The Mind in Motion: How Education and Equine Assisted Therapy Work Together to Support Neurodivergent Learners

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Introduction

Globally, around one in five people are neurodivergent, meaning a person whose neurocognitive functioning is significantly different from the normal or typical societal standard (Cleveland Clinic, 2022). More specifically, around one in seven children worldwide have a mental disorder (Lindner, 2025), which includes various forms of neurodivergence. Of this, one in 100 children are diagnosed with autism spectrum disorder (ASD) around the world (Lindner, 2025). In Canada, one in 50 children is diagnosed with ASD (Ward, 2025). One thing to keep in mind however, is that these statistics represent only those with a formal diagnosis. We must remember that the Fifth edition of the Diagnostic and Statistical Manual of Mental Disorders (DSM-V) is consulted world-wide, however it can be interpreted slightly differently based on the doctor. For example, a child could go to two different experts and receive two different results. The criteria required for diagnosis relies on observations the doctor makes to establish the severity of a certain behaviour, and this can always be interpreted differently For example, the idea of eye contact may vary in different cultures around the world (C. Andrews, CanTRA Coach, EC Coach, personal communication, December 7, 2025). Additionally, we must keep in mind the many children around the world do not have the means to access formal diagnoses.

Autism spectrum disorder is a neurodevelopmental condition, meaning affecting the development of the brain/nervous system, with lifelong effects that can be recognized from early childhood with effects of variable severity. This can be characterized by impairments in communication, restricted interests and/or repetitive impairments in social interaction, and sensory integration difficulties (C. Andrews, CanTRA Coach, EC Coach, personal communication, December 7, 2025).

Struggles for those with autism often revolve around social interaction such as interpreting body language and facial expressions, lack of eye contact, and not being able to appropriately interact in accordance with cultural norms and expectations with the others around them (C. Andrews, CanTRA Coach, EC Coach, personal communication, December 7, 2025). The goal of this project is to bridge these gaps in social interactions and present these social skill ideas through the use of a horse instead.

As a note, this paper will use terms such as equine assisted therapy (EAT), equine assisted learning (EAL) and therapeutic riding. Though they are all slightly different based on certain criteria, unless specifically stated, this paper will use the term Equine Assisted Services (EAS) as an umbrella term.

Problem

Current academic classrooms usually only stimulate two of the five senses (sight and sound). Children can spend time listening to lectures, and reading notes, but this lack of full sensory stimulation can be a barrier for someone with neurodivergence. By bringing the children outside the classroom and engaging more of their senses, this may provide youth with better skills development that can be translated back into the classroom situation.

For example, when you take care of the horse, before you can even start to ride for a lesson, you must brush out all the dirt from the horse's hair, and tack them up with gear to get ready to ride, then when you get into the arena you have to walk them around so that the horse is used to the space. Then and only then are you able to get on the horse and start whatever training you want to achieve that day. This idea of breaking down the larger goal of riding a horse into smaller and more manageable tasks and stages may be translated to the idea of schoolwork with the breakdown of assignments into steps.

The goal of this project is to develop a system where children are able to regulate themselves during class, (e.g. having a tangible fidget of some sort that allows them to remember the lessons in equine assisted services as well as acting as a sensory stimulus).

Lack of Professional Research

There is a wealth of anecdotal and qualitative studies showing the effectiveness and the validity of equine-based services. However, there are few evidence-based studies. Existing evidence-based studies have flaws such as low sample sizes, a lack of control group, a lack of counsellor-administered curriculum, and/or assessments leaving gaps (Nagrath, 2020). Additionally, the idea of using horses to facilitate treatments for mental health as a means to help with mental health is an emerging topic, and therefore has not been extensively researched.

Method

Fundamental concepts and understandings of equine therapy were initially developed from my project from last year on the benefits of equine therapy to help individuals with PTSD, and by interviewing professionals in the areas of Equine Therapy, Equine Assisted Psychotherapy, Therapeutic Riding, education, and traditional mental health services. This paper aims to show the efficacy of EAS in conjunction with the educational system to help individuals with autism and other forms of neurodivergence form things such as social skills, therefore improving their educational outcomes, self regulation, task management, and improve their overall quality of life. Research was conducted through interviews with equine therapy facilitators, psychologists, psychiatrists, teachers, and other professions in the field of horses, and searches through Google Scholar.

Solution

By taking skills from all areas of Equine Assisted Services (EAS) and translating that into a classroom environment, the goal of this project is to improve the social skills of individuals with autism or other similar neurodivergence. Certain struggles for those with autism often revolve around social interaction such as interpreting body language and facial expressions, lack of eye contact, and not being able to interact with others around them. The goal of this project is to develop these skills with a horse to further increase the ability to interact with peers and society.

Research

Autism

The DSM-5 outlines autism diagnosis as requiring several criteria across different categories.

The first category is social communication and interaction, which has three criteria an individual must have either historically or currently. The first one is abnormal social-emotional reciprocity which is when an individual struggles with back-and-forth conversation, sharing interests, or initiating social contact. The second requirement is difficulties with nonverbal communication, this can include issues with interpreting and producing eye contact, body language, gestures, or facial expressions. Finally, the individual must have difficulties with relationships, either adjusting behaviour to social contexts, sharing imaginative play, or making/keeping friends (*Autism Diagnostic Criteria: DSM-5*, n.d.).

The second category is restricted and repetitive behaviour(s) in which the individual must demonstrate at least two of the following criteria. The first one is the use of repetitive movements, such as lining up objects, or the use of sensory stimuli, such as bouncing or rocking, to regulate internal emotional states, also known as stimming. The second being the insistence on

sameness which is the rigid adherence to routine, distress at small changes, or ritualized patterns. The third being fixed interests where an individual has an intense, abnormal preoccupation with specific or unusual subjects. The final category is sensory issues, meaning over or under-sensitivity to sensory input (*Autism Diagnostic Criteria: DSM-5*, n.d.).

Other requirements include early onset, meaning an individual must have these symptoms in early development, even if they are masked by learned strategies later in life. An individual must also show functional impairment, meaning symptoms must cause a significant impact in areas of life. Finally, there must be no other diagnosis that better explains the symptoms (*Autism Diagnostic Criteria: DSM-5*, n.d.).

