

THESIS

A SYSTEMATIC MAPPING REVIEW OF EQUINE-ASSISTED ACTIVITIES
AND THERAPIES FOR CHILDREN WITH AUTISM:
IMPLICATIONS FOR OCCUPATIONAL THERAPY

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ABSTRACT

A SYSTEMATIC MAPPING REVIEW OF EQUINE-ASSISTED ACTIVITIES AND THERAPIES FOR CHILDREN WITH AUTISM: IMPLICATIONS FOR OCCUPATIONAL THERAPY

Equine-assisted activities and therapies (EAAT) are often used to promote the health and wellbeing of children with autism. However, the diverse body of literature investigating the effects of EAAT has yet to be systematically synthesized. This study aimed to determine the current state of knowledge pertaining to the use of EAAT for children on the autism spectrum in relation to their ability to participate in everyday occupations where they carry out their lives at home, school, and in the community. A systematic mapping review identified the empirical methods, treatment strategies, theories, and outcomes present in the literature. Database searching and a rigorous process of inclusion and exclusion identified 25 peer-reviewed papers relevant to EAAT for children with autism. Data were extracted from each paper and analyzed in Microsoft Access and Microsoft Excel. Eighty percent (20 papers) of the literature was research, all of which employed quantitative designs. The most commonly studied treatment strategies were therapeutic riding (10 papers) and hippotherapy (4 papers). A variety of theories for why EAAT may be therapeutic were proposed, including the movement of the horse, horse-human interaction, positive reinforcement, social interactions, and sensory processing. A variety of outcomes were studied, including communication, sensory processing, balance, autism severity, behavior, and quality of life. Strengths and gaps of knowledge are identified, leading to recommendations for future practice and research.

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DEDICATION

I dedicate this thesis to Katharine Compton, to whom I am forever grateful for her unwavering friendship. Her kindness, joy, and enthusiasm for life will always be remembered.

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CHAPTER ONE: BACKGROUND TO THE STUDY

Autism spectrum disorders (ASD) are growing in prevalence and therefore exacting a greater toll on individuals, families and society at large. Autism is a Pervasive Developmental Disorder (PDD) whose symptoms generally appear before age 3. The disorder is characterized by restricted or repetitive behaviors and deficits in communication and social interaction (World Health Organization, 1992). The Center for Disease Control and Prevention (CDC) estimates that one out of every 88 children born in the United States today will be diagnosed with ASD (Center for Disease Control and Prevention, 2012). This report also found that the prevalence rate rose by 78% from 2002 to 2008, and is estimated to continue rising. Therefore, more and more children and their families are affected by this disorder every year. ASD has profound effects on the child's development and quality of life, often interfering with the child's ability to participate in everyday occupations in the areas of play, social participation, and education. Families that include a child with ASD typically experience more stress than families with children with other disabilities (Abbeduto et al., 2004; Blacher & McIntyre, 2006; Ross & Cuskelly, 2006). From an even broader perspective, the lifetime societal cost of ASD is estimated to be \$3.2 million per person due to factors such as lost productivity, adult and child care, special education, medical, and therapeutic expenses (Ganz, 2007). Overall, autism has profound effects for the child, the family, and society as a whole.

While there is no cure for ASD, there is evidence that early intervention can decrease symptoms and enable the child to thrive throughout the lifespan (e.g. Dawson & Osterling, 1997; Karanth & Chandhok, 2013; Klintwall, Eldevik, & Eikeseth, 2013). One emerging therapeutic technique to help children on the autism spectrum involves the use of equine-assisted activities

and therapy (EAAT) as an intervention. However, to the best of my knowledge there have not been any studies that examine the current state of the literature to assess what EAAT are effective for children with autism, specifically in relation to participation in daily life. Therefore, the purpose of this study is to determine the current state of knowledge pertaining to the use of EAAT for children on the autism spectrum in relation to their ability to participate in everyday occupations where they carry out their lives at home, school, and in the community. This study has the potential to illustrate the current understanding of the use of the horse as a therapeutic tool with this population across multiple disciplines, and lead to implications for the practice of occupational therapy and future research in the field.

In this introductory chapter of my thesis, I first explore an occupational perspective of autism and how the symptoms interfere with a child's ability to participate in daily life. I next explain EAAT, examine its occupational nature and explore its theorized mechanisms of action especially in relationship to autism. I additionally critically evaluate current literature on EAAT to determine if it is fulfilling its potential to harness the power of occupation. I conclude by addressing the need and significance of the proposed study and justify the choice of a systematic mapping review given the current state of literature addressing EAAT.

An Occupational Perspective of Autism and Daily Life

Occupation and an Occupational Perspective

Occupation refers to the activities in which people engage throughout their lives—such as brushing their teeth, cooking, or socializing with friends—that are personally meaningful and purposeful (Dickie, 2014). According to Hocking (2009), occupation contributes to health and well-being through three basic mechanisms: it fulfils biological needs, develops capacities, and contributes to a sense of purpose and satisfaction. In occupational therapy, this transformative

power of occupation is harnessed and used to promote the health of individuals with a broad spectrum of health conditions and occupational needs.

Occupation's power to develop the individual lies in its holistic nature. Dewey (1934) describes occupation as an experience, during which the individual components—be they intellectual, physical, emotional, purposive, or volitional—are not divisible but rather work together simultaneously to affect the person having the experience. He writes, “An experience has a unity... the experience was not a sum of these different characters; they were lost in it as distinctive traits” (Dewey, 1934). Occupation is powerful because it simultaneously engages a person emotionally, intellectually and physically—all of these aspects are indivisibly intertwined in one experience. Hooper and Wood (2014) describe this well when they write, “in pursuing occupation, humans express the totality of their being, a mind-body-spirit union” (p. 38). Deweyan philosophy asserts that humans learn best when the whole person—this same *mind-body-spirit union*—is engaged throughout the learning process (Dewey, 1916; Hooper & Wood, 2014). He claims that this type of learning can be achieved by engaging in experiences that are meaningful to an individual, rather than just rote exercise or practice. Dewey writes, “the more human the purpose, or the more it approximates the ends which appeal in daily experience, the more real the knowledge” (Dewey, 2012, p. 198).

Understanding occupation lends itself to seeing the world through an occupational lens, thus creating an occupational perspective. First and foremost, central to an occupational perspective is the understanding that humans are occupational by nature. Plato once wrote, “in every man and woman there is born the instinct to make and to do” (Plato as cited in Friedland, 1998, p. 374). Humans have a natural *instinct* to engage in occupation: it is central to who they are. Another core assumption of an occupational perspective is that humans are inseparable from

their environment, which shapes and forms their occupational engagement. The environment can serve “to elicit—or press toward—the expression of some behaviors and suppression of others”(Wood, Womack, & Hooper, 2009, p. 338). Therefore, it is essential to consider the context in which humans engage in occupation. Another consideration for an occupational perspective is that occupation has the power to transform individuals (Hooper & Wood, 2014). Hooper and Wood (2014) write, “what people do each day can lead to... satisfaction, competence, and good health” (p.39). Therefore, the transformative power of occupation has the potential to be therapeutically harnessed in order to promote the health and well-being of people with various health conditions. These core tenets of occupation form an occupational perspective when, “knowledge of occupation organizes and integrates all other knowledge” (Hooper & Wood, 2014, p. 40). When the holistic, transformative nature of occupation is kept in the forefront of one’s mind, all other knowledge is viewed differently and takes on new meaning. This occupational perspective informs the conceptual framework for the study. Therefore, in the following sections I will apply an occupational perspective to both autism and EAAT in order to gain a unique understanding of these concepts.

An Occupational Perspective of the Hallmarks of Autism

The International Classification of Diseases, Tenth Revision (ICD-10) (World Health Organization, 1992) defines autism by three hallmark characteristics: deficits in communication, deficits in social interaction, and restricted or repetitive behavior. These defining characteristics are separated to facilitate ease of academic and clinical discussion and evaluation. However, an occupational perspective on autism suggests that its hallmark characteristics—as they are expressed in everyday occupations—are simultaneously present and experienced. For example, a young girl’s deficits in communication and social interaction are manifested within, and may

directly affect the expression of, how she interacts with peers in the context of, say, play or meals. Similarly, a young boy's difficulty with communication and social interaction may lead him to occupy a great deal of time with restricted or repetitive behaviors such as hand flapping, as opposed to more developmentally beneficial occupations, as an outlet for his frustration. From an occupational perspective, therefore, the hallmarks of autism are not separate entities, as they interact simultaneously to affect the ways in which children do and do not participate in everyday occupations that are conducive to positive development and well-being. In the following section I will explore how the symptoms of autism affect occupational participation.

Autism and areas of occupation. Autism is a spectrum disorder, which means that children diagnosed with ASD vary widely in their symptoms, abilities, and level of functioning. Across all levels of functioning, children with ASD struggle with participation in everyday occupations at home, school, and in the community. The Occupational Therapy Practice Framework (OTPF) categorizes occupation into eight areas—activities of daily living, instrumental activities of daily living, rest and sleep, work, play, leisure, social participation, and education (Roley et al., 2008). In order to further explore how autism affects a child's ability to engage in occupation, I will analyze how ASD affects participation in three of these occupational areas: social participation, play, and education.

