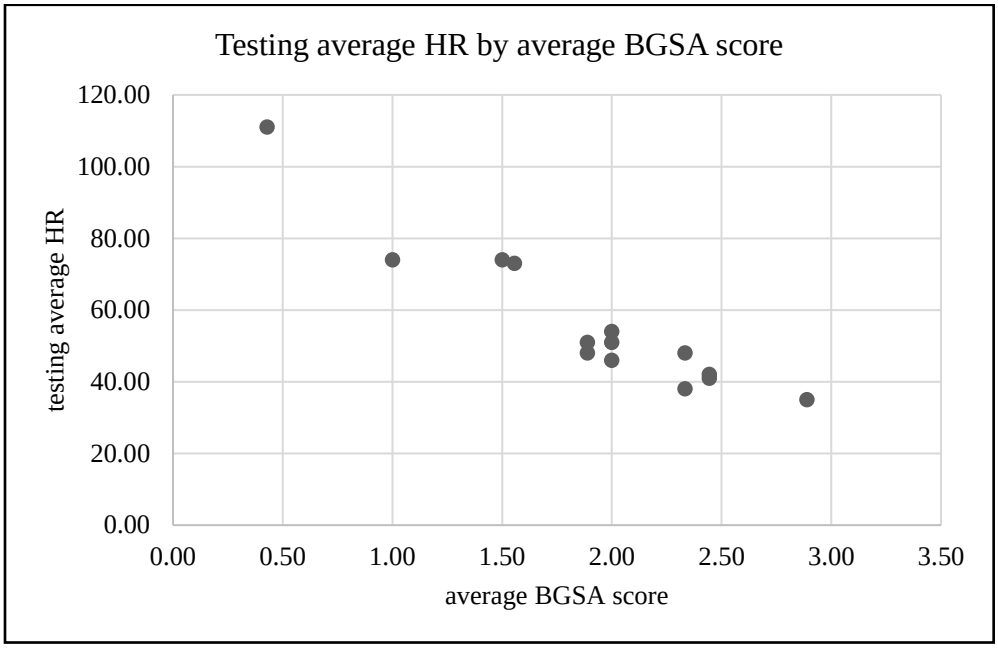


Figure 4

Testing Average HR and Average BGSA Score Correlation Graph



Objectives 3 and 4

Define the equine evaluation procedures that PATH Intl. centers incorporate. Determine if procedures differ between PATH Intl. Premier Accredited Member Centers and PATH Intl. Member Centers.

Define the link, if any, between safety and equine evaluation procedures in PATH Intl. centers. Determine if there is a difference between PATH Intl. Premier Accredited Member Centers and PATH Intl. Member Centers.

Survey Results

The survey had a low response rate. Out of the 245 PATH Intl. centers contacted through email to take the survey, 29% started the survey. The survey was answered in its entirety by 77.1% of the individuals who started the survey (55 responses). Early responders were classified as those who responded prior to the date of the final reminder email and made up 77.1% of responders. Late responders were those who responded on the date of or after the final reminder and made up 22.9% of responders. There was no association between early and late responders and if the survey was completed ($X^2(1) = .829$, $p = .363$).

Of the respondents, 50.8% (33) were from a PATH Intl. Member Center and 49.2% (32) were from a PATH Intl. Premier Accredited Member Center. There was no association between early and late responders and type of PATH Intl. center ($X^2(1) = .905$, $p = .341$).

The respondents were affiliated with their PATH Intl. center through a number of positions, often holding more than one position. These positions included being an administrative assistant (1), board chair (1), board member (1), center director (1), certified instructor (1), certified therapeutic riding instructor (3), equine/herd manager (32), equine trainer (20), executive director (15), facility manager (1), founder (4), instructor (3), lead instructor (1), program director (37), program manager (1), riding instructor (1), therapist (1), and volunteer coordinator (12).

Of the respondents, 6.2% were certified PATH Intl. ESMHL professionals, 50.8% were certified PATH Intl. CTRIs, 20% held both the PATH Intl. ESMHL and PATH Intl.

CTRI certifications, 13.8% held neither the PATH Intl. ESMHL or PATH Intl. CTRI certifications, and 9.2% held "other" credentialling. There was no association between the type of PATH Intl. center and the certifications held by the respondent ($X^2(4) = 2.759$, $p = .599$).

All the centers provided ground activities (e.g., leading, grooming, liberty work, ground therapy sessions, and ground learning activities). When asked if their center has "an evaluation process to determine 'the suitability of new equines prior to participating in center [ground] activities/therapies' per the PATH Intl. standard Equine Welfare and Management #2," 98.5% answered "yes" and 1.5% answered "I'm not sure."

The evaluation procedures the centers employed assessed ground related skills and/or behaviors. The frequencies of each skill that centers evaluated are located in Table 5. Table 6 breaks down the responses to the category of "other" ground related skills and/or behaviors that centers evaluated.

Table 5

Ground Skills and Behaviors Assessed

Skill	Frequency	Percentage
leading at the trot	53	12%
leading over obstacles	53	12%
grooming	54	12%
leading at the walk	54	12%
reaction to arena props	54	12%

back up	49	11%
catching and haltering	49	11%
standing tied	51	11%
others	31	7%

Table 6

"Other" Ground Skills and Behaviors Assessed

Skill	Frequency	Percentage
leading to a mounting ramp	5	12%
how they interact with people	4	9%
reaction to various items	4	9%
herd behavior	3	7%
long lining	3	7%
lunging	3	7%
reaction to adaptive mobility devices	3	7%
age	2	5%
conformation	2	5%
hoof care/lifting feet	2	5%
leading on a sensory trail	2	5%
touch	2	5%
clipping	1	2%
general likes/dislikes	1	2%

health	1	2%
leading from the offside	1	2%
past history	1	2%
reactions to different environments	1	2%
round pen work	1	2%
soundness	1	2%

The evaluations the centers incorporated into their programs were placed into four categories (see Figure 5). The categories included a checklist (which includes yes/no questions or pass/fail; e.g., does the equine meet the criteria or not meet the criteria), rating scale (the equine is scored on a Likert scale; e.g., poor, fair, good, excellent), rubric (the equine is scored on a Likert scale that includes detailed descriptions of each level; e.g., does not meet criteria and displays X behaviors), and other. Table 7 displays the frequency and percentage of responses in each category. There was no association between type of PATH Intl. center and the evaluation type used ($X^2(3) = .212$, $p = .976$). There was no association between early and late responders and the evaluation type used ($X^2(3) = .952$, $p = .813$).

Table 7

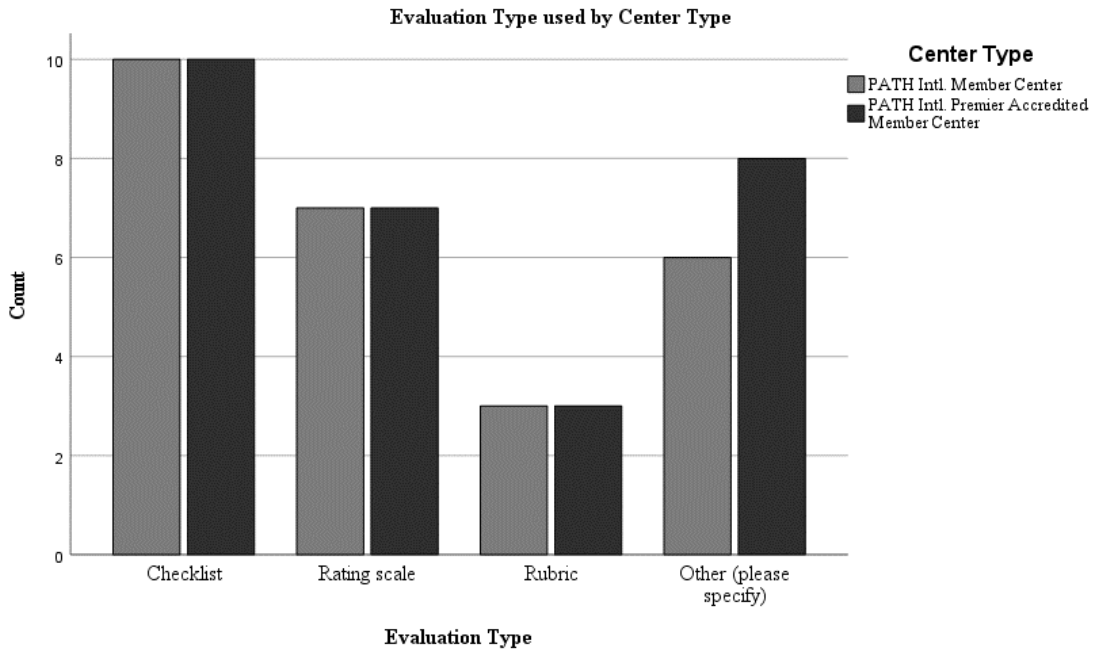
Evaluation Type Used in Centers

Evaluation Type	Frequency	Percentage
Checklist	20	37%

Other	14	26%
Rating scale	14	26%
Rubric	6	11%

Figure 5

Evaluation Type used by Center Type



When asked what constitutes a "passing score" for an equine when using their center's evaluation process, responses were coded into two broad categories: 1) had a clearly defined passing score (i.e., used a defined percentage, number, rating scale, or yes/no checklist that must be achieved by the equine prior to them entering program) and 2) does not have a clearly defined passing score. Thirty-six-point seven percent of centers had a clearly defined passing score while 63.3% did not. There was no association

between type of PATH Intl. center and if there was a clearly defined passing score or not ($X^2(1) = .492$, $p = .483$). There was no association between early and late responders and if there was a clearly defined passing score or not ($X^2(1) = .905$, $p = .341$).