Other important things to note include the "grandfather" clause, which outlines that anyone with an older diagnosis of asperger's or Pervasive Developmental Disorder-Not Otherwise Specified (PDD-NOS) is automatically considered to have ASD under the current manual (*Autism Diagnostic Criteria: DSM-5*, n.d.).

Autism itself is also categorized into three levels that help clinicians describe the level of support a child would need in their daily life. The table below outlines these different levels.

Table 1

Levels of Autism

Severity Level	**Level Description**	**Social Communication (Criterion A)**	**Restricted, Repetitive Behaviours (Criterion B)**

Level 3	**"Requiring very substantial support"**	Severe deficits in verbal and nonverbal communication. Very limited initiation of social interactions and minimal response to others.	Inflexibility of behaviour, extreme difficulty coping with change, or other repetitive behaviours markedly interfere with functioning in all spheres. Great distress changing focus.
Level 2	**"Requiring substantial support"**	Marked deficits in verbal and nonverbal communication skills; social impairments apparent even with supports in place; limited initiation of social interactions.	Inflexibility of behaviour, difficulty coping with change, or other repetitive behaviours appear frequently enough to be obvious to the casual observer and interfere with functioning in a variety of contexts.

Level 1	**"Requiring support"**	Without support in place, deficits in social communication cause noticeable impairment. Difficulty initiating social interactions and clear examples of atypical or unsuccessful responses to others.	Inflexibility of behaviour causes significant interference with functioning in one or more contexts. Difficulty switching between activities. Problems of organization and planning hamper independence.

Note. The information from this table was taken from (*Autism Diagnostic Criteria: DSM-5*, n.d.)

Other things to note are these levels are not permanent, a person's need for support may change over time as they learn new coping strategies, or the environment changes around them. The context to where a person is must also be considered, someone may be a level 1 at home, however in high-stress situations they might be a level 2 or 3. Additionally, the idea of "high" or "low" functioning are terms the clinical community is trying to move away from, as they may be misleading as someone could be high functioning due to masking skills or other compensating strategies (*Autism Diagnostic Criteria: DSM-5*, n.d.).

Brain Chemistry

People who are diagnosed with autism have differences in their neurological chemicals signalling molecules. This can be in neurotransmitters or hormones, which can be seen in the table below.

Table 2

Hormones and Neurotransmitters in the Minds of Individuals with Autism

Name of Hormone/Neurotransmitter	What it does	How it differs in people with ASD
Serotonin	An inhibitory and modulatory neurotransmitter that controls things such as mood, social feelings, sleep, appetite, and repetitive behaviours,	Individuals with autism often build up too much in the blood. This build up is why many people with autism experience social challenges, repetitive behaviours, anxiety and sleep problems
Glutamate	An excitatory [a] neurotransmitter that is referred to as the chemical that excites brain cells	People with autism often have too high levels in some brain areas or blood. This is why the brain may get too excited or stimulated in people with autism, causing sensory overloads, anxiety, an overall

		feeling of overwhelm, and in some cases seizures.
Gamma-Aminobutyric Acid (GABA)	An inhibitory neurotransmitter that calms the brain down.	Individuals with autism often do not work well enough. This means that a person with autism may often be either under or overstimulated. This overstimulation is why many people with autism have sensory challenges or anxiety
Dopamine	A monoamine that handles rewards motivation, pleasure, focus, movement, and habits	However in individuals with autism there can be too much or too little in certain brain parts. This means a person with autism may find it harder to feel motivated or rewarded. Symptoms may include things such as difficulties in starting tasks, irritability, repetitive behaviours, and hyperactivity.

		This is why ADHD and autism are common pairings.
Noradrenaline/ Norepinephrine	A monoamine that controls alertness, attention, energy, and the fight-or-flight response,	However in individuals with autism, it may be higher in blood or certain brain areas. This results in the body being more alert, causing hyperactivity, trouble focusing, and stronger stress reactions (Why ADHD is a common pairing to ASD)
Oxytocin	The social bonding hormone, it helps trust, empathy, eye contact, and closeness,	However in individuals with autism there are often lower levels or weaker signals. This can lead to social challenges such as difficulty making friends, reading emotions, showing affection, and social challenges

Vasopressin (AVP)	Helps social behaviour, stress control, and bonding (usually stronger in males),	However in individuals with autism there are usually lower levels. This means troubles with social skills and stress management for example, social anxiety, and problems with social and stressful situations
Melatonin	The sleep hormone, telling our bodies when to rest and keeps the sleep normal,	However in individuals with autism it is often lower at night, or very easily disturbed. This means sleep either doesn't come easy, or doesn't stay good, this can present itself as trouble falling asleep, walking a lot, poor sleep quality which then leads to daytime tiredness and irritability.
Cortisol	The body's main stress hormone that helps the body	However in individuals with autism the levels are unusual, meaning they fluctuate

	respond to stress, keep energy up, and regulate daily rhythm,	between high and low at random times. This can mean feeling stressed for longer periods of time, and easier for example frequent anxiety, emotional meltdowns, and trouble regulating (calming down)
Testosterone	The sex hormone that shapes brain development, behaviour and traits which is naturally higher in males,	However in an individual with autism some people have higher exposure before birth (or later). This can contribute to intense interests, sensory differences, and gives a reason to why autism is more prevalent in boys.