Social participation. Limitations in social participation, or the inability to interact with others in a socially-expected manner, affect children with ASD. To understand these limitations, it may help to understand the theory of mindblindness. Baron-Cohen (1997) theorized that people with autism experience mindblindness, which he describes as, “blind to things like thoughts, beliefs, knowledge, desires, and intentions, which for most of us self-evidently underlie behavior” (p.1). Many studies have supported this theory of mindblindness, including one that

demonstrated adults with autism cannot infer the mental state or emotion of a person in a photograph as well as typical adults (Baron-Cohen, Jolliffe, Mortimore, & Robertson, 1997).

Mindblindness has implications for the social skills of children with autism.

It is theorized that mindblindness inhibits a child with autism's ability to experience empathy. For example, children with ASD demonstrate impairments in social orientation and attentional distress—the instincts to spontaneously pay attention to social stimuli and display sensitivity to another's emotional cues (Dawson et al., 2004). Additionally, young children with autism do not engage in joint attention—defined as the sharing of attention with others through showing, pointing, and coordinated looks between objects and people—as often as typically-developing children (Charman et al., 1997). All of these deficits in social interaction skills have implications for the child's social participation. Preschool-aged children with an ASD have been found to be less likely to socially interact with their peers than typically-developing children (McGee, Feldman, & Morrier, 1997). In a study about teenagers with autism, the authors found that adolescents with ASD were significantly more likely than their peers with other disabilities to be socially isolated, never to see or get called by friends, and never to be invited to activities (Orsmond, Shattuck, Cooper, Sterzing, & Anderson, 2013).

Play. Play is another area of occupation that is affected by autism. Play is the means by which children engage with their environment and learn to master their world. Play is an important occupation of childhood because it develops children's emotional, cognitive, and physical capacities (Ginsburg, 2007). Children with autism do not participate in functional play—defined as appropriate use of an object, such as pushing a car along the ground—as often as typically-developing children (Charman et al., 1997). Similarly, children with autism do not initiate pretend play, defined as the acting out of stories which involve multiple perspectives and

the playful manipulation of ideas and emotions, as often as typically-developing children (Charman et al., 1997; Jarrold, Boucher, & Smith, 1996). Finally, children with ASD have difficulty engaging in social play—defined as play that involves social interaction with at least one other child (Bass & Mulick, 2007). These deficits in play behavior have implications for the child’s development and participation.

Education. Another category of occupation that is affected by autism is education, which includes a broad array of school activities that occur in the classroom, hallways, cafeteria, and playground. Thirty-eight percent of children with ASD also have an intellectual disability, which affects their ability to learn (Centers for Disease Control and Prevention, 2012). Outside of IQ, many other characteristics of autism affect a child’s ability to participate in educational activities. Children with autism often have receptive and expressive language deficits (Kover, McDuffie, Hagerman, & Abbeduto, 2013; Maljaars, Noens, Scholte, & van Berckelaer-Onnes, 2012), which can affect their ability to understand and ask questions of the teacher. In addition, restricted behavior and the need for a routine can make the constant change of classroom activities very difficult for a child with ASD. Children with ASD often have motor impairments including a lack of coordination (Abu-Dahab, Skidmore, Holm, Rogers, & Minshew, 2012; Ming, Brimacombe, & Wagner, 2007). These motor impairments may make it difficult for children to participate in typical playground activities, such as tag or organized sports. Furthermore, children with autism have difficulty modulating sensory information (Iarocci & McDonald, 2006). Common sensory inputs such as the feeling of a clothing tag, children’s loud laughter, or bright classroom lights can be overwhelming and therefore distract from the task of learning. Children with autism often engage in disruptive behavior as an escape from aversive sensory stimuli or from demands that interfere with repetitive behavior (such as being forced to

participate in a classroom activity) (Reese, Richman, Belmont, & Morse, 2005). The demands of the classroom are often too much for a child with an ASD to cope with, which can lead to disruptive behavior such as a temper tantrum that only further inhibits the child from learning. All of these difficulties combine to make participation in school activities difficult for children with autism: only 56% of students with ASD finish high school (Wagner, Newman, Cameto, Levine, & Garza, 2006).

An Occupational Perspective of EAAT

By conducting this research, I wish to learn more about the ways in which EAAT—precisely because these interventions are occupational in nature—may improve the daily lives of children with autism in the areas of social participation, play and education. I am additionally interested in learning more about whether equine-assisted interventions, because they harness the holistic power of occupation, simultaneously address the main hallmarks of autism detailed above.

EAAT as Occupations

The Professional Association of Therapeutic Horsemanship, International (PATH, Intl.) (2014) defines *equine-assisted activities* as any activity at an equine center during which the center’s “clients, participants, volunteers, instructors and equines are involved” (para. 1). Additionally, PATH, Intl. defines *equine-assisted therapy* as a “treatment that incorporates equine activities and/or the equine environment. Rehabilitative goals are related to the patient’s needs and the medical professional’s standards of practice” (para. 2). Thus, EAAT is a broad term that incorporates almost any use of the horse to help people. Regardless of how the horse is being used, however, equine-assisted interventions are activity-based, hence, they are occupational by nature. Whether clients are riding, grooming the horse, or mucking stalls, and

whether they are participating in equine-assisted activities or therapies, they are experiencing purposeful activities that may hold personal meaning for them. These activities occur within natural equine contexts, inside or outside. Both the activities themselves and the contexts in which they occur are more *real* than the contrived therapeutic activities that often occur within a therapy gym. Therefore, the nature of EAAT is in line with Dewey's assertion that, "the more human the purpose, or the more it approximates ... daily experience, the more real the knowledge" or consequences emerging from an experience (Dewey, 2012, p. 198).

In relation to children with autism, the two specific approaches that are most commonly used are hippotherapy and therapeutic riding. Once again, both of these interventions are fundamentally occupational in nature as next developed.

Hippotherapy as occupation. *Hippotherapy* (HPOT) is a treatment strategy performed by an occupational therapist, physical therapist, or speech-language pathologist that utilizes the 3-dimensional movement of a horse to achieve functional outcomes related to postural control, motor planning, coordination and timing, respiratory control, grading of responses, attentional skills and sensory integration skills (American Hippotherapy Association, 2010). In HPOT, the therapist rather than the participant controls the horse, and the theorized mechanism of action that leads to change is exclusively equine movement in combination with the therapeutic practice. Therefore, the child is mounted on the horse throughout the entire HPOT session. The therapist uses different mounted activities that are occupational by nature—such as playing a game, or walking a sensory trail—in order develop the child's capacities and achieve therapeutic goals.

Therapeutic riding as occupation. *Therapeutic riding* (TR) is defined as "an equine-assisted activity for the purpose of contributing positively to the cognitive, physical, emotional

and social well-being of individuals with special needs” (American Hippotherapy Association, 2010, para. 10). TR differs from HPOT in that the instructor is not necessarily a therapist, the participant may control the movements of the horse (Whalen & Case-Smith, 2012), and non-riding activities may be incorporated (All, Loving, & Crane, 1999). Therefore, TR uses a broader range of horse-related occupations such as grooming, mucking stalls, and ground work in order to promote change in the participant. TR also has greater potential to harness the social aspect of horse-related activities, as a therapeutic bond is encouraged between the participant and horse (Bass, Duchowny, & Llabre, 2009). The natural context where these therapeutic activities occur once again increases the meaning and purpose behind the intervention. In reference to the term ‘therapeutic riding,’ the American Hippotherapy Association (American Hippotherapy Association, 2010) states, “though still commonly used, this ‘umbrella’ term has caused confusion among the medical community” (para. 8). TR is a broad category of EAAT and specific techniques used within TR are often unclear, leaving practitioners with little evidence as to what specific intervention techniques are effective. Nevertheless, there is evidence to suggest TR can benefit children with autism.

Theorized Mechanisms of Action in EAAT

What makes EAAT work? In other words, what are the mechanisms of action, or causal factors, which serve to bring about desired outcomes when an individual is involved in equine-assisted interventions? One way of addressing this question is to examine aspects of EAAT—such as their inherent sensory, social, physical, and recreational dimensions—that may have the power to affect change in children with autism. Recognizing that EAAT is inescapably occupational in nature, it is understood that these dimensions are intertwined and mutually

influencing, hence, can never truly be separated. For the sake of clarity, however, I will individually discuss how each one might bring about positive changes in children with autism.

The sensory nature of EAAT. Sensory experiences are ever present in equine-assisted activities and therapies. The way in which sensory experiences affect the rider depends on the specific type of EAAT being implemented. For example, HPOT utilizes the three-dimensional movement of the horse as a therapeutic tool, and the American Hippotherapy Association (2010) claims that, “equine movement offers well-modulated sensory input to vestibular, proprioceptive, tactile and visual channels” (para. 1). On the other hand, TR incorporates sensory stimulation in ways broader than just the movement of the horse. For example, certain equine-related activities such as grooming the horse and carrying hay allow for tactile stimulation. All forms of EAAT can also incorporate sensory activities while the child is riding such as holding textured objects, listening to audiotapes, smelling different scents, or riding along different types of surfaces.