When asked who performs the equine evaluations, 28.8% of centers listed that one person performs the evaluations and 71.2% have more than one person listed to perform the evaluations. Those listed that perform the evaluations included the following: able-bodied child (1), barn management staff (1), barn manager (3), board member (1), center director (1), certified instructor (1), certified therapeutic riding instructor (4), director (1), equine coordinator (1), equine management team (2), equine manager (9), equine operations (1), executive director (11), head wrangler (1), head/lead riding instructor (6), instructor (8), management (1), operations director (1), program director/manager (10), staff (5), trainer (2), and volunteers (4). There was no association between type of center and the number of individuals (one or more than one) who performs the evaluations ($X^2(1) = .321$, $p = .571$). There was no association between early and late responders and the number of individuals (one or more than one) who performs the evaluations ($X^2(1) = .1.875$, $p = .171$).

Many individuals were listed as "the ultimate decision maker who decides whether an equine is suitable for center activities/therapies or not." Table 8 lists the reported individuals who perform equine evaluations. Sixty-six percent of centers listed one person as the decision maker and 34% listed more than one person as the decision maker. There was no association between type of center and the number of individuals (one or more than one) listed as the ultimate decision maker ($X^2(1) = .083$, $p = .773$). The

minimum expected cell count was 6.92. There was no association between early and late responders and the number of individuals (one or more than one) listed as the ultimate decision maker ($X^2(1) = 2.653$, $p = .103$).

Table 8

Ultimate Decision Maker in Centers

Ultimate Decision Maker	Frequency	Percentage
executive director	14	23%
equine manager	8	13%
staff/evaluation group	8	13%
program director	6	10%
head/lead instructor	4	6%
barn manager	3	5%
director	3	5%
instructors	3	5%
board of directors	2	3%
center director	2	3%
program manager	2	3%
certified instructor	1	2%
certified therapeutic riding instructor	1	2%
equine operations director	1	2%
equine professional	1	2%
ESMHL	1	2%

owner	1	2%
riding director	1	2%

Centers evaluated their equines at different intervals. The responses to the category "other" were coded to produce a total of seven categories. It was found that 20.4% of centers evaluated equines only once before initial placement in program, 33.3% of centers evaluated equines at regular intervals (e.g., once a year, twice a year), and 46.3% of centers evaluated equines at sporadic intervals (e.g., after an occurrence, injury, or illness; continuously). There was no association between type of center and the evaluation intervals ($X^2(2) = 1.008$ $p = .604$). There was no association between early and late responders and the evaluation intervals ($X^2(1) = .378$, $p = .539$). It should be noted that to compare early and late responders and evaluation intervals, the categories "once before initial placement in program" and "regular intervals" were combined because expected cell counts were less than five prior to this adjustment.

When asked "In your opinion, is the evaluation process implemented at your center an 'unbiased assessment' of the equine? Why or why not?" The responses were coded as follows: 7.7% no, 63.5% yes, 13.5% in between, and 15.4% responded with a statement that did not clearly state if they believed their evaluation was or was not an unbiased assessment. There was no association between type of center and the perceived bias ($X^2(3) = 7.004$, $p = .072$). There was no association between early and late responders and the perceived bias ($X^2(3) = 5.074$, $p = .166$).

Themes were identified that explained the respondents perceived biased or unbiased nature of their center's evaluation. Many agreed that their evaluation was biased

because “everyone has natural biases.” Those that stated their evaluation was unbiased used a variety of methods to ensure an accurate assessment took place. These methods included having multiple individuals evaluate the horse, evaluating the horse on different days, using a rating scale with a clear pass/fail score, using a checklist with “strict criteria,” and, most prominently, ensuring that safety was always the first priority when evaluating. Individuals that believed their evaluation was somewhere between biased and unbiased recognized that evaluators may have inherent biases related to their attachments to the equine and that it is hard to remove all emotionality from the decision. They also recognized that they are able to complete unbiased assessments based on breeds, blemishes, gender, and color. One individual stated that their center planned to incorporate a “rubric for consistency among evaluations,” further supporting the need for a validated equine assessment process.

Centers reported a variety of safety issues that occur or may occur during ground activities/therapies. Table 9 lists the reported safety issues.

Table 9

Safety Issues that Occur or May Occur

Safety Issues	Frequency	Percentage
biting/nipping	16	28.6%
reacting to/spooking at external stimuli	10	17.9%
stepping on a person's foot	8	14.3%
irritation/aggression/agitation	4	7.1%

not responding to handler cues	4	7.1%
pulling on/dragging handler	4	7.1%
kicking	3	5.4%
loose horse	2	3.6%
spinning	2	3.6%
charging	1	1.8%
crowding personal space	1	1.8%
not standing tied	1	1.8%

When asked if there have "been participant injuries during ground activities/therapies at your center in the past 2 years," 18.2% answered yes, 76.4% answered no, and 5.5% answered maybe. There was an association between type of center and injuries, with Premier centers having more reported injuries than Member centers ($X^2(2) = 9.908$, $p = .007$). There was no association between early and late responses and the injuries ($X^2(2) = 1.756$, $p = .416$). Those that answered "yes" indicated that 37.5% of injuries were caused by the equine and 62.5% were caused by both the equine and the human. When asked to elaborate on the cause of injury, responses were coded into two categories: 1) equine stepped on a person and 2) equine bit a person. It was indicated that injuries caused by the human and equine were caused by the person standing in the wrong place, irritating the horse, walking too close to the horse, and causing equine discomfort. Equine caused injuries resulted from a horse spooking and a horse shifting balance.

Out of the equines involved in the human injuries, 87.5% had completed their centers evaluation process with a passing score. The remaining 12.5% indicated that some of the equines did, and some of the equines did not. There was no association between type of center and if the equine had been through the evaluation process ($X^2(1) = .163$, $p = .686$).

When asked "how does an evaluation process for equines before they are used in program impact equine and human safety" the respondents tended to state that the evaluation process does keep humans and horses safe by identifying areas of risk. Additionally, the evaluation process identifies if the horse is suited for its attended job, both physically and mentally, which in turn sets them up to be successful and safe in the EAS environment. One survey respondent stated (emphasis in original quote):

> Not all horses have a desire to be in this industry. If a horse is not interested in this or is burnt out, they will try to communicate in negative behaviors which puts EVERYONE in danger. The initial evaluation process is a great indicator of the horse wanting to do this job AND the yearly evaluations are great indicators of the horse being physically and mentally capable of doing the job. The evaluation is an opportunity to LISTEN to the Horse. If the Horse is not heard, they will communicate louder i.e., biting, kicking, bucking resulting in unsafe situations for everyone involved.

When asked their level of agreement or disagreement with the following statement: An unbiased equine evaluation process increases both horse and human safety during therapies, learning activities, and adaptive horsemanship, responses varied from strongly agree to strongly disagree (see Table 10). There was an association between type of center and level of agreement with the statement ($X^2(3) = 7.817$, $p = .050$) (see Figure 6). There was no association between early and late responses and level of agreement with the statement ($X^2(3) = .777$, $p = .855$).