Note. The information for serotonin came from Muller et al., (2016). The information for glutamate came from Rojas, (2014). The information for GABA came from Zhao et al., (2022). The information for dopamine came from Blum et al., (2024). The information from norepinephrine came from Beversdorf (2020). The information for oxytocin came from John & Jaeggi, (2024). The information for AVP came from Hendaus et al., (2019). The information for melatonin came from Rossignol & Frye (2014). The information for cortisol came from Taylor & Corbett, (2014). The information for testosterone came from Dooley et al., (2022)

[a] Excitatory: Strongly activate the brain cells

[b] Inhibitory: Strongly calm down the brain cells

[c] Modulatory: They regulate how strongly other neurotransmitters work

[d] Monoamine: The intensity to which someone feels things

Current Classroom Accommodations

Currently our school classrooms have different strategies that may help students, neurodivergent or neurotypical, focus better in the classroom setting, some of these include vestibular, tactile, and proprioceptive input such as a "wiggle cushion", or yoga ball to sit on or in place of a chair during classroom time, this is helpful because the stimulation adds different opportunities to add or decrease sensor input as needed to help students regulates. For example, a child who needs more sensory input can have a weighted vest, and a child who self-regulates through rhythmic movement can rock back and forth on a wiggle cushion or yoga ball. Another strategy to consider is the use of weighted vests and pressure vests, however both need to be prescribed by a physiotherapist for the appropriate amount of weight, time, and pressure. A "thera band" can be used for stretching exercises or put across the legs of a chair, this is helpful for tactile stimulation. Additionally, many students have things such as fidget toys while listening to the lectures, or working by themselves, this gives the brain stimulation. Finally, activities that can be used during a break rather than in class such as a cross crawl figure 8's in the air, leaning left, right, forward and backward, or carrying something heavy before a difficult activity or when agitated (C. Andrews, CanTRA Coach, EC Coach, personal communication, December 7, 2025). The final accommodations deal with strategies that develop gross motor (large muscle) strength, coordination, and balance. In addition to the strategies mentioned above, a student may try throwing balls and beanbags, and placing rings on cones to improve overall

coordination. In addition to gross motor skill development, there are strategies that develop the fine motor (small muscles) in strength and dexterity. Examples can include flipping cards, coins, or other smaller thin objects to improve the finger's dexterity (C. Andrews, CanTRA Coach, EC Coach, personal communication, December 7, 2025).

The classrooms themselves may also make accommodations for students with autism that do not need to be interacted with directly by the student. This can include a visual schedule on a whiteboard, and a smaller one the student can keep with them, or put on their desk. A visual countdown clock has also been shown to be useful, as well as ASL gestures, or picture signals. These strategies all help students with ASD greatly as people with autism tend to be visual-learners, this means having these visual things such as schedules or countdowns could provide comfort, and make it easier for the student to learn (C. Andrews, CanTRA Coach, EC Coach, personal communication, December 7, 2025).

As previously mentioned, the main challenge for individuals who have autism are around social skills, this can include things such as language and communication skills, interpersonal skills (such as eye contact, turn taking, etc), identifying emotions, self regulation skills, confidence and more. Currently the CDC webpage titled "Treatment and Intervention for Autism Spectrum Disorder" gives a good overview on different approaches to helping individuals with ASD to reduce symptoms that interfere with daily functioning and improve quality of life. It highlights the idea that there is not one single "cure all" approach, rather each case must be individualized, often combining multiple strategies. These treatments aim to address core symptoms such as social/communication challenges, repetitive behaviours. These treatments also may be able to help co-occurring issues such as anxiety, sleep problems, and ADHD-like symptoms.

Behavioural approaches, especially Applied Behaviour Analysis (ABA), have the strongest evidence base for treatment. They encourage positive behaviours, and aim to reduce challenging ones, and track progress through structured or naturalistic methods such as Discrete Trial Training or Pivotal Response Training.

Developmental approaches target specific skills which include speech and language therapy for communication, occupational therapy for daily living and sensory issues, physical therapy for motor skills and the Early Start Denver Model for young children to build language and social abilities through play.

Educational approaches like TEACCH use visual supports and structured routines in classrooms. Social-relational approaches such as DIR/Floor Time, Social Stories or social skill groups focus on improving social interactions, emotional bonds, and understanding social situations. Psychological approaches such as Cognitive Behavioural Therapy help to manage anxiety or depression by changing thought patterns and behaviours.

Medications do not necessarily treat the core ASD symptoms, but they may be prescribed for co-occurring conditions like anxiety, hyperactivity, seizures or sleep problems always under medical supervision due to the potential side effects

Equine Assisted Therapy

Equine Assisted Therapy (EAT) is an experimental treatment incorporating equines and equine-assisted activities into treatment plans for cognitive, behavioural, and sensory functioning. Studies have shown that EAT can also foster positive growth and learning. It is designed to promote the development of different life skills needed to help to regulate emotions better and to improve psychosocial functioning of people in society (Nargath 2020).

Equine Assisted Psychotherapy

In addition to EAT, equine assisted-psychotherapy (EAP) is also an experimental treatment. While similar to EAT, EAP is more focused on the psychological aspects of equine-based programs. EAP is designed so participants are able to learn more about themselves by participating in different activities with horses followed by a reflection with therapists about that specific activity (Ruegg, 2023).

There is also research into EAT used to treat people with post traumatic stress disorder (PTSD), which is similar to ASD in some of the struggles because of common struggles of overstimulation, and the need to self-regulate in various situations. People with PTSD, similarly to those with autism can have difficulties with communication or self-regulation that may be helped through equine assisted services.

For example, in the CanPraxis program, there is a couples therapy exercise where participants are paired up and one partner is blindfolded, while the other partner is not. Both participants hold onto a lead rope connected to a horse. The sighted participant must guide the blindfolded person and the horse through the given obstacle. This exercise was designed to explore the difficulties with having PTSD and communicating effectively.

When someone has experienced PTSD, their ability to communicate gets skewed, as PTSD shifts their view on the world, making their world seem more high-pressure. This leaves their nervous system on edge, meaning little mistakes often blow up and seem larger than they actually are. The horse is used as an emotional mirror in these activities, as they are able to reflect the feelings the participants have, allowing the non verbal communication to be shown between the horse and human, allowing the facilitator to pick up on any cues the horse may give via their body language or behaviour. If a horse is with an anxious handler, the horse will often also show signs of anxiety either through their body language, or interaction with the participant.

For example, Sarah Knight uses an exercise where this process is repeated four times, one time with strangers of the same gender to see what the participants act like around strangers, who the participant has no emotional baggage with, and once with their partner or spouse. This way, the therapist gets to see how the participants interact with strangers, and how they interact with their partner. This practice helps to identify issues such as anxiety, depression, PTSD, relational problems, and communication challenges the couple may face (S. Knight, Equine Therapy Facilitator, personal communication, December 23, 2024).