The inherent sensory nature of these interventions may be especially germane to children with ASD who are theorized to process sensory information differently than typically-developing children (Iarocci & McDonald, 2006). Dysfunction in sensory integration is defined as the “inability to modulate, discriminate, coordinate, or organize sensation adaptively” (Miller & Lane, 2000, p. 2). Children with autism often struggle with sensory integration dysfunction; incidence rates reported in the literature vary from 42% to 83% (Tomchek & Dunn, 2007). Sensory integration dysfunction has been theorized to contribute to the cause of self-stimulatory behaviors, temper tantrums, and other problem behaviors common in children with ASD (Kranowitz, 2005; Smith, Press, Koenig, & Kinnealey, 2005). The sensory aspects of EAAT can therefore be therapeutic, and may contribute to the understanding of how EAAT can benefit children with ASD.

The social nature of EAAT: Interacting with other people. Because EAAT is also inherently social in nature, it may help to develop the child's social capacities. During EAAT, the child interacts with the provider, volunteers, and other children also present for EAAT. The barn environment meant for children with disabilities promotes a natural, inclusive atmosphere, free from the social pressures often present in other environments such as school or the community. In addition, depending on the type of EAAT, the intervention itself can include social activities. For instance, in Bass et al. (2009) study about TR for children with autism, the intervention included games while mounted on the horse that encouraged social communication between participants. It is important to note that these social interactions are occurring within a natural context, rather than the simulated context of a therapy gym. Thus, the gains in social skills have greater potential to be transferred to real-life situations where the child carries out life at home, school, and in the community.

The social nature of EAAT: Interacting with the horse. In addition to providing a natural environment that promotes social participation between the child and other people, EAAT also inherently requires interaction with the horse. For instance, grooming activities provide the opportunity for the child to care for another living being. Directing the horse provides the opportunity for the child to use communication skills with the horse in order to achieve the intended outcome. Riding the horse requires the child to trust and rely on the horse throughout the therapy session. As developed below, interacting with the horse during therapy may be beneficial for the child because it promotes participation within therapy, promotes social and emotional health, and the development of communication and social skills.

In line with previous research in the field of animal-assisted therapy, the use of the horse has the potential to increase the child's participation in therapy. For example, Redefers and

Goodman (1989) demonstrated that a dog's presence in a therapy session can decrease isolation and increase social interaction in children with an ASD. Similarly, Martin and Farnum (2002) illustrated that when a dog was present during a therapy session for a child with autism, children were more playful, focused, and aware of their social environment than when therapy only included a toy or stuffed dog. The presence of an animal during therapy creates an environment that motivates the child to participate in adaptive social behaviors in which children with autism typically do not engage. Furthermore, Macauley and Gutierrez (2004) demonstrated that children are more motivated to attend HPOT than traditional therapy. Utilizing the horse as a motivating therapeutic tool may encourage the child to be a more active participant during the therapy session, therefore maximizing benefits.

In addition, the use of the horse within therapy promotes a human-animal bond that can be therapeutic. Temple Grandin, a successful animal scientist who has autism herself, claims that this human-animal bond has particular potential for children with autism because of the unique way in which they relate to animals (Grandin, Fine, & Bowers, 2010). Understanding *mindblindness* that is associated with autism—the inability to understand the social meaning underlying behavior—may be key in understanding why children with ASD relate better to animals; animal behavior is easy to interpret and not ripe with underlying social meaning. Additionally, animals only use one form of communication: nonverbal. Interacting with animals may be easier for children with autism than interacting with people because nonverbal and verbal communication does not have to be decoded simultaneously (Prothmann, Ettrich, & Prothmann, 2009). Finally, Grandin proposes that people with autism relate well to animals because of the way they think: she claims that, similarly to animals, people with autism are sensory-based thinkers who experience the world more through pictures than through words. She writes,

“Autistic people and animals are *seeing* a whole register of the visual world normal people can’t, or don’t” (Grandin & Johnson, 2009, p. 24). Because of the unique way in which children with autism relate to animals, there is great potential for the child with autism to form a therapeutic bond with the horse.

This bond with the horse can promote the well-being of the child. It is well-documented that the human-animal bond can have positive effects on human health (e.g. Barker & Wolen, 2008; Cole, Gawlinski, Steers, & Kotlerman, 2007). For example, the presence of a friendly dog has been demonstrated to decrease blood pressure in people experiencing stress (Friedmann, Katcher, Lynch, & Thomas, 1980). It is theorized that these health benefits are due to the social support experienced as a result of the human animal bond (Fine, 2010). Lynch (1977) suggested, “that the health of the human heart depends not only on such factors as genetics, diet, and exercise, but also to a large extent on the social and emotional health of the individual” (p.13). Animals can be a source of social and emotional health, therefore contributing to the overall health of an individual.

Additionally, this relationship with the horse can aid in developing the social and communication capacities of the child. Directing the horse requires the child to use specific nonverbal communication such as pulling the reins, and the horse’s reaction will inform the client about the quality of communication skills. Karol (2007) stated it well when she wrote, “the process of learning to ride can further the client’s knowledge about how he or she communicates nonverbally and he or she will get immediate and clear feedback about the effectiveness of that communication from the horse” (p. 84). In regards to social capacities, children with autism often have limited range of interests as well as a decreased sense of self-efficacy; since the horse is a motivating therapeutic tool it has the potential to develop volitional capacities in children

with autism (Macauley & Gutierrez, 2004; Taylor et al., 2009). Children with autism also typically have difficulty with understanding the thoughts and emotions of others. Forming an emotional bond with the horse—a bond that as previously discussed may be easier to form than an emotional connection with other people—could help develop the child’s empathic skills.

The physical nature of EAAT. Equine-assisted interventions inherently require participants to move and exercise. EAAT sessions generally range from 30 minutes to 2 hours. During this time, the rider must use abdominal, back, and shoulder strength to maintain balance and posture. Depending on the ability level of the rider, he may also use thigh, calf, arm and hand strength to maintain posture and to direct the horse with physical cues. Oxygen consumption and heart rate increase while horseback riding as well (Devienne & Guezenec, 2000).

There is substantial evidence suggesting that physical exercise is an effective intervention for children with ASD. Multiple studies have found that aerobic exercise decreases self-stimulatory behavior and increases positive behaviors such as task completion and academic responding in children and adolescents with autism (Kern, Koegel, Dyer, Blew, & Fenton, 1982; Rosenthal-Malek & Mitchell, 1997). Additionally, Hillier, Murphy, and Ferrara (2011) demonstrated that an exercise program combined with relaxation techniques decreased cortisol and corresponding anxiety levels in children with autism: this is important because children with autism often experience high levels of stress and anxiety (Goodwin, Groden, Velicer, & Diller, 2007; White, Oswald, Ollendick, & Scahill, 2009). Furthermore, Baranek (2002) found that children with autism perform better on goal-directed motor tasks when the context is meaningful and purposeful. Given that exercise has many benefits for children with autism—especially when

performed within a natural context—the physical demands of EAAT that occur within a meaningful and purposeful environment may contribute to its effectiveness.

The recreational nature of EAAT. The recreational nature of EAAT may also contribute to its ability to help children with autism. Horseback riding is a form of recreation, and therefore EAAT can harness some of the powers of recreation therapy. Having a meaningful, purposeful, and fun activity to engage in on a consistent basis can have positive benefits for a child with autism. Learning how to control a large animal can help foster a sense of self-efficacy. In addition, research has demonstrated that engagement with a horse can be highly motivational; EAAT has the potential to develop the child's volition (Taylor et al., 2009). EAAT also incorporates many activities that can be considered play, and therefore has the potential to develop the participants' play behaviors. Children with autism are often unable to engage in typical team sports, so horseback riding offers a recreational outlet that can be graded to fit the child's abilities.

Recreational therapy has great potential to benefit children with ASD. Children with ASD often have a limited range of interests and demonstrate deficits in play behavior (American Psychiatric Association, 2013; Charman et al., 1997). These characteristics along with the hallmarks of autism—restricted and repetitive behavior and deficits in communication and social interaction—make participation in common recreational activities difficult. Parents of children with autism have identified recreation as important for their child's physical and social well-being. However, they have also identified that there is limited access to appropriate recreational engagement for their child (Schleien, Miller, Walton, & Pruett, 2013). Engagement in therapeutic recreation has been an effective intervention for children with autism. Goh and colleagues (2011) demonstrated that a social recreation program has the ability to decrease

anxiety in children with autism. Additionally, a leisure program for children with autism decreased the children's levels of stress and increased their quality of life (García-Villamizar & Dattilo, 2010). The recreational nature of EAAT contributes to a deeper understanding of why it is beneficial for children with autism.