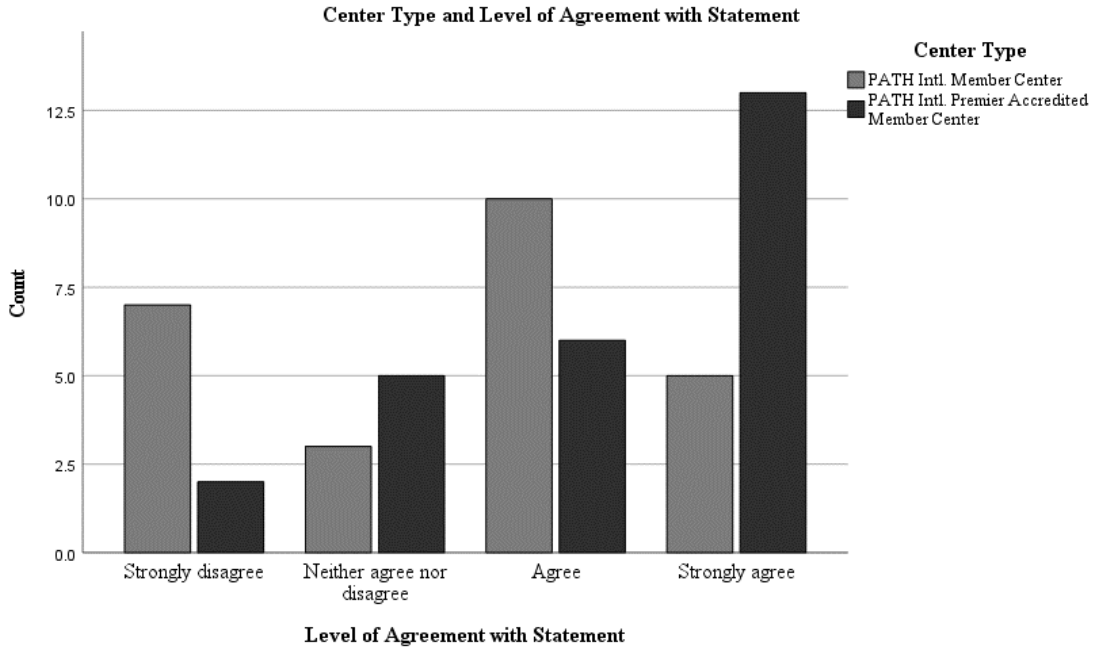
Table 10

Level of Agreement/Disagreement That Equine Evaluations Increase Safety

Level of Agreement/Disagreement	Frequency	Percentage
strong agreed	18	35.5%
agreed	16	31.4%
strongly disagreed	9	17.6%
neither agreed nor disagreed	8	15.7%

Figure 6

Center Type and Level of Agreement with Statement



Chapter V Discussion and Conclusion

Objective 1

Develop and assess a reliable rubric for EAS equine basic ground skills.

Intra- and Inter-rater Reliability

To align with the need to develop a reliable assessment tool for equines in EAS (Chapman and Thompson, 2016; Professional, 2018, p. 74), the BGSA was created. The analysis of the BGSA demonstrated it has moderate to strong intra-rater reliability and weak to moderate inter-rater reliability.

As intended, intra-rater reliability proved to be moderate to strong, demonstrating that the BGSA could be used by the same rater with the same horse and achieve similar results. The variance in scores from one evaluation day to the next could have occurred due to individuals being distracted or having an off day.

Inter-rater reliability, on the other hand, was not as strong as hoped. The weak reliability seen between the two raters could have occurred due to the small number of competencies compared, the differences in the raters' equine background, or different interpretations of the rubric. It is important to note that when the inter-rater reliability was analyzed based on if the raters gave the equine a "passing" score (a score of two or three) or a "failing" score (a score of zero or one), the reliability increased to moderate, with the raters differing on only one score. This is a more practical analysis of the scores when considering how the BGSA is intended to be implemented into EAS basic ground skills programs. If raters can agree if an equine should or should not pass the BGSA (i.e.,

agreement on if the equine is suitable or unsuitable for EAS basic ground skills programs) the rubric will have done its intended job.

Further work should be done to increase the reliability of this assessment tool. This could include revising the BGSA through additional expert recommendations. In addition, a robust training program for evaluators could be created to ensure the BGSA is interpreted the same way.

Limitations

The results are limited based on the small sample of raters assessed. If a bigger pool of raters were used and if the raters assessed more than one horse, the results could have differed.

Recommendations

More work should be done to improve the BGSA as an effective EAS equine assessment tool. Further testing of the rubric could be beneficial in improving reliability. Future testing should include additional raters assessing and scoring equines using the BGSA. As they use the BGSA, notes taken as to why they choose what they choose may reveal areas of the assessment that could be strengthened.

The next step in improving the BGSA would be to develop a robust training for individuals to ensure they understand all parts of the BGSA and to reduce score discrepancies between raters. The training could include example videos that walk through the scoring of the equines and use of the BGSA. After a training is developed and implemented, analysis of inter-rater reliability would be advisable.

Objective 2

Develop and assess a valid rubric for EAS equine basic ground skills.

Validity

To align with the need to develop a valid assessment tool for equines in EAS (Chapman and Thompson, 2016; Professional, 2018, p. 74), the BGSA was created. The analysis of the BGSA demonstrated it has strong validity.

As anticipated, correlation between the average BGSA scores and testing HR (both average and maximum), a physiological measure of stress, was negative and strong. This was expected because increased HR can be a sign of reactivity, fear, and internal stress (Lieiner & Fendt, 2011; McCall et al., 2006; McDonald, 2017). Equines that are stressed or fearful are more prone to demonstrate behaviors unsuitable for EAS equines, such as fight and flight behaviors (Lieiner & Fendt, 2011; McCall et al., 2006). Testing showed that horses with higher average and maximum HR during testing tended to have low average BGSA scores and were thus unsuited for EAS programs. This aligns with the BGSA goal to keep unsuitable equines from being engaged in EAS; alternatively, equines with lower average and maximum HR had higher average BGSA scores and were thus suited to be engaged in EAS. Overall, these results demonstrated that the BGSA is a valid assessment.

The other physiological measure of stress tested was serum cortisol. The correlation between serum cortisol changes from pre- to post-testing and average BGSA scores was insignificant. It should be noted that all cortisol levels remained within normal parameters. These findings could be explained by the short testing period for handling,

which may have not been long enough to raise the equine's cortisol levels significantly. Additionally, the equines were in their normal working environment, so their stress may not have been increased to the point where it was shown in their serum. Overall, it appeared that serum cortisol was not an accurate indicator of stress. HR data was a better indicator of equine stress levels, in this study.

Limitations

Validity testing was limited by the sample available. Only fourteen horses, not all of which were engaged in EAS, were available to be tested using the BGSA. The results may or may not apply to other herds of equines.

Additionally, the need to transfer the blood samples from the testing site to the laboratory could have skewed the cortisol results if the samples were not handled properly. Measures were in place to ensure all samples were handled the same way, but human error is always present. Samples were placed at room temperature within five minutes of drawing the blood. They were then transported by vehicle to the laboratory on campus within 30-60 minutes. They were centrifuged, separated, and frozen by the same individual each time to ensure consistency in handling.

Recommendations

Future research may choose not to use serum cortisol as an indicator of stress and/or EAS program suitability assessment due to the non-significant correlations between cortisol and assessment scores. Alternatively, HR proved to be an effective and feasible way to measure stress and may be considered for use in future studies. This supported the findings of previous studies that utilized HR data (Lieiner & Fendt, 2011;

McCall et al., 2006; McDonald, 2017; Turner, 2014). The HR equipment was also user friendly and produced easily understood data.

The BGSA is recommended as an assessment tool for equines in basic ground skills programs. Implementation of the BGSA into multiple EAS programs may demonstrate its relation to human and horse safety and injury risk prevention. To conclude, the BGSA should continue to be tested for validity by different researchers and programs.

Objective 3 and 4

Define the equine evaluation procedures that PATH Intl. centers incorporate. Determine if procedures differ between PATH Intl. Premier Accredited Member Centers and PATH Intl. Member Centers.

Define the link, if any, between safety and equine evaluation procedures in PATH Intl. centers. Determine if there is a difference between PATH Intl. Premier Accredited Member Centers and PATH Intl. Member Centers.

Survey Results

The almost perfect split in responses from PATH Intl. Member Centers and PATH Intl. Premier Accredited Member Centers allowed comparison between centers. It was found that there was no association between center type and any compared responses except for when type of center was compared to incident of human injury. This is promising because it demonstrates that member centers are meeting the PATH Intl. standards of evaluation and safety, just as premier accredited centers are.

The list of ground related skills and behaviors that centers evaluated equines on could be incorporated into future assessments, such as an advanced ground skills assessment. If this was done, the assessment should go through reliability and validity testing just as the BGSA has. The majority of centers (80%) used a rubric, rating scale, or checklist as their assessment tool to evaluate their horses. The BGSA has the potential to be more easily adopted by these centers because of the format it follows (i.e., the format fits into the rubric category, but it is also similar to rating scales and checklists).