Research has shown that the outdoor settings or other large arenas are beneficial to the participant. The research has suggested physically moving with and among the horses helps the client to feel grounded, improving things such as their stress tolerance, emotional awareness, and problem solving skills. As Ruegg stated, this is most likely due to the nonverbal cues horses can pick up on. As prey animals, they are sensitive to emotions, and because of this, their body language reflects the patient, providing what some call “honest feedback” (Ruegg, 2023). This ability allows horses to pick up on emotions such as anger, anxiety, or distress. This not only allows the therapist to identify any hidden emotions, but also allows the client themselves to understand and address emotions they themselves may not have recognized. With additional support, overtime these can lead to the benefits mentioned above.

The analogy of a mirror can be used, as the horses reflect the client as they actually are and not the way they seem, or want to be perceived. Researchers have stated this way of approaching therapy is powerful, as the patient must actively make changes during the session to complete the task properly (Ruegg, 2023). An example of this type of exercise would be groundwork, a fundamental part of EAP. This allows individuals to directly interact with the horses without any previous knowledge of equine activities. Groundwork can include things such

as grooming, leading the horse, and observing the horse's interactions. These activities not only help the clients build trust and self confidence, but also provide them with emotional awareness, regulation, and the ability to problem solve (S. Knight, Equine Therapy Facilitator, personal communication, December 23, 2024).

The disadvantages of EAP include factors such as people being uncomfortable with large animals and the costs of horses as they need large amounts of space and they have high maintenance needs. In addition to the financial costs of EAP, people may be concerned about accidents around horses that may result in serious injury or death. Accessibility in terms of travel is also a concern, as most programs require the setting to be more rural which limits public transport. Finally, people with either agorophobia, allergies, or other fears around horses may make this form of therapy unsuitable for a participant.

Equine Assisted Learning

Equine-assisted learning (EAL) is the idea of incorporating equines into the learning space. Specifically trained or certified professionals may offer one of three non-therapy services EAL in education, organizations, and personal development. Whether as individuals or in teams, professionals are able to possess appropriate training, experience, and skill to facilitate EAL activities that will provide an environment that integrates the equine-human interaction. This process is supported by a planned learning experience to meet identified goals for the participants (i.e. to work on teamwork). EAL participants are exposed to activities that can promote the discovery of critical life skills such as healthy decision making and problem solving, creative and critical thinking, self awareness, and empathy, communication and interpersonal skills, and coping with emotions and stress (Professional Association of Therapeutic Horsemanship International, n.d.)..

Therapeutic Riding

Therapeutic riding allows people with physical, cognitive, or emotional special needs to interact with the horse. This process may offer major physical and emotional results without limiting participation due to disability. Riding a horse moves the body in a way that can improve flexibility, balance, and muscle strength. It also builds a unique relationship with the horse which may lead to confidence, patience, and self esteem for emotional challenges. Additionally, similarly to other forms of EAS, Therapeutic Riding allows the participants to experience outdoor recreation and animal interaction (Freedom Hooves Therapeutic Riding Center, n.d.).

While only citing one website, the following information can reflect many sources all with the same view on the program. These programs have found the benefits of therapeutic riding to be categorized into four main categories. The first being physical benefits such as improved balance, strength, and range of motion, improved coordination/motor skills as well as faster reflexes, improved respiration and circulation, and finally sensory integration. The second category is the psychological benefits which include a general sense of well being, improved self-confidence, improved risk management abilities and emotional control and self-discipline. The third category is the social benefits from therapeutic riding, such as friendship and interaction with other participants, animals, and nature, and improved overall social skills either one on one or in a group setting. Finally, the educational benefits of therapeutic horseback riding include things such as reading and following instructions, better listening skills and focus, sequencing, patterning, and motor planning skills, visual and spatial perception and differentiation, and improved hand-eye coordination (Freedom Hooves Therapeutic Riding Center, n.d.).

Language and Communication, and Interpersonal Skills

A general study found one article that looks at whether therapeutic riding may help with speech-language therapy, aiming to improve outcomes for adolescents with communication disorders. One of the results found a study on cerebral palsy (a group of conditions that affect movement and posture (Mayo Clinic, 2023)) that showed an improvement in play skills and nonverbal communication, however only during the sessions. The results would fade after the sessions ended, regressing after withdrawal. The other study found better speech and language skills and higher motivation. Overall, this therapy method was shown to boost motivation, social/nonverbal communication and language skills in some teens, however in both cases the sample size was small, and is not fully recognized as a valid therapy technique (Mitchell-Cannone & Gladfelter, 2020).

Specifically dealing with autism, a study in 2019 performed eight 30-minute sessions of therapeutic riding in comparison to regular therapy, aiming to improve language and thinking/cognitive skills in children ages 6-13 with ASD or an intellectual disorder (ID). The study was split into two groups: one, the therapeutic riding group with 18 kids who got a mix of therapeutic riding, and usual therapy, and the second, a control group with 11 kids with only usual therapy. Before and after the 8-week program, they used standard tests for vocabulary (involving understanding and using words), language scales, and cognitive abilities. The results of this experiment showed that the group with therapeutic riding showed clear improvement in most language areas, being able to understand vocabulary better, and express words, and showed improvement in cognitive skills while the control group improved only a little in understanding words and basic cognition. The differences were not great enough to be statistically significant so we can not be 100% sure, however there is a strong likelihood that the therapeutic riding had an impact. Additionally, the study showed the kids with ASD improved more in language skills,

while kids with IDs showed more improvement in thinking or cognitive areas. The study guesses the reasons for these results include bonding with the horse, practicing non-verbal communication, the physical demands of riding (which help posture and focus), and the rocking motion of riding itself that can stimulate the brain's balance system. However, the weaker points of this study were again small sample sizes, short time period, and no long-term check-ins (Kwong et al., 2019).