An example of therapeutic riding as a holistic occupation. I will use the therapeutic horseback riding session described in Bass et al. (2009) as an example of how each of these dimensions of EAAT work together in a single occupational intervention. In this particular application of TR, after mounting the horse the participants engaged in 10 minutes of warm-up exercise to prepare their bodies for the session; thus TR can directly incorporate exercise into therapy. Next, the participants were taught riding skills, “specifically designed to stimulate sensory seeking, as well as gross and fine motor domains” (p. 1264); sensory-based approaches are part of TR as well. The next portion of the session involved mounted games in which the participants engaged in games focused on social and communication skills: social interaction with peers can be encouraged within TR. Finally, the participants dismounted the horse and engaged in grooming activities, which promotes the therapeutic bond with an animal that may be beneficial for children with autism. As a whole, the children spent an hour engaging in a recreational activity with their peers, providing a sense of meaning, purpose, and fun while also developing underlying capacities. All of these dimensions combined into one therapy have the potential to greatly benefit children with ASD.

Current Research on EAAT and Autism

A preliminary search of the literature reveals that there is evidence that supports the use of EAAT as a therapeutic intervention for children with autism. To the best of my knowledge,

the specific therapeutic approaches used to help children with autism that are present in the literature are hippotherapy (HPOT) and therapeutic riding (TR).

Hippotherapy. Several studies have provided preliminary evidence that HPOT provides benefits for children with autism (Ajzenman, Standeven, & Shurtleff, 2013; Tabares et al., 2012; Taylor et al., 2009). Using a single-subject design, Taylor et al. (2009) demonstrated that 16 weeks of HPOT increased the volition during play of 3 children with autism. Similarly, Tabares et al. (2012) used a single group pretest-posttest design to demonstrate that four HPOT sessions altered the hormone levels (cortisol and progesterone) of boys with ASD in a manner that suggests an improvement in social attitudes. Finally, using a single group pretest-posttest design Ajzenman et al. (2013) demonstrated that 12 weeks of HPOT increased postural stability, receptive communication, coping, self-care, low-demand leisure participation, and social interaction in children with autism. These studies provide promising evidence that HPOT has the potential to help children with autism. However, the sample sizes are all fairly small and the research designs provide a lower level of evidence than, say, a randomized control trial. To the best of my knowledge there is no consensus within the academic community about specific intervention methods to be implemented, or outcomes to be expected when HPOT is used as an intervention for ASD.

Therapeutic Riding. There is also preliminary evidence that supports the use of TR as an intervention for children with autism. Using a within-subjects design, Kern et al. (2011) demonstrated that 6 months of TR led to a decrease in the severity of core autism symptoms (as measured by the Childhood Autism Rating Scale), an increase in quality of life, and an improvement in mood for 22 children with autism. Furthermore, Gabriels et al. (2012) illustrated that 10 weeks of TR led to an improvement in self-regulation behaviors (defined as irritability,

lethargy, stereotypic behavior, and hyperactivity) in children with an ASD when compared to a control group that did not receive therapy. Ward, Whalon, Rusnak, Wendell, and Paschall (2013) demonstrated that the positive effects of TR expanded to the school setting in their study where teachers rated their students with autism higher in social communication, attention, tolerance and reaction to sensory stimuli, and social interaction after the children participated in 6 weeks of TR. Possibly the strongest evidence in support of TR, a randomized controlled trial demonstrated that children with autism who participated in TR exhibited greater sensory seeking behaviors, sensory sensitivity, social motivation, and less inattention, distractibility, and sedentary behaviors (Bass et al., 2009). However, it is important to note that not all outcomes have been positive; Jenkins and Reed (2013) directly observed and rated children's behavior at home and in the community while the children were enrolled in a TR program and the only improvement (out of 8 possible behaviors associated with autism) was in the children's posture. Nevertheless, it is clear that therapeutic riding is an intervention that has great potential for children with autism.

Critical Examination of EAAT from an Occupational Perspective

The current research examining EAAT for children with ASD is not fully harnessing its potential because it is lacking an occupational perspective. In order to critique EAAT from an occupational perspective, I will utilize a taxonomy proposed by Fisher (2014) to evaluate occupational therapy practice. She defines treatment as *occupation-based* when it uses occupation as a means of evaluation and intervention. Therefore, occupation-based refers to the methods employed by the practitioner. Conversely, she defines treatment as *occupation-focused* when the "immediate focus is on evaluating and/or changing a person's quality of occupational performance" (Fisher, 2014, p. 166). Therefore, treatment is occupation-focused if the immediate *goal* of treatment is enhanced occupational performance. Using this taxonomy, I argue that

literature about EAAT for children with autism is moderately occupation-based but not occupation-focused.

Occupation-Based. EAAT for children with autism is occupation-based because it employs the occupation of horseback riding as the method of intervention. However, there is room for the literature to be more occupation-based due to the way in which authors conceptualize the agent of change. Fisher (2013) writes, “occupation-based interventions are those where the occupational therapist uses engagement in occupation as the therapeutic agent of change” (p. 164). Many authors still conceptualize the agent of change within therapy as a smaller component of the overall occupation, rather than the entire occupation itself. For instance, Kern et al. (2011) wrote that children with ASD, “may have an innate connection to animals” (p. 14). Furthermore, Ward et al. (2013) claims that, “TR provides a multisensory experience” (p. 2190). While these components of the intervention undoubtedly contribute to its overall benefit, the inherent occupational nature of EAAT with many dynamically interacting components and causal factors appears to be missed. Few authors accordingly address how discrete components of EAAT combine to form a single purposeful activity that engages the child’s motivation. Ajzenman et al. (2013) began to capture this perspective when they wrote:

Performance of goal-oriented motor and imitation activities in children with ASD is typically more meaningful in purposeful situations... HPOT has been suggested to have similar effects, where increased motivation during therapy activities influenced by the horse’s movement can affect the generalization of newly acquired motor skills to other daily activities. (p. 654)

These remarks make it clear that Ajzenman et al. (2013) recognize that the power of EAAT comes from the fact that it engages the child in meaningful, naturalistic activities rather than working on motor control through the use of decontextualized exercise. Therefore, this author embodies the idea of occupation-based therapy. However, this conceptualization of EAAT within current research literature is rare.

Perhaps, a transactional perspective could help authors and practitioners conceptualize *occupation* as the agent of change in EAAT, therefore making the therapy more occupation-based. The transactional perspective is based on the work of John Dewey, a 20th century pragmatic philosopher. Dewey asserted that people do not just act on the environment or the environment on people, but rather the two are mutually influencing. Abu-Dahab et al. (2012) wrote, “the so-called response [of a person] is not merely *to* the stimulus [in the environment], it is *into* it... the ‘stimulus’ emerges out of this co-ordination” (p.358). In other words, people are not acting upon their environments, but rather *transacting with* their environments. Furthermore, Dewey asserts that this transaction with the environment occurs within an experience, and these experiences lead to growth. In reference to Dewey’s work, Duffield et al. (2013) wrote, “growth results from the process of freely and equally embodying habits, skills, and knowledge based on transactional experiences in the world” (p. 18). If this perspective were applied to EAAT, it would become more apparent that the transactional *experience* of riding a horse—the sensory, physical, social, and recreational aspects of EAAT all combined into one meaningful and purposeful occupation—is the agent of change that leads to growth in children with autism.

Occupation-Focused. Not only could EAAT literature be more occupation-based, it could also be more occupation-focused. The intended goal or *focus* of treatment is evident within research studies by examining the outcome measures. Many outcome measures in EAAT literature focus on components of the child’s overall health and well-being, rather than occupational performance. For instance, Tabares et al. (2012) measured the cortisol and progesterone levels of children after EAT with the premise that these hormone levels affect the child’s social attitudes. Furthermore, Bass et al. (2009) chose to use the Social Responsiveness Scale (Constantino & Gruber, 2002) and the Sensory Profile (Dunn, 1999) as outcome measures.

While hormone levels, social functioning, and sensory integration are important components of a child's overall functioning, there is an apparent gap in the use of outcome measures focused on the combination of these components into concepts valued within the field of occupational therapy such as participation and occupational performance in everyday life. While underlying abilities such as sensory integration are important to capture, occupational therapists are concerned with how these abilities translate into everyday engagement; an outcome that to the best of my knowledge is not currently captured within the literature. There is great room for growth within EAAT literature, and the field as a whole could benefit from a more occupation-based and occupation-focused approach in future research.

Need and Significance of the Proposed Study

Current state of the Literature

Research in the realm of EAAT for children with autism is relatively underdeveloped: in my preliminary search of the literature I was able to identify seven pertinent research articles evaluating EAAT interventions for children with ASD. Of these articles, was only one randomized control trial (considered the gold standard of primary research) (Bass et al., 2009). The lack of high-quality research in this area presents two main concerns: a lack of knowledge to guide practitioners and an ethical dilemma in the use of intervention that is not evidence-based.

First, with such sparse literature about the implementation of EAAT for children with ASD, there is little information available to practitioners to guide their treatment. HPOT and especially TR are broad categories with endless possibilities of therapeutic techniques to incorporate with the use of the horse. The types of activities and games performed with the horse vary widely. The lack of best practice guidelines to guide treatment leaves much up to practitioner discretion and therefore allows for wide variation within the field. Secondly, the lack

of evidence leaves practitioners with an ethical dilemma. Occupational therapists are called to implement evidence-based practice: the interventions used within therapy should have research supporting their efficacy (American Occupational Therapy Association, 2006). While preliminary evidence exists to support the efficacy of treatment, EAAT is still considered complimentary or alternative medicine (CAM) for children with ASD. However, 11% of parents of children with an ASD report utilizing HPOT or TR, which is the second most-utilized social intervention (Thomas, Morrissey, & McLaurin, 2007).