It was interesting to find that 63.3% of centers did not have a clearly defined passing score (i.e., used a defined percentage, number, rating scale, or yes/no checklist that must be achieved by the equine prior to them entering program). It would stand to reason that an undefined passing score would lead to an increased chance of bias in evaluations. The researchers recommend that all assessments should have a clearly defined measure that indicates if an equine is or is not suitable for EAS, just as 36.7% of centers did.

The majority of centers employed more than one individual to evaluate their equines, though there was a diverse type of positions that performed the evaluation. There are currently no standards that state how many people are needed to perform an accurate equine evaluation, so future research should explore this factor. In addition, future research should examine the reliability of different assessment methods, just as was done with the BGSA, and what training the individuals need in order to use the assessment tool accurately and reliably. If a large number of individuals could be trained to use an assessment reliably and validly, it could take the strain off certain positions and

ensure that horses are being evaluated accurately. The BGSA should aim to create a training process for future use.

Another area explored by the survey that could benefit from additional research was the frequency of equine evaluations. Evaluation intervals ranged from "continuously" to "only once before initial placement in the program." There is currently little to no research on how long an equine will maintain behavior suitable of an EAS equine. It is recommended that research is performed to determine how far apart evaluations can be while still maintaining accuracy (i.e., the interval of time that is still close enough to catch safety issues and accurately assess an equine's ability, but not so close in time that it is unfeasible for staff to perform).

Few centers reported injuries from equine and human ground interactions in the past two years. Premier accredited centers did have a higher incidence of reported injuries than member centers. There was no clear reason why, though a further look into the number of injuries compared to the proportion of individuals served as well as equine interaction hours at each center would be necessary before further conclusions can be drawn. The injuries occurred either because of an equine stepping on or biting a person. A suitable assessment process should screen for these behaviors and remove equines from programming if these behaviors are present until they can be re-trained or re-homed because these behaviors lead to human injury.

Overall, individuals saw equine evaluations in a positive light. All the programs had an evaluation procedure in place. Most agreed that an unbiased equine evaluation procedure increased both horse and human safety in EAS programs.

Limitations

The results generalizability to the broad population of PATH Intl. centers is limited by the small response rate. Survey research has determined that "late responders are similar to non-responders" (Uusküla et al., 2011); because of this, it can be reasonably assumed that nonresponding PATH Intl. centers responses should somewhat follow the trend of responding PATH Intl. centers based on the fact that there were no statistically significant differences between early and late responders. Differences may have indicated that the responders differed from the overall population, including the nonresponding portion of the sample. No definitive statement can be made though, because of the limited responses. The lack of responses could have been attributed to the survey being confusing or too long, poor distribution channels, not a large enough incentive to complete the survey (i.e., not enough monetary incentive and lack of a clear direct benefit to PATH Intl. centers), and a lack of response due to the strain COVID-19 has placed on PATH Intl. centers, specifically research fatigue (Patel et al., 2020).

Recommendations

Additional surveying methods should be incorporated into future research. Phone interviews may have been more successful in achieving responses and allowed a better understanding of PATH Intl. center perspectives. Due to time and financial constraints, this was not done in this research study. Additionally, the survey was anonymous, which prevented the researchers from following up with non-responders.

As stated previously, future research on equine assessment procedures should include:

- a clearly defined measure that indicates if an equine is or is not suitable for EAS,
- how many individuals are needed to evaluate an equine to ensure the assessment is reliable and unbiased,
- what training/equine background is needed to ensure equines are evaluated accurately,
- an assessment for additional ground skills not listed on the BGSA, such as advanced ground skills, and
- the frequency evaluations need to occur to be valid.

Conclusion

The EAS industry needs a clearly defined, reliable, and valid equine assessment procedure. The BGSA could be what fills this need. This research demonstrated that the BGSA was valid and moderately reliable. Additional work should be done to improve the efficacy of the BGSA, including development of a training program for evaluators.

The results from the survey demonstrated that there is widespread use of evaluations for equines in PATH Intl. centers, though the evaluations differed greatly in their composition. To achieve a valid and unified assessment process, the BGSA should be piloted by PATH Intl. centers to determine if it meets their needs. Additional research that defines how often and by whom the BGSA is completed would add to the reliability and validity of the BGSA.

In closing, this study developed and validated a basic ground skills assessment for use in EAS. The assessment created met the best practice standard requirements laid out

by PATH Intl. standard EQM-2. While improvements can be made, it is a solid first step towards an unbiased equine assessment procedure for EAS programs.

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Appendices

Appendix A. PATH Intl. standard EQM-2 and Copywrite Permission

EQM2

Does the center have written procedures for the:

1. **Evaluation of the suitability of new equines prior to participating in center activities/ therapies?**
2. **Evaluation for the permanent removal of equines no longer/not suited for participating in center activities/therapies?**

Yes No

Interpretation: Having written standard procedures for evaluation and removal of equines provides centers an unbiased tool for effective measurement of the abilities and suitability of all equines participating in center activities/therapies.

The written procedures for intake suitability should delineate the following:

- Who is the ultimate decision maker?
- Who performs the equine evaluations?
- What specific criteria/behaviors an equine must demonstrate prior to being placed into each activity/therapy, such as the following examples:
  - Standing quietly at the halt for grooming, tacking, harnessing or other activities and during mounting, dismounting or putting to for driving
  - Behaving appropriately with personnel, volunteers, participants and other equines as well as wheelchairs and other adaptive equipment
  - Responding appropriately to participant's aids, both natural and artificial, and the many different working conditions specific to the activity/therapy including sidewalkers or therapists working closely on both sides
  - Tolerating hugging, hair pulling, loud noises, erratic behavior and other disturbances
  - Accepting training specific to the equine activity or therapy

The written procedures for the permanent removal of equines that do not meet program qualification or are unable to continue working in program activities and therapies should delineate the following:

- Who is the ultimate decision maker?
- Who performs the equine evaluations?
- Specific criteria to be considered during the evaluation
- What becomes of the equine after removal (return to owner, sale, adoption, retirement, euthanasia, etc.) from center activities/therapies?

Once these written procedures are developed and implemented, they should be reviewed and modified as needed, as long as the written procedures match center practices.

Compliance Demonstration: Visitor observation of WRITTEN procedures for equine suitability and WRITTEN procedures for equine removal, and personnel explanation of the procedures.

Copywrite Permission Emails

Email to pathintl@pathintl.org from sarah.andersen@usu.edu
Subject line: Question about Copywrite Permission

Dear PATH Intl. Representative,

I am completing a thesis at Utah State University entitled "Development and Validation of a Basic Ground Skills Assessment for Equine-assisted Services." The focus of my thesis is to validate an assessment process that meets PATH Intl. standard EQM-2. To assist with my explanation of this standard, I would like permission to place the standard in the appendices of my thesis.
Specifically, I would like your permission to reprint in my thesis an excerpt from the following:
Professional Association of Therapeutic Horsemanship International. (2018). Professional Association of Therapeutic Horsemanship International standards for certification & accreditation (2018 ed.). https://www.pathintl.org/images/pdf/standards-manual/2018/2018-path-intl-standards-complete-manual.pdf
The excerpt to be reproduced is the: Equine Welfare and Management standard number 2 (EQM-2) on page 74.
The requested permission extends to any future revisions and editions of my thesis, including non-exclusive world rights in all languages, to the electronic publication of my thesis by Utah State University. These rights will in no way restrict republication of the material in any other form by you or by others authorized by you. Your response will also confirm that you own [or your company owns] the copyright to the above-described material.
If these arrangements meet with your approval, please return this e-mail with affirmation.
Thank you very much.

Sincerely,
Sarah Andersen

Email to sarah.andersen@usu.edu from kmarks@pathintl.org
Subject line: RE: Question about Copywrite Permission

Hello Sarah,

Thank you very much for reaching out and for creating a perfect attribution for the standard reference. Permission granted!
Best of luck on your thesis. That's no small undertaking.

Kind regards,
Kaye Marks

Appendix B. BGSA

Basic Ground Skills Assessment

Equine Name:
Evaluator Name:
Date:

Instructions

Score the equine on each competency according to the rubric. Make sure to review the definitions of terms and the descriptions of each score.

A *score of 0* on ANY of the competencies means the equine is NOT cleared for use in an equine-assisted services (EAS) setting until the behavior and/or health issue is resolved. Upon receiving a *score of 0*, the evaluation is immediately terminated, and the equine is marked as "failed." If an equine receives a *score of 0* due to pain or is otherwise unsound, they must be cleared by a veterinarian before reassessment. If an equine receives a *score of 0* due to dangerous behavior, they must go through professional re-training to correct the behavior before being reassessed.