Another study was a short study looking at the effect of a 5-week equine assisted activities program which included therapeutic riding programs, and if it could improve social skills in kids ages 5-16. In this study there were 15 children with ASD, and limited speech. The kids would attend 3-hour group sessions that included riding horses, and other stable activities. At the beginning and end of the program the kid's parents would fill out a questionnaire. This questionnaire included three sections. One being the Autism-Spectrum Quotient (ASQ), which are the overall autism traits. The second was the Empathising and Systemising Quotient (EQ/SQ), which is the ability to understand feelings and empathizing, versus the interest in systems and or rules. And finally, the last section was the Vineland Adaptive Behaviour Scale (VABS), which includes the every-day skills and problem behaviours. The main results included lower ASQ scores, fewer problem behaviours such as aggression and withdrawal, and better ability to empathize. Researchers suggested that the work with horses encouraged the non-verbal signals, building trust, reduced stress levels, and created positive social experiences. The weak points of this study also included a small sample group, a lack of control group, and the information came from the parents only, not the children. Overall, this study showed a short horse-based program appeared to help with specific social and emotional areas (such as fewer

difficult behaviours and lower autism traits), but didn't improve communication or broader social skills. Anderson & Meints (2016).

In more recent years, there has been a study with larger sample sizes with statistically significant results. This study took 61 children, aged 6-12 with ASD from different therapy centres and special schools in China. From this, 31 got put into a therapeutic riding group and 30 got put into a control group. The 16-week program included 32 sessions, each lasting an hour. This hour was divided up into warm-ups, riding skills, group games, horsemanship, visual aids, and consistent team building and horse activities with every child. Results were tested by the Social Skills Improvement System (SSIS) by teachers (on communication, cooperation, assertion, responsibility, empathy, engagement, and self control), and were also tested by the Assessment of Basic Language and Learning Skills-Revised (ABLLS-R) by parents (specific communication items such as eye-contact, manners, and turn-talking). The main results of this study included a significant improvement in overall social skills, social interaction, communication, responsibility, and self-control in the group in therapeutic riding. There were also positive results in communication items such as eye-contact, use of gestures, and politeness. This study showed no significant change in turn-taking in conversations, and there was minimal to no improvements in the control group (Zhao et al., 2021).

Identifying Emotions and Self Regulation

Through learning through the Zones of Regulation, the Alert program, and using visual aids, equine assisted services can help participants identify their emotions and learn strategies for self regulation. This can be shown through the principles of HeartMath, and attachment.

Zones of Regulation

One way we can try to help self regulation is by applying social skill strategies. As many social skills rely on self regulation, the ability to control one's emotions and adjust one's behaviours is necessary. One way we can do this is through the idea of "Zones of Regulation". This idea teaches riders to recognize, monitor, and regulate their emotions and behaviours. This is achieved through teaching riders to recognize, monitor and regulate their emotions and behaviours. This is done via four common street signs; blue (slow) is a low state of alertness, and down feelings, green (go) is a state of calm alertness, ready to learn and interact, yellow (caution) is a state of elevated emotion, but with some control, and finally red (stop) is an out of control state where we can no longer intervene. Although this program is not directly related to equine assisted services, some practitioners integrate it into their own programs (C. Andrews, CanTRA Coach, EC Coach, personal communication, December 7, 2025).

The Alert Program

Similarly to the Zones of Regulation, the Alert Program also uses analogies. Also known as the "How Does Your Engine Run", the Alert Program was developed by occupational therapists Mary Sue Williams and Sherry Shellenberger as a self regulation framework that uses a car engine analogy to help children understand and manage their arousal state. If the person's 'engine' is running high, they are overaroused, if it is running low, they are under-aroused, and if the engine is just right they are in the optimal state for tasks. The goal of the program is to teach kids to monitor, maintain, and adjust their alertness through sensory input, specifically emphasizing the arousal levels in a person fluctuate normally which impact attention, learning, and behaviour (Wood, n.d.).

The key concepts of the Alert Program involve connecting the body's alertness to things youth can understand such as characters from a show or a car. Additionally, implementing the

five senses to change the alertness. Taste: drinking shakes, chewing gum, candy, crunch ice, etc. Touch (movement): Fidget, work out, yoga, heavy work, shower, play with animals, rocking in a chair, etc. Sight: look around, adjust the lighting, watch something soothing, reduce overall visual clutter, etc. Hearing: Play music, work in either crowded or quiet environments, sing, listen to audiobooks, etc

Teachers can use play-based activities and interactive situations to build awareness, the goal is to support self-regulation in various settings by sensory approaches to promote better participation and quality of life. This program can also be customized based on things such as age, preferences, and sensory needs keeping the individual in mind.