In pursuing future research, it is important to consider the current state of research in a particular field. Randomized control trials are considered the gold standard for quality of primary research. However, an in-depth and comprehensive understanding of a field is necessary in order to fully develop a complex intervention and design an effective control trial. Campbell et al. (2000) describe a “framework for trials of complex interventions” (p. 694) that includes phases on a continuum of increasing evidence that a body of literature must go through in order to be comprehensive enough to employ an effective control trial. Given the relatively little information known in the field of EAAT, I assert that the research is currently in the preclinical phase or in phase 1. The preclinical phase involves, “exploration of relevant theory” (p. 695) while phase 1 involves, “identifying the components of the intervention and the underlying mechanisms by which they will influence outcomes” (p. 695). Therefore, the next step in this line of research includes critically evaluating all relevant literature in order to better understand the theory and mechanisms of action underlying EAAT for children with autism to provide a firm foundation for future research.

Systematic Mapping Review

Given the state of the literature on the phases on the continuum of increasing evidence, I believe the next step in the line of EAAT research is to conduct a systematic mapping review. Systematic mapping reviews are carried out by gathering literature on a broad topic (in this case EAAT) including all types of papers: opinion-based, descriptive, and evaluative (Hammick, 2005). Thus, the review produces a ‘map’ of the field that describes, categorizes, and evaluates the current topography of literature about that particular topic (Hooper, King, Wood, Bilics, & Gupta, 2013). The primary concern of a mapping review is not to evaluate the efficacy of any specific intervention, but rather to understand what subtopics have been addressed and what empirical methods were used (Kitchenham, Budgen, & Pearl Brereton, 2011). This type of review can paint a broad picture about the context of the field as a whole, identify gaps in existing research literature, and provide a sound basis for developing hypotheses, theories, and more focused research questions (Grant & Booth, 2009; Hammick, 2005). In regards to the field of EAAT, a systematic mapping review has the potential to identify the theorized mechanisms of action, what treatment strategies are being implemented, and what types of outcomes are being measured.

A systematic mapping review approach was chosen instead of a scoping review for the purpose of this study because the intended outcome is to provide recommendations for further study and primary research, rather than determine the need for a systematic review (Arksey & O'Malley, 2005; Grant & Booth, 2009). Additionally, the ‘map’ we are creating includes use of all literature including descriptive papers, whereas a scoping review limits the search to research literature only (Arksey & O'Malley, 2005; Grant & Booth, 2009). The inclusion of descriptive

papers is important in order to have a broader understanding of theories and mechanisms of action underlying EAAT interventions.

Our goal with this systematic mapping review is to include an occupational perspective in the evaluation of EAAT literature. In order to do so, we will classify outcomes according to the International Classification of Functioning, Disability, and Health (ICF) (World Health Organization, 2002). As occupational therapists we are concerned with providing therapy to our clients that enhances their “performance and participation in everyday occupations and contexts” (CSU Occupational Therapy Department, 2014). Thus, an occupational analysis of outcomes should have the ability to capture outcomes that permeate participants’ everyday lives. The ICF classifies health and disability based on the following elements: health condition, body structure and function, activity, participation, environmental factors, and personal factors. Thus, it provides a good framework to capture outcomes of EAAT that are purely physical (body structure and function), emotional (personal factors) as well as outcomes that infuse into the participants’ everyday occupations and contexts (activity and participation). This will help to identify if the current understanding of EAAT is taking full advantage of the occupational nature of EAAT, and identify areas of development to implement a more occupational perspective in future research.

Research Questions

Overall, there is great potential for EAAT to improve the lives of children with autism. However, the current state of the literature leaves practitioners with little description of specific therapeutic techniques to employ and with little evidence supporting the effectiveness, appropriateness, or feasibility of intervention. The state of the literature calls for a critical examination of current literature to identify theories and mechanisms of action underlying

intervention, as well as what specific treatment strategies have been implemented. This information has the potential to help guide practitioners in their implementation of EAAT for children with autism, as well as provide a foundation for increasingly rigorous research in the field. The evaluation of the literature should take on an occupational perspective in order to highlight the strengths and areas for development of the current research in the field of EAAT in regards to its occupational nature. This will serve to determine the current state of knowledge pertaining to the use of EAAT for children on the autism spectrum in relation to their ability to participate in everyday occupations where they carry out their lives at home, school, and in the community. Therefore, my research questions are: In regards to published, peer-reviewed literature addressing EAAT for children with autism,

What empirical methods have been employed?

What treatment strategies have been implemented?

What are the theorized mechanisms of action underlying treatment?

What outcomes have been studied?

CHAPTER TWO: METHODS

The present study was derived from a larger mapping review study that is currently underway about EAAT for all populations, which influenced the methods of the present study.

Data Collection

Search Strategy

A library science expert was consulted to construct comprehensive searches to execute in selected databases. The initial search strategy was revised several times to accommodate vocabulary additions and eliminations that were identified through concurrent review of relevant literature. The librarian executed the revised search strategy in the following resources: CAB Abstracts (EBSCO), CINAHL (EBSCO), PsycINFO (EBSCO), PubMed (NCBI), Social Sciences Abstracts (EBSCO), Social Services Abstracts (ProQuest), Social Work Abstracts (EBSCO), SPORTDiscus (EBSCO), and Web of Science (Thomson Reuters). The search strategy restricted retrieval to English articles published in peer-reviewed journals between 1980 and 2014. A total of 1,402 sources were identified through this systematic search. In addition, reference lists of relevant articles were manually searched and 139 articles not already captured through databases were found.

Data Management

All records were managed in the bibliographic management software EndNote which allows for organization and coding of references as described by King, Hooper, and Wood (2011).

Inclusion and Exclusion

Inclusion and exclusion criteria were initially developed by jointly reviewing 20 articles, identifying topics of questionable relevance to EAAT, and deciding to include or exclude those topics. Three researchers blindly coded articles using these initial criteria, discussed discrepancies in coding, and fine-tuned inclusion and exclusion criteria until they were comprehensive and precise: Table 1 below presents the final criteria. Three researchers then blindly coded 20% of the database (280 articles) and achieved an inter-rater reliability of 95%, at which point the remaining articles were independently coded for inclusion or exclusion. Any articles that were confusing or difficult to code were brought to the group for discussion and consensus. Overall, 225 of the original 1541 were coded for inclusion in the full mapping review. For the present study, an additional exclusion criteria was added to exclude papers that did not directly address EAAT for people with autism, further narrowing the papers analyzed here to 25 articles. A summary of the entire identification, screening, eligibility, and inclusion process is given in Figure 1.