A *score of 1* indicates the equine is unsuitable to perform the competency in EAS at this time. A *score of 2* and a *score of 3* indicates the equine is suitable to perform the competency in EAS at this time

It is recommended that equines be evaluated by two evaluators prior to being engaged in EAS that incorporate basic ground skills to reduce bias. The two evaluator scores should be averaged. Equines should be re-evaluated annually. Evaluators should understand equine behavior and be familiar with the grading scale of zero through three for each competency.

Note: a timer or watch will be needed for the assessment.

Definitions Used in the Grading Scale

Movement: One step of movement is when each foot lifts and sets down on the ground one time. Head movement is when the equine's head moves to the point of shoulder or beyond.

Calm: signs of a calm equine include cocked hind foot, consistent head carriage (i.e., head at or below withers), consistent tempo, gentle blowing, head at or below the withers, loose tail that swings freely while in motion, low energy, relaxed nostrils, relaxed stance, soft eyes.

Tense: signs of a tense horse include flared or widened nostrils, head elevated beyond normal head carriage, inconsistent head carriage (i.e., head raising and lowering repeatedly), inconsistent tempo, pawing or stomping, pinned ears, stiff stance, tail that is tucked or flagged, tight or pinched muzzle, wide eyes.

Dangerous Behaviors: dangerous behaviors included biting, bucking, charging, crow hopping, kicking, pulling away from the handler, pulling back when tied, rearing, running over the handler, and striking.

Pain: grimace face (i.e., mouth strained and pronounced chin, orbital tightening, prominent streamlined chewing muscles, stiffly backward ears, strained nostrils and flattening of the profile, tension above the eye area)[1], palpates sore (i.e., on back, limb, or other body part), repetitive tail swishing, shaking, tensed/tucked up abdomen.

Unsound: abnormal or irregular movement, asymmetrical movement (i.e., hips, limbs, shoulders), head bob present, limited range of motion in a limb, refusal to bear weight on a limb.

[1]Costal, E. D., Minerol, M., Lebelt, D., Stucke, D., Canali, E., Leach, M. C. (2014). Development of the horse grimace scale (HGS) as a pain assessment tool in horses undergoing routine castration. *PLoS ONE, 9*(3), 1-10. https://doi-org.dist.lib.usu.edu/10.1371/journal.pone.0092281

1 Catching: stall

Competency Assessment Requirements: Equine will be loose in a stall without a halter. The handler will enter the stall and approach the equine with a halter and lead rope. The handler will halter the equine.

Time Considerations: If the equine is not caught within five minutes of entering the stall, a score of zero will be given and the assessment terminated.

Equipment Needs: Halter, lead rope, timer or watch.

Scoring Rubric

0 Automatic Failure	1 Does Not Meet Criteria	2 Meets Criteria	3 Exceeds Criteria
Displays dangerous behavior and/or is in pain or otherwise unsound. If it takes more than five minutes to catch the equine, it results in a zero score.	Walks away from the handler three or more steps. Turns hind end to handler. When haltering, raises head and will not lower when pressure is applied to the poll.	Walks away from the handler no more than two steps. Puts head down when pressure is applied to the poll. Accepts halter calmly.	Turns to face the handler as they enter the stall. Stands when approached and/or walks to the handler. Accepts halter calmly.

2 Catching: large area

Competency Assessment Requirements: Equine will be loose in an arena, large turnout, or pasture without a halter. The handler will enter the arena, large turnout, or pasture and approach the equine with a halter and lead rope. The handler will halter the equine.

Time Considerations: If the equine is not caught within ten minutes of entering the arena, large turnout, or pasture, a score of zero will be given and the assessment terminated.

Equipment Needs: Halter, lead rope, timer or watch.

Scoring Rubric

0 Automatic Failure	1 Does Not Meet Criteria	2 Meets Criteria	3 Exceeds Criteria
Displays dangerous behavior and/or is in pain or otherwise unsound. If it takes more than ten minutes to catch the equine, it results in a zero score.	Moves more than ten steps away from the handler. When haltering, raises head and will not lower when pressure is applied to the poll.	Moves away from the handler, but no more than ten steps. Puts head down when pressure is applied to the poll. Accepts halter calmly.	Stands when approached and/or walks to the handler. Accepts halter calmly.

3 Basic Leading

Competency Assessment Requirements: The handler will lead the equine through two gates, turn the equine away from the handler twice, turn the equine towards the handler twice, perform three walk to halt to walk transitions, and complete one 15-20 meter circle in each direction. Throughout all handling, the handler will be aware of the equine's response to walk cues, halt cues, turn cues, and handler space and score according to responses. The handler space is defined as one to two feet around the handler. The equine should be led in proper leading position (i.e., the equine's head at the handler's shoulder).

Time Considerations: The handler should take at least three to five minutes to complete the above listed tasks.

Equipment Needs: Halter, lead rope, timer or watch.

Scoring Rubric

0 Automatic Failure	1 Does Not Meet Criteria	2 Meets Criteria	3 Exceeds Criteria
Displays dangerous behavior and/or is in pain or otherwise unsound.	Tense and alert. Spooks or balks. Is not responsive to walk, turn, and stop cues within three seconds of cueing. Moves into the handler's space two or more times per minute. Bumps into the handler with their shoulder. Tries to walk through gates before being cued by the handler.	Aware of surroundings but does not become unaware of the handler. Responsive to walk, turn, and stop cues within three seconds of cueing. Moves into the handler's space no more than one time per minute and responds promptly to corrections given to stay out of the handler's space (i.e., handler turns head away with lead rope pressure). Waits for the handler's cue to walk	Aware of surroundings but does not become unaware of the handler. Calmly leads with the head at the handler's shoulder. Responsive to walk, turn, and stop cues within one and a half seconds of cueing. Stays out of the handler's space in all situations, including stopping, walking, and turning. Waits for the handler's cue to walk through gates.

		through gates. Does not spook or balk.	

4 Standing Tied

Competency Assessment Requirements: The handler will tie the equine to a sturdy tie rail with a quick release knot. The handler will move at least ten feet away from the equine but remain within sight of the equine to observe their reactions.

Time Considerations: The equine should remain tied for three minutes.

Equipment Needs: Halter, lead rope, tie rail, timer or watch.

Scoring Rubric

0 Automatic Failure	1 Does Not Meet Criteria	2 Meets Criteria	3 Exceeds Criteria
Displays dangerous behavior and/or is in pain or otherwise unsound.	Does not stand still. Moves feet three or more times per minute. Paws at the ground or equipment. Vocalizes.	Moves feet no more than two times per minute. Does not paw at the ground or equipment. Does not vocalize.	Calm while standing. May shift weight but does not move feet.

5 Park

Competency Assessment Requirements: The handler will halt the equine in any spot in the arena. The handler will stand two to three feet in front of the equine with a loose lead. Any forward motion from the equine will be corrected by backing up the equine into their original spot. A dressage whip may be used as a tool to reinforce backing by tapping the ground in front of the equine.

Time Considerations: The equine should remain in park position for two minutes.

Equipment Needs: Dressage whip (optional), halter, lead rope, timer or watch.

Scoring Rubric

0 Automatic Failure	1 Does Not Meet Criteria	2 Meets Criteria	3 Exceeds Criteria
Displays dangerous behavior and/or is in pain or otherwise unsound.	Moves feet more than two times per minute. Tense.	May look around at the environment (i.e., move head). Does not move feet more than two times per minute. Responds to pressure on the halter to step back into park position after movement.	Stands still. May shift weight but does not move feet. Calm.

6 Grooming

Competency Assessment Requirements: The handler will tie the equine to a sturdy tie rail with a quick release knot. The handler will then groom the entire equine including the head, body, legs, mane, and tail. The handler will pick up and clean all four feet in any order. Use the grooming tools that will be utilized by participants in EAS. Make sure to groom the entire equine on both sides.

Time Considerations: Groom for five to ten minutes.

Equipment Needs: Grooming tools (e.g., rubber curry, stiff bristle brush, soft bristle brush, mane and tail comb, mane and tail detangler, hoof pick), halter, lead rope, tie rail, timer or watch.

Scoring Rubric

0 Automatic Failure	1 Does Not Meet Criteria	2 Meets Criteria	3 Exceeds Criteria
Displays dangerous behavior and/or is in pain or otherwise unsound.	Moves feet more than one time per minute while being groomed. Pins ears or nips at the handler. Resists picking up feet when asked to lift feet for cleaning.	Moves feet no more than one time per minute. May play with the lead rope. Accepts different grooming brushes. Picks up feet with little to no resistance when asked to lift feet for cleaning.	Stands calmly during the grooming process. Accepts being groomed everywhere. Accepts different grooming brushes. Picks up feet on cue without resistance when asked to lift feet for cleaning.