Visual Reference

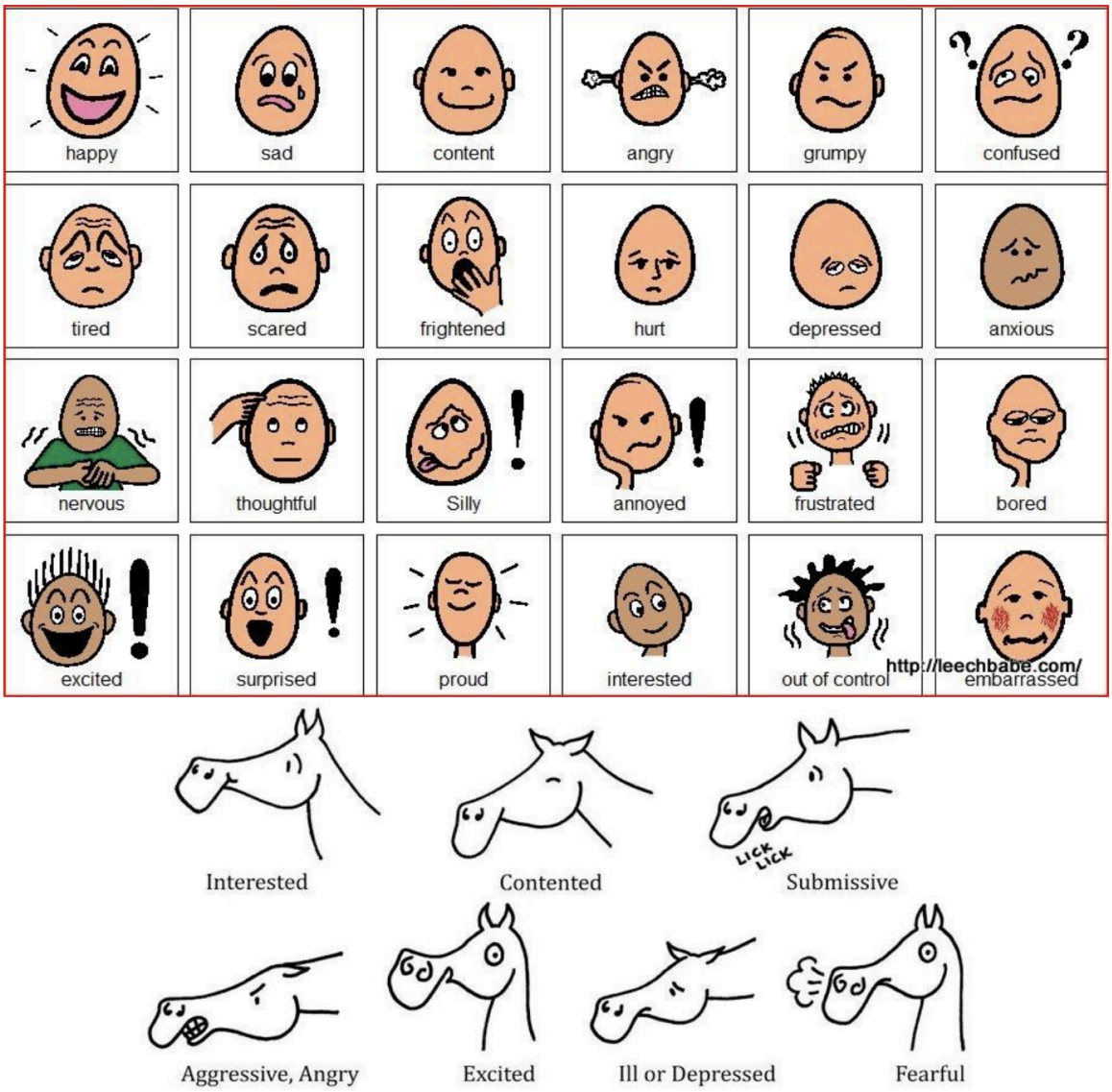
In addition to the Zones of Regulation, we can use things like emotion picture symbols to widen the rider's vocabulary for emotions. This can also be shown with horses to show the connection, and potentially make it easier for the child to pick up on the emotion shown (C. Andrews, CanTRA Coach, EC Coach, personal communication, December 7, 2025). This visual reference can be indicated in Figure 1 below.

Because humans have such complex facial muscles and expressions, people with autism may find it challenging to read the facial expression. C. Andrews pointed out their view on horses and their emotions saying a horse's emotion can fall into five distinct "emotions". They can be content, angry, startled, sad, or happy. This means when they display each emotion, each emotion is the same, and is often presented the same horse-to-horse.from horse-to-horse. For example, when a horse is frightened or startled by something, their ears pin back and they move away from whatever source of danger they find. While this could also be a form of a warning to other horses to move out of the way before they bite or kick, it can also mean they are focusing

on something in that direction in a therapeutic setting we can make the connection, This behaviour can be explained through the horse's herd and prey nature. They naturally live in groups, and enjoy the others' presence whether it be grooming each other, playing, grazing, or relaxing. They use body language, facial expressions, physical touch, vocalization, and smell to communicate with each other (Bransby Horses, n.d.). This skill can be developed in humans as well, by just observing the horses' behaviour seeing how the horse can express how they are feeling in facial expression and body language. This positive contact via either observation or physical contact will improve trust and develop a bond between the horse and person which may be useful for autistic children who struggle with recognizing emotions. Which additionally helps autistic children to develop confidence as they learn to recognize emotions, respond appropriately, and develop this bond or connection with the horse.

Figure 1

A Simplified Comparison of Human and Horse Facial Expressions



Note. Andrews C. (December 2025). Autism spectrum disorder: What is it? [Image]

HeartMath

HeartMath is an evidence based system of techniques and heart rate variability (HRV) technology designed for self-regulation. Focusing on a state of coherence where the heart, mind, and emotions are all in sync with each other. This synchronization helps to build resilience and align the systems in our body. Some of the key concepts around the idea of HeartMath are: The heart as a “brain”, which is viewed as an organ of perception, with 80% of the communication

flowing from the heart up to the brain. The second concept is around the electromagnetic field, which outlines the principle of the heart's electromagnetic field, which can be measurable up to three feet away from the body, which can then influence others. And finally, the techniques used: HeartMath uses breathing techniques to calm the nervous system and induce coherence, which leads to improved clarity, better sleep, and less pain (*What Is HeartMath® and What's It Got to Do With Horses?*, 2021).

This can be verified with another study that looked at the connection between a person's heart rate and the horses, causing the "sync up". The test similarly to the last one had a category with no interaction, just seeing or smelling each other, and finally grooming the horse. They measured the heart rate variability (HRV) and found when a person and horse were closer together, their heart rhythms started to match and "couple" together (Lanata et al., 2017).

How does it connect to horses?

HeartMath is applicable to horses as the concept of coherence and energetic communication are present in both the theory of HeartMath, and equestrian activities. For instance, natural coherence. Horses, for example, spend their lives in a natural state of coherence, meaning they are able to regulate their emotions. They spend most of their days grazing or socializing in the herd (*What Is HeartMath® and What's It Got to Do With Horses?*, 2021). However, if needed, they are able to react to and recover from danger in the environment quickly. After the danger has passed, they go back to grazing and re-enter a state of coherence. Humans on the other hand, are often incoherent as they are easily influenced by their emotions, biases, or subconscious. This distinction between the coherent horse, and the incoherent human is one of the ways equine assisted programs are so useful. Another way horses are important is their large heart field. Since a horse's heart is five times bigger than a human's, it generates a

bigger electromagnetic field which is a topic now in research on whether or not this explains why horses are able to connect so easily with humans and the beings around them (*What Is HeartMath® and What's It Got to Do With Horses?*, 2021). Additionally, in Equine Facilitated Learning, the horse can help the human achieve coherence. The horse's nervous system interacts with and co-regulates the human's system. Practitioners can observe horses calming down clients by breathing in a measured manner, and as the human interacts with the horse, calms down the human's own nervous system. Finally, practitioners teach HeartMath breathing techniques to clients during equine sessions so the client is able to experience first-hand how the horse responds positively or negatively to the client's nervous system (*What Is HeartMath® and What's It Got to Do With Horses?*, 2021).