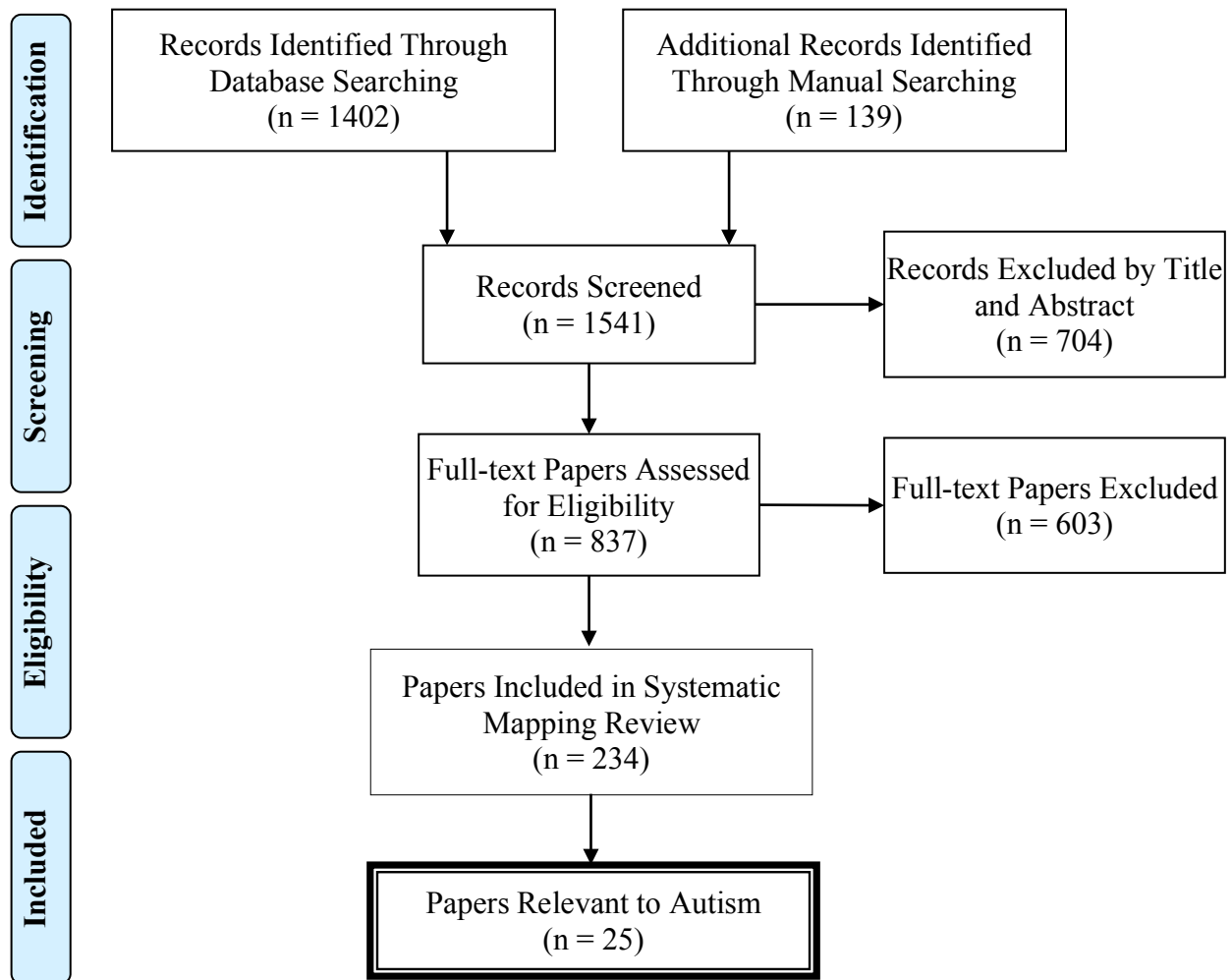
Table 1

Inclusion and exclusion criteria

Inclusion	Exclusion
<p>All included papers must be:</p> <ul style="list-style-type: none"> • Peer-reviewed; • Primary source; • Written in English; AND • Published between 1980 – 2014 <p>Paper must be directly relevant to EAAT by meeting one of the following:</p> <ul style="list-style-type: none"> • Primary focus of the paper is one or more kinds of EAAT; • Primary focus of the paper is on simulated horse studies (i.e. mechanical horse studies) of relevance to EAAT; OR • Primary focus of the paper is on the welfare, training, maintenance or any other issue affecting horses involved in EAAT 	<p>Papers are excluded that:</p> <ul style="list-style-type: none"> • Focus on animal-assisted therapy or human-animal bond, connection or interaction that is either unrelated to EAAT or that includes EAAT only as a minor focus • Provide only a synopsis of a paper about EAAT that has been published elsewhere • Provides horse related information not related to EAAT; OR • Have no obvious relevance to EAAT or human-animal bond • Do not address EAAT for people with autism as a primary concern of the article*

EAAT: Equine-Assisted Activities and Therapies; PDD: Pervasive Developmental Disorder

*Additional exclusion criteria added for the present study only



Adapted from Moher, Liberati, Tetzlaff, and Altman (2009).

Figure 1. Summary of search strategy and inclusion process.

Data Extraction.

To extract and record details from each article, the standard protocol is to develop a data extraction tool (Hammick, Dornan, & Steinert, 2010). The data extraction tool was developed through review of EAAT literature in a manner consistent with the established research questions. To classify outcomes, the International Classification of Functioning, Disability, and Health (ICF) (World Health Organization, 2002) and the Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition, (DSM-IV) (American Psychiatric Association, 2000) were both adapted to succinctly capture the outcomes that EAAT would likely produce.

The ICF classifies human functioning into levels: body structure, body function, activity, and participation. Body functions are defined as “physiological functions of body systems”(World Health Organization, 2002, p. 10) and include outcomes such as sensory processing, muscle power, and gait patterns. In contrast, activity is defined as “the execution of a task or action” (p. 10) while participation is defined as “involvement in a life situation” (p.10). While adapting the ICF, the categories of activity and participation were combined due to the unlikelihood that an article would provide enough detail to be able to distinguish between the two. Examples of outcomes coded as activity/participation include communication, education, play, interpersonal interactions and relationships, and self-care. The DSM-IV was used to code outcomes that reflected symptom severity of a disorder described in the DSM-IV; for example, outcomes measured by the Childhood Autism Rating Scale (Schopler, Reichler, & Renner, 1988) were coded as DSM-IV: autistic disorder.

An initial draft of the data extraction tool was reviewed with members of Colorado State University’s Equine Science Advisory Committee, in addition to several experts in equine science, social work, and veterinary science: these individuals helped make decisions

surrounding what data were relevant to extract. The final tool (see appendix) extracted information about EAAT recipients, practitioners, horses, facilities, interventions, and outcomes. The tool also collected broad descriptors of the paper such as the purpose, approach, and impact factor. After the tool was finalized, it was entered into Microsoft Access to allow articles to be coded electronically.

Inter-rater Reliability

The inter-rater reliability standard for the DET was set at 90%, and all six members of the research team coded ten articles to ensure that the standard was met. Kappa coefficient was also calculated to determine inter-rater reliability between two team members at a time; kappa ranged from .65 - .74, which is considered substantial agreement (Cyr & Francis, 1992). Following these initial articles, each article was coded individually with weekly meetings to discuss coding questions and challenges. Inter-rater reliability checks were performed on every 22nd article to control for intra-rater drift.

Data Analysis

The query tool on Microsoft Access was used to analyze relevant items on the data extraction tool and the intersections between them. For example, one query displayed all of the types of EAAT provided, such as TR and HPOT. Another query displayed the types of EAAT *and* intervention descriptions, such as riding the horse or grooming the horse. These data were then imported into Microsoft Excel and analyzed using the pivot table tool in order to produce descriptive statistics. For example, one pivot table revealed that 70% of TR papers and 25% of HPOT papers used grooming as an intervention for children with autism.

CHAPTER THREE: RESULTS

Figure 2 maps broad categorizations of the 25 articles included in the total database. As shown, more articles addressed EAA than EAT, and one study involved a mechanical horse. While research reports outnumbered conceptual papers overall, EAT proportionately had the most conceptual papers. The literature was published in 21 different journals relatively recently, that is, in 2000 or later. The following sections organize results by research questions posed in chapter one.

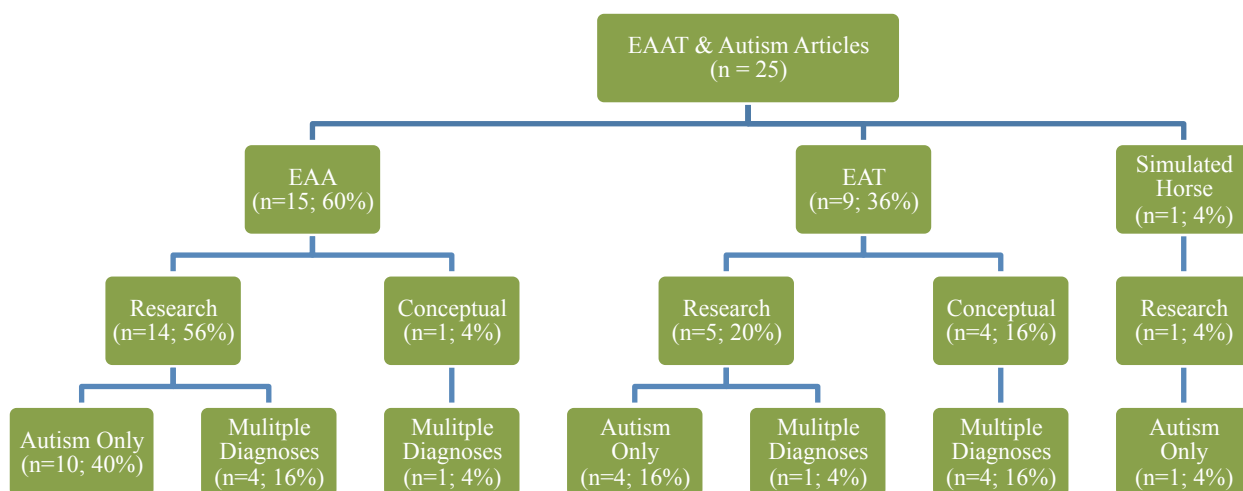


Figure 2. Distribution of EAAT and autism literature by intervention, article type, and diagnosis (n = number of papers)

Research Question One: What Empirical Methods Have Been Employed?

All 20 research articles employed quantitative designs, demonstrating a lack of qualitative research. The designs consisted of eight single-group pretest-posttest designs (Ajzenman et al., 2013; Candler, 2003; Kang, Kang, Ryu, & Lee, 2013; Keino et al., 2009; Kern

et al., 2011; Silkwood-Sherer, Killian, Long, & Martin, 2012; Tabares et al., 2012; Ward et al., 2013), five single-subject designs (Evans & Bingham, 2007; Holm et al., 2013; Jenkins & Reed, 2013; Nelson et al., 2011; Taylor et al., 2009), four non-randomized control trials (Gabriels et al., 2012; Hiromi et al., 2009; Lanning, Baier, Ivey-Hatz, Krenek, & Tubbs, 2014; Wuang, Wang, Huang, & Su, 2010), two descriptive studies (Memishevikj & Hodzhikj, 2010; Zabriskie, Lundberg, & Groff, 2005), and one randomized control trial (Bass et al., 2009). Of the four non-randomized group comparisons, three also reported results from within-group data and thus also reflected a pretest-posttest design (Gabriels et al., 2012; Lanning et al., 2014; Wuang et al., 2010).