7 Backup

Competency Assessment Requirements: The handler will halt the equine in any spot in the arena. The handler will then turn to face the equine and cue for three to five steps of backup in a straight line by stepping toward the equine and applying pressure on the halter. The lead rope can be used to wave back and forth in front of the equine's chest to encourage backing. A dressage whip may be also used as a tool to reinforce backing by tapping the ground in front of the equine. The handler will back the equine three times.

Time Considerations: not applicable.

Equipment Needs: Dressage whip (optional), halter, lead rope.

Scoring Rubric

0 Automatic Failure	1 Does Not Meet Criteria	2 Meets Criteria	3 Exceeds Criteria
Displays dangerous behavior and/or is in pain or otherwise unsound.	Requires a lot of pressure from the halter and/or whip. Steps back with resistance. Backs up crooked.	Cues with pressure from the halter and/or whip. Backs one leg at a time slowly in a straight line.	Cues with body language and light pressure from the halter. Smoothly steps back in diagonal pairs in a straight line.

8 Arena Obstacles

Competency Assessment Requirements: The handler will identify three or more arena obstacles that the equine will be exposed to in EAS (e.g., bridge, ground poles, cones, upright poles, tarp). The arena obstacles will be placed in the arena. The handler will lead the equine, at a walk, around, on, and over the obstacles as applicable (e.g., lead the equine *around* cones, *on* a bridge, *over* ground poles). Each arena obstacle should be attempted/completed two to three times.

Time Considerations: If the equine is hesitant to go around, on, or over an arena obstacle, terminate that obstacle attempt after one minute.

Equipment Needs: Arena obstacles (e.g., bridge, ground poles, cones, upright poles, tarp), halter, lead rope, timer or watch.

Scoring Rubric

0 Automatic Failure	1 Does Not Meet Criteria	2 Meets Criteria	3 Exceeds Criteria
Displays dangerous behavior and/or is in pain or otherwise unsound.	Tense when introduced to obstacles. Walks over, on, and around some obstacles, but not all. Hesitates or rushes over, on and around obstacles.	Crosses different obstacles. May hesitate at first, but with pressure on the halter they will walk over, on and around all obstacles.	Calmly crosses a variety of obstacles. Walks with a consistent tempo over, on, and around all obstacles.

9 Loud Noises

Competency Assessment Requirements: The handler may choose to introduce loud noises with the equine in park position and/or while leading the equine at a walk around the arena. Identify at least three types of loud noises that the equine may be exposed to in EAS (e.g., arena doors opening and closing, clapping/cheering/shouting, four-wheelers or tractors, people walking across bleachers, stomping of feet). With the handler controlling the equine, an assistant will demonstrate each loud noise.

Time Considerations: Each noise should persist for at least fifteen to thirty seconds. If the equine demonstrates dangerous behaviors during the loud noise, terminate the assessment.

Equipment Needs: Assistant, halter, lead rope, loud noise equipment (e.g., arena doors, four-wheelers or tractors, bleachers), timer or watch.

Scoring Rubric

0 Automatic Failure	1 Does Not Meet Criteria	2 Meets Criteria	3 Exceeds Criteria
Displays dangerous behavior and/or is in pain or otherwise unsound.	Startles when introduced to loud noises (e.g., jumps,	Response to loud noises is mild (i.e., looks in the direction of the noises, but does not	Calm during loud noises. May acknowledge noises (e.g., flicks ears) but is

	moves more than one step). Tense.	move more than one step).	not disrupted from their job (e.g., walking, standing).

10 Activity

Competency Assessment Requirements: The handler may choose to introduce activities with the equine in park position and/or while leading the equine at a walk around the arena. Identify at least three types of activities that the equine may be exposed to in EAS (e.g., cars driving by, dropping grooming tools, other animals, flags waving, paper, people walking by, putting jackets on/off, spray bottles). With the handler controlling the equine, an assistant will demonstrate each activity.

Time Considerations: Each activity should persist for at least fifteen to thirty seconds. If the equine demonstrates dangerous behaviors during the loud noise, terminate the assessment.

Equipment Needs: Activity equipment (e.g., car, grooming tools, other animals, flag, paper, jacket, spray bottle), assistant, halter, lead rope, timer or watch.

Scoring Rubric

0 Automatic Failure	1 Does Not Meet Criteria	2 Meets Criteria	3 Exceeds Criteria
Displays dangerous behavior and/or is in pain or otherwise unsound.	Startles when introduced to activity (e.g., jumps, moves more than one step). Tense.	Response to activity is mild (i.e., looks in the direction of the activity, but does not move more than one step).	Calm during activity. May acknowledge activity (e.g., flicks ears) but is not disrupted from their job (e.g., walking, standing).

Version Updated: March 21, 2021

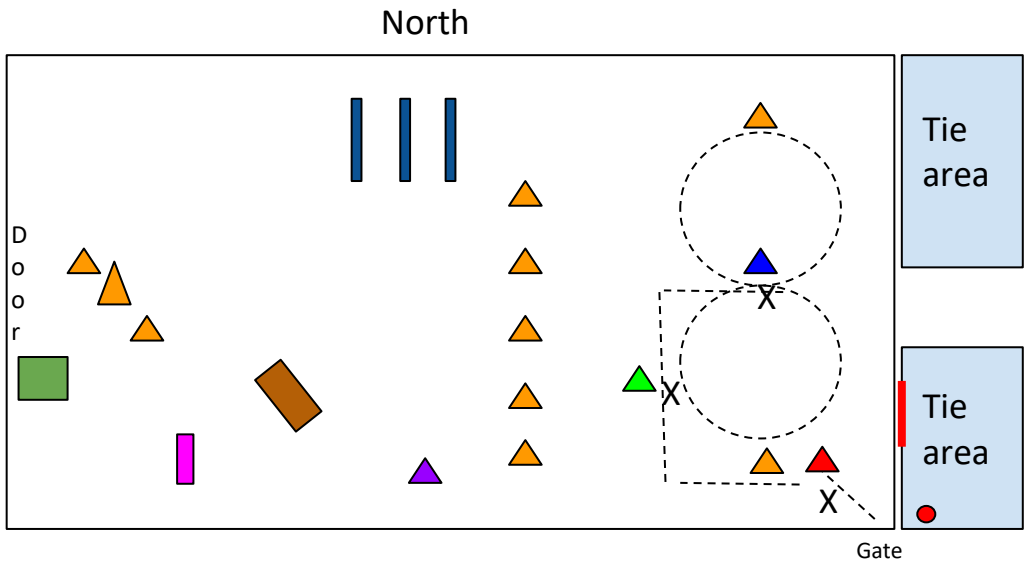
Appendix C. Detailed Script for Data Collection

Data collection periods

1. Pre-test (catch horse and lead just outside of their pen)
    a. Blood draw
2. Test (in indoor arena)
    a. HR data
    b. video
3. Post-test (immediately after the test before leaving the indoor arena)
    a. Blood draw
4. HR Baseline (in horse's living environment; occurs a different day than their test but same time of day they are filmed for the test)
    a. HR data
    b. Video

BGSA Testing

Arena set up



Props/Obstacles

- Grooming bucket (with all grooming tools) (use Novice herd grooming tools for those horses)
- 9 small orange cones
- 1 big orange cone

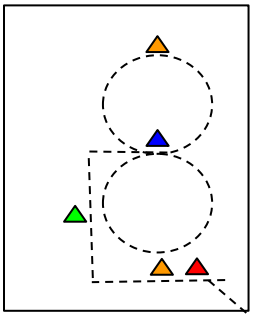
- Bridge
- 3 ground poles
- 4 colored cones
- Fourwheeler
- Tub with spray bottle, jacket, grooming bucket, paper
- Dressage whip
- Halter and lead rope

Personnel

1. Horse
2. Handler
3. Videographer
4. Assistant

Steps

1. Catch the horse in their living environment. Lead to just outside their pen. Draw blood.
2. Enter the barn.
3. Attach heart rate monitor. Start recording HR data and video.
4. **Catching: small area**
    a. *Location:* holding stall in stall barn (or living stall for Novice horses)
    b. *Camera:* stand at the corner of the stall (on the outside). Film through the open window.
    c. *Horse:* loose in the pen for at least 30 seconds
    d. *Handler:* Enter the stall with a nylon halter and lead rope.
    e. Approach and halter the horse.
5. **Basic leading**
    a. *Location:* corner gate and indoor arena
    b. *Camera:* stand against the south wall, across from the south orange cone. Start video with the horse being led through the gate.
    c. *Horse and Handler:* Start just outside the arena's corner gate
    d. Enter the arena through the corner gate.
    e. At a walk, turn the horse to the right and lead the pattern depicted below.



f.

g. Halt at the red cone. Remain at the halt for 2-3 seconds.

h. Walk to the green cone. Halt. Remain at the halt for 2-3 seconds.