The ideas of HeartMath and the connection between the human body and horses is a major factor when considering the efficacy of EAS. Since individuals with ADHD, and ASD most commonly have difficulties with self regulation, the connection between HeartMath breathing techniques and the horse's ability to regulate the human heart may be useful tools when teaching children with neurodivergence.

In addition to the HeartMath Principle, horses are suited for honest, authentic reactions as they are large prey animals. They do not care what the intention was, if they sense danger or they do not like something, they are programmed to react to it. They will not interact with a person who is not calm, and are not going to listen to a dysregulated individual. This can be helpful for motivating clients learning to self-regulate

Attachment

This section focuses on the potential positive impact of the relationship between human and horse and the ideas around co-regulation.

One study done in 2022 proposed a program for youth with mild-to-moderate anxiety delivered in a therapeutic riding setting. The program is called Reining in Anxiety (RiA) and it is based on the five components of Cognitive Behavioural Therapy (CBT): in vivo exposure, cognitive restructuring, youth psychoeducation, relaxation, and caregiver psychoeducation about anxiety (Hoagwood et al., 2022). In vivo exposure involves directly facing the feared situation in a controlled manner to reduce avoidance and fear, also known as 'exposure therapy' (American Psychological Association, 2017). Cognitive restructuring teaches youth to identify, challenge, and reframe the negative or anxious thoughts they may have into a more realistic and balanced state of mind (Santos et al., 2024). Youth psychoeducation focuses on de-stigmatizing the nature of anxiety, treating it as a manageable emotion not a threat (Therapist.dk, n.d.). Results found reduced anxiety and better regulation in the youth after the 10-week program (Hoagwood et al., 2022). Results also showed a decrease in cortisol or stress levels, and an increase in oxytocin or relaxation levels through saliva testing (Hoagwood et al., 2022). They also concluded the naturalistic setting of delivering therapy in a stable environment can be less intimidating for youth than a clinical office (Hoagwood et al., 2022).

A later study conducted in March of 2025 wanted to test the physiological effects of short-term human-horse interaction on hormone levels in each species, specifically oxytocin and cortisol. The study was conducted on three men, three women, with limited horse experience, and each was paired with a horse. Then there were three activities that were tested: resting, or the control variable, where the human rests alone with no horse present; standing, where the person stands near the horse, looking at it but not touching; and finally, the last test is rubbing, where the person gently rubs the horse's neck and withers (the highest point on a horse's back). From this, samples were collected at three points per activity, once for a baseline, once immediately after,

and once 15 minutes after. The main conclusions from this were short, low intensity human-horse interaction appears to promote social bonding in the horse itself via increased oxytocin, without causing stress in either humans or horses. However, this study was limited in participants, and only focused on short-term sessions (Jung & Yoon, 2025).

Additionally, certain studies have shown people with autism often find it easier and more natural to relate socially with animals than with people. Sometimes, people with autism are even seen to have a greater affinity with animals (are more skilled with animals) than other people (Atherton et al., 2023)

One study found that many autistic people have a strong attachment to animals, suggesting they may even show a bias to animals over people. The study explored a comparison in animal attachment in the adult autistic community with a quantitative study of 735 people. From this, they found autistic adults were equally as attached to their pets and neurotypical people, however were less likely to own them, despite the correlation to pets and elevated mental health. They concluded the substitution of pets for people also served as a compensatory mechanism for social contact for those with ASD. In a second study they performed, they explored the lives of 16 autistic pet owners. This analysis highlighted both the benefits and barriers to animal companionship. These two studies combined highlighted how pets improve the lives of their autistic owners, however there was no correlation to autistic people being more likely to own pets (Atherton et al., 2023).

Temple Grandin is a good example of this and has done research on it. For example, see her book "Animals in Translation" which highlights these principles (T. McKinnon, CanTRA instructor, equine facilitator, personal communication, December 16, 2025. Of course, not everyone with autism relates well with animals or even enjoys being around them, however this

may be significant in the role of horses in helping individuals with ASD (T. McKinnon, CanTRA instructor, equine facilitator, personal communication, December 16, 2025).

Data

Urban Stable (previously The Horse Connection Inc) was a non-profit organization founded in 2001. The goal was to help youth learn life skills through equine-assisted learning (aka EAL), with the slogan of "unbridling youth potential" and focusing on helping the development of communication, teamwork, kindness, and healthy relationship-building as well as other social-skill development as well as developing personal strengths such as emotional awareness and regulation, confidence, independence, resilience in the face of challenges, and pride in their accomplishments. The program partnered with the local school divisions, social service organizations and charities and non-profits to bring the youth (ages 10-14) to a stable near Winnipeg, Canada, where the youth learned to groom, lead, and ride horses with the other students. The program also featured a leader-in-training program for the youth alumni, where other skills could be developed. The program and its instructors were accredited and certified by the Canadian Therapeutic Riding Association (CanTRA). The program closed down permanently in 2025 due to funding concerns. (T. McKinnon, CanTRA instructor, equine facilitator, personal communication, December 16, 2025).

2016-17 Annual Impact Report

This report showed the student engagement from these years was 98%, with 96% of students having a heightened sense of confidence, and 89% being more comfortable with themselves

Urban Stable focused on teaching the importance of assertive communication, helping to understand balance in life, spending time being mindful and living in the moment, providing a safe place for youth to gain confidence, lightening up difficult tasks, and more.

Personal testimonies

*note, all names have been changed to preserve anonymity and safety for participants.

In Urban Stable's end of year 2019 newsletter it states that Leanna and Hazel both were able to find strength and companionship, allowing them to start to build meaningful relationships in their lives. Britta was able to show compassion and empathy with her horse, Zachary was able to find a kindred spirit to learn and grow with at Urban Stable (Urban Stable, personal communication, December 2019. Last Chance! Make Your Year-End Charitable Donation by Midnight).