Research Question Two: What Treatment Strategies Have Been Implemented?

Nineteen of the 20 research articles (95%) provided some type of description of the EAAT intervention, but the extent to which authors described the intervention varied widely. For example, Candler (2003) only stated, “instructors were responsible for all horse-related activities including riding times, equine education, and activities such as barn care, washing, and grooming the horses.” (p. 57). On the other end of the spectrum, Bass et al. (2009) used an entire page of text to describe the intervention, including a rich description of mounting/dismounting, exercises, riding skills, mounted games, and horsemanship activities. The following sections explore the intervention descriptions provided in EAT and EAA studies.

Equine-Assisted Therapy

Of the five research articles that addressed EAT, four (80%) described the intervention as hippotherapy (Ajzenman et al., 2013; Silkwood-Sherer et al., 2012; Tabares et al., 2012; Taylor et al., 2009). Three of these studies were conducted in the United States and had very similar intervention descriptions (Ajzenman et al., 2013; Silkwood-Sherer et al., 2012; Taylor et al.,

2009). All three studies included riding the horse at different gaits and speeds, in different figures (e.g. figure 8), and around obstacles (e.g. weaving through cones). Two of the three studies included riding the horse in different positions (e.g. prone, supine, backwards) (Ajzenman et al., 2013; Silkwood-Sherer et al., 2012). These HPOT interventions conducted in the United States differed from EAAT literature as a whole in that riding skill instruction (i.e. how to control the horse with reins), grooming, or other activities off of the horse were not included in the intervention. The other two studies were conducted internationally, which may have influenced why the intervention descriptions differ. Tabares et al. (2012) conducted HPOT in Spain that included grooming, tacking, and riding skill instruction. Memishevikj and Hodzhikj (2010) implemented an EAT intervention in Bosnia that included grooming, riding the horse, and groundwork.

In the introduction to their paper, Silkwood-Sherer et al. (2012) described HPOT as “a treatment strategy provided by rehabilitation professionals (physical therapists, occupational therapists, and speech-language pathologists) to meet functional goals developed as part of a comprehensive rehabilitation plan” (p. 708). While EAT interventions are defined as being part of a broader therapeutic context, no studies investigated any other part of the therapeutic process other than the intervention itself. In other words, none of the EAT studies described a process of evaluation or goal-setting, or how the specific intervention related to individualized client goals.

Equine-Assisted Activities

Ten of the 14 EAA articles (71%) investigated interventions that the authors termed as therapeutic riding (TR) (Bass et al., 2009; Candler, 2003; Gabriels et al., 2012; Holm et al., 2013; Jenkins & Reed, 2013; Kang et al., 2013; Kern et al., 2011; Lanning et al., 2014; Nelson et al., 2011; Ward et al., 2013). The remaining articles investigated ‘Psycho-Educational Horseback

Riding,' (Hiromi et al., 2009; Keino et al., 2009) Riding for the Disabled (Evans & Bingham, 2007), or recreational riding (Zabriskie et al., 2005).

EAA literature described similar intervention strategies common in HPOT literature (i.e. riding the horse at different gaits and speeds and in different positions), but additionally incorporated other intervention activities. All 10 TR studies provided a description of the intervention. The core intervention of riding skill instruction was pervasive throughout all studies, but each intervention varied in the extent to which it included other equine-related activities (e.g. grooming, social games, etc.). The most common intervention descriptions in TR studies were riding skill instruction (100%), grooming the horse (70%) (Bass et al., 2009; Candler, 2003; Gabriels et al., 2012; Holm et al., 2013; Kern et al., 2011; Lanning et al., 2014; Ward et al., 2013), intentionally pairing the participants to the horses (50%) (Gabriels et al., 2012; Kern et al., 2011; Lanning et al., 2014; Nelson et al., 2011; Ward et al., 2013), group session as opposed to individual (40%) (Bass et al., 2009; Candler, 2003; Gabriels et al., 2012; Ward et al., 2013), and emphasis of verbal or nonverbal communication in order to direct the horse (40%) (Bass et al., 2009; Kern et al., 2011; Nelson et al., 2011; Ward et al., 2013).

Participants were generally paired to the horse for one of two reasons: either based on the child's physical characteristics (e.g. height, weight) (Lanning et al., 2014) or in order to foster a bond between the child and horse (Gabriels et al., 2012). Other common interventions in TR studies included following verbal instructions (Bass et al., 2009; Holm et al., 2013; Nelson et al., 2011; Ward et al., 2013), and performing activities or games while mounted on the horse (Bass et al., 2009; Nelson et al., 2011; Ward et al., 2013). The two psycho-educational horseback riding studies (Hiromi et al., 2009; Keino et al., 2009) were conducted in Japan and involved activities and games on horseback aimed specifically at increasing verbal communication. The

Riding for the Disabled paper emphasized the importance of allowing the child to make choices during the intervention (Evans & Bingham, 2007), while the recreational riding article emphasized the importance of including family in the intervention (Zabriskie et al., 2005).

Interestingly, the TR articles differed in their description of how the intervention was shaped by intended outcomes. For instance while describing the intervention, Lanning et al. (2014) stated, “the main focus of the EAA lessons was to improve riding and horsemanship skills” (p. 1899); this statement makes it clear that specific behavioral or physical outcomes were not targeted during intervention. On the other hand, Gabriels et al. (2012) stated, “instructors set individual therapeutic goals and horsemanship goals based on the initial evaluation... the lesson plans consisted of activities and exercises that addressed physical, psychological, cognitive, and social skills as well as horsemanship skills” (p. 582). In this article, the intervention was clearly designed to address specific therapeutic goals.

Research Question Three: What Are The Proposed Theoretical Bases For EAAT?

A variety of theoretical bases were proposed for why EAAT may benefit people with autism. All five non-research articles gave narrative descriptions of proposed theories that may contribute to EAAT’s effectiveness; however each of these articles discussed EAAT broadly, not specifically for people with autism (Bracher, 2000; Granados & Agis, 2011; Ratliffe & Sanekane, 2009; Rothe, Vega, Torres, Soler, & Pazos, 2005; Westerman, Stout, & Hargreaves, 2012). Of the 20 research articles, 17 articles (85%) provided a possible theoretical explanation for why the intervention may work, while three did not (Candler, 2003; Jenkins & Reed, 2013; Taylor et al., 2009). Some of these theoretical explanations were brief and somewhat vague, such as “simply being around the horse, grooming and working with the horse has a healing power” (Memishevikj & Hodzhikj, 2010, p. 58). Conversely, other authors developed theoretical

rationales that were discussed at length and include many coexisting mechanisms of action, such as “hippotherapy provides the benefits of mass practice in an activity that forces a client to develop and refine motor patterns with concurrent practice in integrating sensory information in a controlled environment as a whole task activity” (Silkwood-Sherer et al., 2012, p. 708). The following sections describe the theories evident in EAA research, EAT research, and conceptual articles.

Equine-Assisted Therapies Research

Similarly to the nature of the intervention, the theoretical basis of EAT was found to vary depending on the country in which the study was conducted. Two of the three studies conducted in the United States provided theoretical rationales behind why the use of HPOT within a skilled therapy session may benefit children with autism, and they were remarkably similar. In papers by Ajzenman et al. (2013) and Silkwood-Sherer et al. (2012), the horse’s variable movement was thought to challenge balance and thus force the child to develop postural control. Also in these U.S. papers, hippotherapy was represented as a “functional, meaningful, and motivating activity in a nonclinical environment” (Ajzenman et al., 2013, p. 708), which enhances the motivation of the child. These proposed theories did not, however, address theoretical premises prominent in other EAAT literature, which highlighted the importance of horse-human interactions, positive reinforcements for communication, sensory experiences of riding a horse, or social interactions. Yet while the theoretical bases proposed by Ajzenman et al. and Silkwood-Sherer et al. were relatively narrow, they were presented in more depth than was found in other articles. Specifically, many empirically supported aspects of therapy were proposed to coexist and work simultaneously to contribute to intervention effectiveness.

In contrast to EAT literature from the United States, the two EAT articles conducted internationally mainly draw on the horse-human interaction to hypothesize why EAT benefits children with autism, using words such as ‘emotional relationship’, ‘trust’, ‘being around the horse’, and ‘healing power’ (Memishevikj & Hodzhikj, 2010; Tabares et al., 2012).