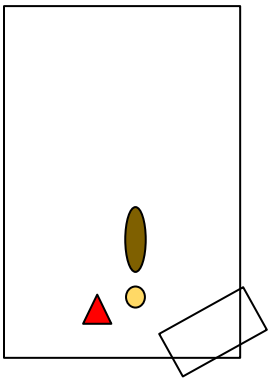
i. Walk to the blue cone. Lead the figure eight starting with a 20-meter left circle, then into a 20 meter right circle.

j. Halt at the blue cone at the completion of figure eight.

6. Park: with being held

a. *Location:* east third of the arena

b. *Camera:* stand in the south east corner of the arena at about a 45-degree angle to the horse.



c.

d. *Horse and Handler:* stand at the red cone, facing south

e. Move into the park position.

f. Remain in park position for two minutes (timed by the *assistant* standing outside of the arena)

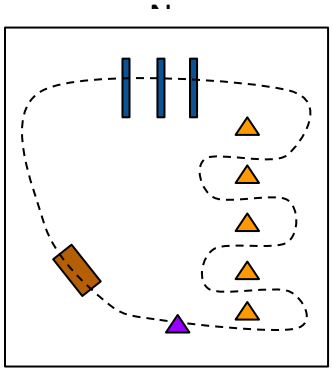
g. Corrections made by handler as needed

7. Arena obstacles (walking over, around, and on)

a. *Location:* middle third of the arena

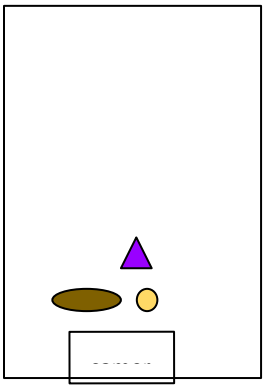
b. *Camera:* stand against the south wall, parallel to the purple cone

c. *Horse and Handler:* Start at purple cone, facing east.

d. 

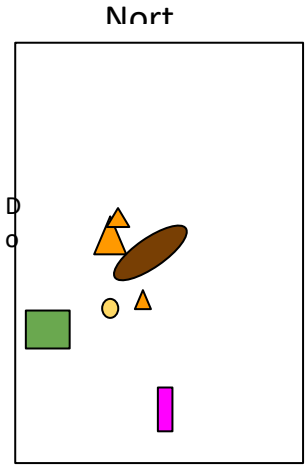
e. Lead through the cones, over the poles, and over the bridge in a counterclockwise loop.
f. At the purple cone, reverse directions by turning right.
g. Lead over the bridge, poles, and through the cones in a clockwise loop.
h. Halt at the purple cone

8. Back up (3-5 steps)

a. *Location:* middle third of the arena
b. *Camera:* stand against the south wall, parallel to the purple cone
c. 
d. *Horse and Handler:* stand at the purple cone, facing east.
e. Complete the following steps 2 times
    i. Handler turns to face the horse.
    ii. Cue for 3-5 steps of backup
    iii. Face forward and walk back to the purple cone.

9. Loud noises

a. *Location:* west third of the arena
b. *Camera:* stand at the small orange cone, parallel to the horse and handler



c.

d. *Horse and handler:* stand at the large orange cone in park position, facing the south west corner.

e. The *assistant* will complete the loud noise tests in the following order:
   i. stomp across bleachers
   ii. enter the arena through the gate at the south west corner
   iii. open and close the west garage door (let it go all the way up)
   iv. turn on the fourwheeler and leave it running for 20 seconds
   v. stand at the small orange cone on the horse's left side; clap, cheer, and yell for 5 seconds. Repeat on the right side.

f. If the equine moves away from the loud noise more than 3 steps, immediately stop that loud noise

10. Activity

a. *Location:* West third of the arena

b. *Camera:* stand at the small orange cone, parallel to the horse and handler, about 15 feet away.

c. *Horse and handler:* stand at the large orange cone in park position, facing the south west corner.

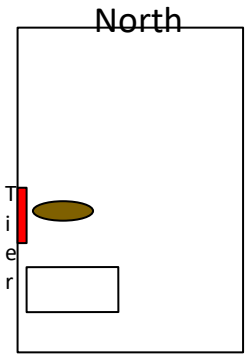
d. The *assistant* will complete the activity tests in the following order (props are found in the purple tub):
   i. walk at a brisk pace around the horse at a distance of ten feet
   ii. stand at the orange cone on the horse's right side and put a jacket on and off
   iii. stand at the small orange cone on the horse's left side; wiggle a piece of paper for 3-5 seconds. Repeat on the right side.
   iv. spray water with a spray bottle on the horse two times in each of the following locations
      1. Left shoulder

2. Left barrel
3. Left hindquarters
4. Right shoulder
5. Right barrel
6. Right hindquarters

v. If the equine moves away from the activity more than 3 steps, immediately stop that activity

11. Standing tied

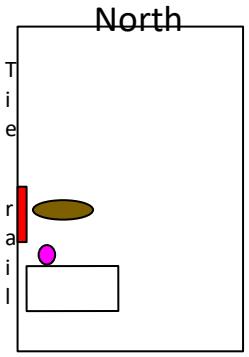
a. *Location:* south tie rails outside of the arena
b. *Camera:* on the south side of the horse, ten feet away, parallel



c.
d. *Horse:* tied on the south tie rail
e. *Handler:* after tying the horse, move out of horse's space for 3 minutes
f. Horse stays tied for three minutes

12. Grooming

a. *Location:* south tie rails outside of the arena
b. *Camera:* on the south side of the horse, ten feet away, parallel



c.
d. *Horse:* tied on the south tie rail
e. *Handler* grooms the horse for about five minutes. Use the grooming tools (found in the grooming bucket-pink circle) in the following order:
   i. Rubber curry
   ii. Stiff brush

iii. Soft brush
iv. Mane and tail detangler and brush
v. Hoof pick

13. End video
14. End HR
15. Collect blood

Appendix D. CTRI and ESMHL Criteria that Demonstrated the Quality of Raters for participation in the Study

PATH Intl. Certified Therapeutic Riding Instructor Criteria

Citation: PATH Intl. (n.d.). *Certified therapeutic riding instructor criteria.* Retrieved October 18, 2020 from https://pathintl.org/images/pdf/resources/certifications/path-intl-ctri-criteria.pdf

CTRE 3.0 Horse Senses and Behavior

CTRE. 3.1 Know the characteristics of the senses of the equine and how they contribute to equine behavior.

CTRE. 3.2 Know the behavioral characteristics of a lesson ready equine.

CTRE. 3.3 Know how the senses of the equine and equine behavior affect the safety of the riding setting.

CTRE. 3.4 Identify stable vices, including cribbing, weaving, biting, kicking and wood chewing.

CTRE. 3.5 Recognize signs and causes of negative equine behaviors (including/not limited to biting, kicking, and crowding personal space).

CTRE. 3.6 Identify appropriate types of rewards for equine positive behaviors (including/not limited to release of pressure, verbal praise or pats/rubs.)

CTRE. 3.7 Identify equine behavior or body language that could signal a dangerous situation and know appropriate actions to take to protect the safety of people and equines.

CTRE 6.0 Health and Sickness

CTRE. 6.2 Know and recognize when an equine is unsound and how it may impact equine behavior.

CTRE 9.0 Unsoundness and Blemishes/Form to Function

CTRE. 9.1 Recognize the difference between a blemish and an unsoundness.

CTRE 10.0 Selection CTRE.