A testimonial from an Urban Stable newsletter highlights Brady's experience:

> Brady (name and picture changed to protect his identity) walked into the barn on his first day with Urban Stable and immediately brightened the room with his sunshiny energy. Brady's teachers and principle had told us how positive Brady's outlook and attitude were and we could see right away that was true. Brady takes every opportunity to lend a helping hand when asked and takes initiative to offer help when he can see the need for it. Brady's horse flourishes under the attention and compliments Brady offers each day he spends at the barn and Brady finds comfort and security in the partnership they are building together.
>
> Brady's incredible positivity at the barn is even more incredible when you consider the obstacles he has faced in life. In Brady's short life he has faced more hardship, confusion,

and heartbreak than many of us ever will. Brady started his journey at Urban Stable in the midst of chaos at home. He's moved several times to different foster homes and families and has experienced confusion and frustration not understanding how he fits into all these different homes. His sense of belonging and connection has been a challenge everyday. Brady lost his family and home and he has to grapple with all the difficult emotions and challenges this creates, and yet each morning he chooses to start the day with a positive outlook and works so very hard to keep looking for the good in everything. His connection with his horse is an anchor for him even while he experiences unrest in other areas of his life. Brady shows each of us how looking for the silver linings that are all around you can spread warmth, bringing positivity and happiness to each day.

Another testimony from Noah's Parents help to explain how Urban Stable has impacted others positively

Noah has participated in Urban Stable for four years with the generosity and support of people like you. During his time in our programs Noah has experienced great personal growth and his mom has seen this growth, developed with the horses, also transfer to other areas of Noah's life. She says, "Urban Stable has helped Noah learn patience and better communication. He's able to listen to his own intuition, and working with the horses has helped tremendously with this. I've also noticed that he's calmer and when he does get upset, he's able to regain control much quicker, and work through the problem instead of just getting upset.

Thanks for everything that you do."

Every week Noah comes to the barn and spends time with his horse we can see him working so hard on this personal growth and succeeding! Seeing Noah's effort and desire

to grow while working with his horse, building skills that will continue to help him find personal success throughout his life, is inspiring. You make this possible with your support.

Both of these testimonies and more like it show how effective a therapeutic riding setting can be for youth. The skills children develop from working with horses can help them later in life with basic social skills, stress management, or help them work through certain challenges such as trauma or stress.

Conclusion

Overall, skills from equine assisted services that can be translated into the classroom environment fall under three main categories. The first is communication skills. Equine assisted services help people with expressive language, using words, picture symbols, and gestures/signs to get a horse to “walk on”, “trot”, and “whoa” (stop) coupled with the horse’s immediate feedback and response may transfer to the use of words, picture symbols, and sign language/gestures in the classroom. In addition, the use of repetitive language in the following instructions may help the person follow simple instructions during class, as well as build the foundation of following multi-step instructions that require more thought. For younger students, learning prepositional phrases (On, beside, diagonal, etc) may transfer to the understanding of simple concepts in class. And finally, the visual schedules and drawings can help students understand what to do in a scheduled way.

The way social skills, the second category, are translated include things such as the use of these visual schedules to reduce anxiety, which allows the student to self-regulate. Additionally, many students find looking at a horse in the eye to be easier than looking at a person, so the exposure to things such as equine assisted services may help the student branch out and make

eye contact with other people. This is related to the understanding of emotions one builds when being around a horse, which are necessary to understand behaviours. When the horse raises its head high, it might feel fear or agitation. This can often mirror the human reaction of raising their shoulders and their eyes widening when they feel fear or excitement. This goes back to the zones of regulation and alert programs. Both of these skills and more help the student to be able to self-regulate such as taking a couple deep breaths when feeling agitated, which is especially useful when riding horses, as the horse will mirror the rider's emotional state. Additionally, the activities we use in equine assisted services help participants to learn the ideas of turn-taking through the various activities.

Finally, the use of equine assisted services may help with overall physical skills. This can include core strength and balance which are often weak in neurodivergent people. When doing warm-ups and riding on a horse these skills are able to develop which allow the students to participate more in physical activities in school such as play and gym. Coordination skills are also developed, allowing the participants to gain fine motor skills such as holding a pencil, or sitting up straight. And finally, if a patient chooses to go to a therapeutic riding session, they are able to build motor isolation when using one hand to control the reigns and one leg without the other, and overall strength and endurance such as standing in the stirrups, posting (the process of moving up and down while the horse is trotting/cantering/galloping), and doing up a girth (the strap that holds the saddle around the horse).

In addition to the three categories, children and youth who enjoy being around horses is an added incentive or motivation for them to succeed in the given task. This can include an increase in excitement and motivation in completing tasks. Additionally, being in a barn or stable can provide a change from the regular routine which may be engaging to some students.

Furthermore, being around horses is an experience not many people get to experience so this combined with the other two examples tend to encourage higher attendance and more commitment to participate fully (T. McKinnon, CanTRA instructor, equine facilitator, personal communication, December 16, 2025). Because the youth are excited to be there, there is more drive to be successful (e.g. they want to self regulate so they are able to be around the horses). This desire to be successful with the horse allows youth to challenge themselves in a way they would not typically, which can lead to a greater learning process (T. McKinnon, CanTRA instructor, equine facilitator, personal communication, December 16, 2025). Finally, being around horses, as mentioned in the earlier section about HeartMath can be good for co-regulation which can be useful for youth who are working through difficult experiences or feel vulnerable in a typical therapeutic setting. Even the simple act of brushing out the horse can add a positive, calming element to the therapeutic process.

Overall, one of the best ways to support children in equine assisted services is to communicate with both the parents and teachers. This makes the skills learned more easily reinforced in other areas of the child's life, and may also help build on the student's existing skills and self regulation.

Some sources of error in this research project include the low sample size of many of the studies showcased in this paper which limits their reputability. Secondly, many people who write articles on equine assisted services are in the field which give some of their claims an inherent bias. Finally, all of the sources are taken from North American publications so there may be a bias due to region.

In future studies I would like to expand on the more hands-on approach, maybe watching and/or participating in more EAS programs, specifically for those with neurodivergence.

Additionally, it would be nice to research more animals to compare to to see if the same effect could be reached with other animals to potentially increase accessibility, otherwise finding other more artificial ways to simulate this to further increase accessibility, as it will allow participants with allergies or location restrictions to access these services.

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