10.1 Explain the characteristics of an EAAT equine. CTRE.

10.2 Recognize when an equine is unwilling to accept: 1 leaders and sidewalkers 2 ambulation aids 3 mounting ramps and blocks 4 game equipment 5 mounting procedures

PATH Intl. Equine Specialist in Mental Health and Learning Criteria

Citation: PATH Intl. (3 January 2018). PATH Intl. equine specialist in mental health and learning criteria booklet. Retrieved May 29, 2021 from https://pathintl.org/images/pdf/resources/certifications/2018-esmhl-full-criteria.pdf

ES em. 3.0 Horse Senses and Behavior

ES em. 3.1 Know the characteristics of the senses of the horse

ES em. 3.2 Know the characteristics of horse behavior

ES em. 3.3 Know how the senses of the horse and horse behavior affect the safety of the equine-facilitated mental health setting

ES em 3.4 Include herd behavior and dynamics

ES em. 3.5 Identify stable vices including A) cribbing B) weaving C) biting and kicking D) wood chewing

ES em. 6.0 Health and Sickness

ES em. 6.2 Know and recognize when a horse is unsound A) Identify healthy footfalls at all three gaits

ES em. 6.3 Recognize the difference between a blemish and an unsoundness

ES em.9.0 Selection and Training

ES em. 9.1 Explain the characteristics of an EAAT horse

ES em. 9.2 Know how to train a horse to accept: A) leading by someone who is learning to lead B) two persons in the stall C) hugging and awkward grooming D) game equipment/props E) yielding to touch

ES mhl 3.0 Ethical Treatment of Equines

ES mhl 3.1 Application of ethical standards A) Knowledge of PATH Intl. standards w/regard to ethical treatment of the equine B) Evaluation of equine mental & physical condition a. safety & ethical concerns and likely impact on participants b. ethical & safety considerations for session impact on equine c. documentation d. team discussion

Appendix E. Equine Evaluation Procedures in PATH Intl. Centers Survey

Q1 Please have one individual on your team that is over the age of 18, who is familiar with your center's equine evaluation processes take 20 minutes to complete the following survey. The data you share will benefit equine-assisted services (EAS) programs by providing research-based evidence for PATH International best practice standards, specifically, the Equine Welfare and Management standard number two that discusses equine evaluation procedures. Thank you for your efforts in promoting the safety of the equines and humans involved in EAS.

Equine Evaluation Procedures in PATH International Centers Informed Consent
You are invited to participate in a research study by Michael L. Pate, Ph.D., an Associate Professor in the School of Applied Sciences, Technology, and Education at Utah State University. The purpose of this research is to capture data on the current equine evaluation procedures performed in PATH International centers that provide equine-assisted services such as adaptive horsemanship, therapy that incorporates the movement and/or interaction of equines, and learning that incorporates the movement and/or interaction of equines. Your participation is entirely voluntary. Specifically, we are interested in learning about the way in which equine evaluation procedures affect the safety of humans engaged in equine-assisted services. You are being asked to participate in this research because you work for a PATH International center that uses equines in groundwork programs. Your participation in this study is voluntary and you may withdraw your participation at any time for any reason during the survey. However, due to the anonymous nature of the survey, you will not be able to withdraw after we have collected your responses. If you take part in this study, you will be asked to complete a nineteen-question survey that includes open and close ended questions. The survey should take approximately 20 minutes. The possible risks of participating in this study include loss of confidentiality. Although you will not directly benefit from this study, it has been designed to learn more about equine evaluation procedures for equines in PATH International centers. **We will make every effort to ensure that the information you provide remains confidential**. We will not reveal your identity in any publications, presentations, or reports resulting from this research study. **We will collect your information through** Qualtrics. You will also be given the option to include your name and email in a gift card drawing. This information will be collected through Google Forms. Online activities always carry a risk of a data breach, but we will use systems and processes that minimize breach opportunities. This survey data will be securely stored in a restricted-access folder on Box.com. Data gathered in the Google Form will be stored in a USU box folder encrypted and password protected that is only accessible to the researchers. The identifying data collected for compensation purposes will be destroyed at the conclusion of the study. **For your participation in this research study, you may receive** a $20 gift card. The gift card will be given to one random individual who completes the survey and signs up for the gift card drawing. You can decline to

participate in any part of this study for any reason and can end your participation at any time during the survey. However, due to the anonymous nature of the survey, you will not be able to withdraw after we have collected your responses. If you have any questions about this study, you can contact the Principal Investigator, Michael Pate, at 435-797-0989 or michael.pate@usu.edu. Thank you again for your time and consideration. If you have any concerns about this study, please contact Utah State University's Human Research Protection Office at (435) 797-0567 or irb@usu.edu. **By continuing to the survey, you agree that you are 18 years of age or older, and wish to participate.** You agree that you understand the risks and benefits of participation, and that you know what you are being asked to do. You also agree that if you have contacted the research team with any questions about your participation, and are clear on how to stop your participation in this study if you choose to do so. Please be sure to retain a copy of this form for your records.

Downloadable Informed Consent Document

Q2 The PATH International center I am filling this survey out for is a

- o PATH Intl. Member Center
- o PATH Intl. Premier Accredited Member Center
- o Not a PATH Intl. center
- o I am not sure

Q3 What is your (the survey respondent) affiliation with the PATH Intl. center? (check all that apply)

- ☐ Equine/herd manager
- ☐ Equine trainer
- ☐ Program director
- ☐ Volunteer coordinator
- ☐ Other (please specify)

Q4 Are you (the survey respondent) a

- PATH Intl. Certified Equine Specialist in Mental Health and Learning (ESMHL)
- PATH Intl. Certified Therapeutic Riding Instructor (CTRI)
- Both a PATH Intl. ESMHL and PATH Intl. CTRI
- Neither a PATH Intl. ESMHL or PATH Intl. CTRI
- Other (please specify)

Q5 Does your center provide ground activities? This can include leading, grooming, liberty work, ground therapy sessions, ground learning activities, etc.

- Yes
- No
- I'm not sure

Q6 Does your center have an evaluation process to determine "the suitability of new equines prior to participating in center [ground] activities/therapies" per the PATH Intl. standard Equine Welfare and Management #2?

- Yes
- No
- I'm not sure

Skip To: Q14 If Does your center have an evaluation process to determine "the suitability of new equines prior to... = No

Q7 How does your center evaluate the equines on ground-related skills and/or behaviors? (select all that apply)

- ☐ Leading at the walk
- ☐ Leading at the trot
- ☐ Back up
- ☐ Grooming
- ☐ Reaction to arena props
- ☐ Catching and haltering
- ☐ Leading over obstacles
- ☐ Standing tied
- ☐ Other(s) (please specify)

Q8 How are horses scored on the evaluation?

- o Checklist (this includes yes/no questions or pass/fail; e.g., Does the equine meet the criteria? Does the equine not meet the criteria?)
- o Rating scale (the equine is scored on a Likert scale; e.g., poor, fair, good, excellent)
- o Rubric (the equine is scored on a Likert scale that includes detailed descriptions of each level; e.g., does not meet criteria and displays "X" behaviors)
- o Other (please specify)

Q9 What constitutes a “passing score” for your center’s evaluation process?

_____

Q10 Who performs the equine evaluations at your center?

_____

Q11 Who is the ultimate decision maker on whether an equine is suitable for center activities/therapies or not at your center?

_____

Q12 How often is an equine evaluated at your center?

- o Only once before initial placement in program
- o Every year
- o Every other year
- o Other (please specify

Q13 In your opinion, is the evaluation process implemented at your center an “unbiased assessment” of the equine? Why or why not?

_____

Q14 Please explain any safety issues that have occurred or do occur during ground activities or therapies.

_____

Q15 Have there been participant injuries during ground activities/therapies at your center in the past two years (an injury is an occurrence resulting in first aid, self-care medical treatment, or physician medical treatment.)?

- o Yes
- o Maybe
- o No

Skip To: Q19 If Have there been participant injuries during ground activities/therapies at your center in the pas... = Maybe

Skip To: Q19 If Have there been participant injuries during ground activities/therapies at your center in the pas... = No

Q16 What were the causes of the participant injuries?

- Equine-caused (an equine's action resulted in injury)
- Human-caused (a human's action resulted in injury)
- Both equine- and human-caused (an equine's and human's action resulted in injury)
- Other (please specify)

Q17 Please elaborate on the cause of injury (e.g., the equine spooked and ran into a participant; the participant stuck their finger in the equine’s mouth and got bit).

_____

Q18 Were the above-mentioned injuries associated with any equine that was previously evaluated as acceptable for use in your center's activities?

- Yes, all injuries were associated with equine that were evaluated as acceptable for use
- Some of the injuries were associated with equine that were evaluated as acceptable for use
- No, none of the injuries were associated with equine that were evaluated as acceptable for use

---

Q19 Please tell us, according to your observations and experience, *how* does the evaluation process for the horses are your center have a positive impact on equine and human safety?

_____

Q20 Mark your level of agreement or disagreement with the following statement: An unbiased equine evaluation process increases both horse and human safety during therapies, learning activities, and adaptive horsemanship.

- Strongly disagree
- Disagree
- Neither agree nor disagree
- Agree
- Strongly agree