Equine-Assisted Activities Research

Twelve of the 14 EAA articles provided some sort of theoretical basis to support why EAA may benefit children with autism. EAA addressed a wide variety of theoretical bases, however not one theory was pervasive throughout all EAA studies. Of the 12 EAA articles that provided theory, six articles (50%) discussed the horse-human interaction (Bass et al., 2009; Hiromi et al., 2009; Keino et al., 2009; Kern et al., 2011; Lanning et al., 2014; Ward et al., 2013), five (42%) discussed positive reinforcement for communication (Gabriels et al., 2012; Holm et al., 2013; Keino et al., 2009; Nelson et al., 2011; Ward et al., 2013), five (42%) discussed the movement of the horse (Gabriels et al., 2012; Kang et al., 2013; Keino et al., 2009; Lanning et al., 2014; Ward et al., 2013), four (33%) discussed the sensory experience of riding a horse (Bass et al., 2009; Gabriels et al., 2012; Kang et al., 2013; Lanning et al., 2014), and four (33%) discussed the social interactions that occur during therapy (Gabriels et al., 2012; Keino et al., 2009; Lanning et al., 2014; Ward et al., 2013). While some authors provided in-depth explanation of the theoretical rationale (Gabriels et al., 2012), many authors did not thoroughly discuss or provide empirical support for the theory they proposed (Memishevikj & Hodzhikj, 2010). Each of these theoretical bases are next discussed individually.

Many papers claimed that the human-horse interaction was therapeutic for children with autism because they have a difficult time forming close relationships. Forming a personal connection to a horse may “facilitate relationship building and bonding skills that can be

transferred from... [the] horse to [the child's] family and home life" (Kern et al., 2011, p. 16).

Other authors claimed the horse-human interaction was therapeutic because animals elicit increased social responses in children, thereby building the social skills of children with autism (Bass et al., 2009; Ward et al., 2013).

Five papers proposed that positive reinforcement for communication may increase verbal and nonverbal communication skills of children with autism (Gabriels et al., 2012; Holm et al., 2013; Keino et al., 2009; Nelson et al., 2011; Ward et al., 2013). During the EAA session, children were often told to direct the horse with verbal cues (e.g. 'walk on,' 'woah'), or nonverbal cues (e.g. body movements, communication devices). If the child communicated well, the horse would follow the command, thereby providing positive reinforcement for the communication. If the child did not communicate or the communication was unclear, the horse would not respond thereby providing a punishment. For example, as Gabriels et al. (2012) explained, "a horse's immediate response to the behaviors (however subtle) of an ASD child can be used in treatment to help the child better understand or become more aware of the impact of his or her social-communication behavior" (p. 586).

Authors of EAA studies differed in their understanding of how the movement of the horse may be therapeutic for children with autism. Some authors suggested that the movement of the horse demands the child to weight shift in order to maintain balance, thereby developing balance and other motor skills (Gabriels et al., 2012; Kang et al., 2013; Lanning et al., 2014). Keino et al. (2009) theorized that the rhythmic movement of the horse stimulates Broca's area of the brain which in turn leads to increased language production. Finally, Ward et al. (2013) suggested the motion of riding the horse may produce a calming or motivating effect for children with autism.

Some authors posited that the sensory experience of riding a horse is therapeutic for children with autism. Riding a horse provides the child with kinesthetic, tactile, proprioceptive, and vestibular input (Bass et al., 2009; Kang et al., 2013). Not only does the child passively receive input, but she must also utilize this sensory information in order to maintain balance on the horse (Kang et al., 2013, p. 145). Lanning et al. (2014) claimed the “sensorimotor experience of riding can aid in the development of both gross and fine motor function leading to better body awareness” (p. 1905). Authors also claimed that the sensory experience of riding the horse can be used to “organize the ASD child’s sensory system” (Gabriels et al., 2012, p. 586) or treat sensory integration dysfunction (Kang et al., 2013).

Finally, interaction with people in the EAA environment was theorized to help develop the social skills of children with autism. Interaction with the instructor (Ward et al., 2013), volunteers (Gabriels et al., 2012), family members present for the session (Keino et al., 2009), and other participants (Ward et al., 2013) were all theorized to be beneficial. Lanning et al. (2014) proposed that these interactions may have been therapeutic for children with autism because the EAA context provided structure and support to the social interaction.

Conceptual Articles

Each of the five conceptual articles had a slightly different premise: one article addressed the importance of mentoring within a therapeutic riding program (Westerman et al., 2012), another article analyzed EAAT from an occupational therapy perspective (Bracher, 2000), one article exclusively explored equine-facilitated psychotherapy (Rothe et al., 2005), while the remaining two articles analyzed EAAT more broadly (Granados & Agis, 2011; Ratliffe & Sanekane, 2009). Four of the five conceptual articles were primarily focused on EAT, while one was primarily focused on EAA. Notably, the single EAA conceptual article that exclusively

discussed mentorship by Westerman et al. did not address why riding skill instruction—the main intervention implemented in EAA—is therapeutic. Therefore, there is a lack of theoretical explanation in conceptual articles for why the most prominent EAA intervention, riding skill instruction, may benefit the participant.

Conceptual articles were more likely than the research articles to reference established theories or models. Three articles addressed sensory integration theory (Bracher, 2000; Granados & Agis, 2011; Ratliffe & Sanekane, 2009), and two addressed dynamic systems theory (Granados & Agis, 2011; Ratliffe & Sanekane, 2009). Bracher (2000) discussed the model of human occupation, Granados and Agis (2011) discussed neuronal group selection theory, and finally Westerman et al. (2012) discussed Bandura's theory of self-efficacy and Vygotsky's theory of social development.

Research Question Four: What Outcomes Have Been Studied?

Overall, the 20 research articles measured 74 different types of outcomes that can be better understood when organized into the following categories: ICF activity and/or participation (ICF-AP), ICF body functions (ICF-BF), DSM-IV, and other. Outcomes at the level of ICF-AP were measured 25 times, the most out of any category. The specific ICF-AP outcomes most often measured were communication (measured 7 times), interpersonal interaction (7 measurements), self-care (3 measurements), and walking/moving (2 measurements).

ICF-BF outcomes were the next most frequently measured, with 23 outcomes measured. As found in this systematic mapping review, the most pertinent ICF-BF measures pertained to mental functions and movement functions. The most common mental functions were sensory processing, measured seven times (Bass et al., 2009; Gabriels et al., 2012; Holm et al., 2013; Kern et al., 2011; Ward et al., 2013; Wang et al., 2010); emotional functions, measured four

times (Candler, 2003; Evans & Bingham, 2007; Hiromi et al., 2009; Keino et al., 2009); and attention, measured twice (Candler, 2003; Evans & Bingham, 2007). Movement functions were measured eight times, including seven measurements of control of voluntary movement (e.g. balance) (Ajzenman et al., 2013; Gabriels et al., 2012; Kang et al., 2013; Keino et al., 2009; Silkwood-Sherer et al., 2012; Wuang et al., 2010), and one measurement of muscle power (Wuang et al., 2010). Tabares et al. (2012) measured changes in cortisol and progesterone levels, an ICF-BF outcome that did not fit into either mental or movement functions.

Five outcomes measured DSM-IV symptomology, specifically changes in severity of autism symptoms (Bass et al., 2009; Holm et al., 2013; Kern et al., 2011; Memishevijk & Hodzhikj, 2010; Ward et al., 2013). Any outcomes that did not fit into the ICF or DSM-IV classification systems were categorized as ‘other’. The most frequently measured ‘other’ outcomes were inappropriate/stereotyped behavior (5 measurements) and quality of life (4 measurements); the remaining ‘other’ outcomes were each measured only once.

Table 2 below illustrates how often general outcomes in each of these categories were measured in the 20 research studies, along with the corresponding significance levels. General outcomes refer to the broadest categories into which outcomes were grouped: ICF-AP, ICF-BF, DSM-IV, and other. Outcomes are also categorized into 3 significance levels: *positive statistically significant* indicates a positive finding that was supported by statistics with a p-value <.05, *other positive finding* indicates positive outcomes were described but statistical significance was not reported, and *negative finding* indicates the outcome was measured but no positive results were found. Overall, there were more positive findings, the majority of which were statistically significant, than negative findings.

Table 2

Frequencies of Measurements in 20 Research Studies Across Different General Types of Outcome and Significance Levels (n; %)

General Outcome Category	Frequency of Measurement n	Significance Level		
		Positive Statistically Significant n (%)	Other Positive Finding n (%)	Negative Finding n (%)
ICF-AP	25	14 (56%)	6 (24%)	5 (20%)
ICF-BF Total	26	14 (54%)	7 (27%)	5 (19%)
Mental Functions	17	7 (41%)	7 (41%)	3 (18%)
Movement Function	8	6 (75%)	0 (0%)	2 (25%)
Endocrine Functions	1	1 (100%)	0 (0%)	0 (0%)
Other	18	4 (22%)	9 (50%)	5 (28%)
DSM-IV	5	3 (60%)	1 (20%)	1 (20%)
TOTAL	74	35 (47%)	23 (31%)	16 (22%)

n = number of times an outcome was measured; % = percentage of each outcome category categorized into the significance level; ICF = International Classification of Functioning, Disability, and Health; AP = Activity/Participation; BF = Body Functions; DSM-IV = Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition

Specific Outcomes

Of the 74 outcomes measured, there were 31 unique specific outcomes (many outcomes were measured in more than one study). Specific outcomes are defined as the narrowest level of categorization that the ICF allows, including outcomes such as communication, balance, and quality of life. Figure 3 below illustrates the frequency of measurement of the eight most commonly measured specific outcomes and their respective levels of significance.

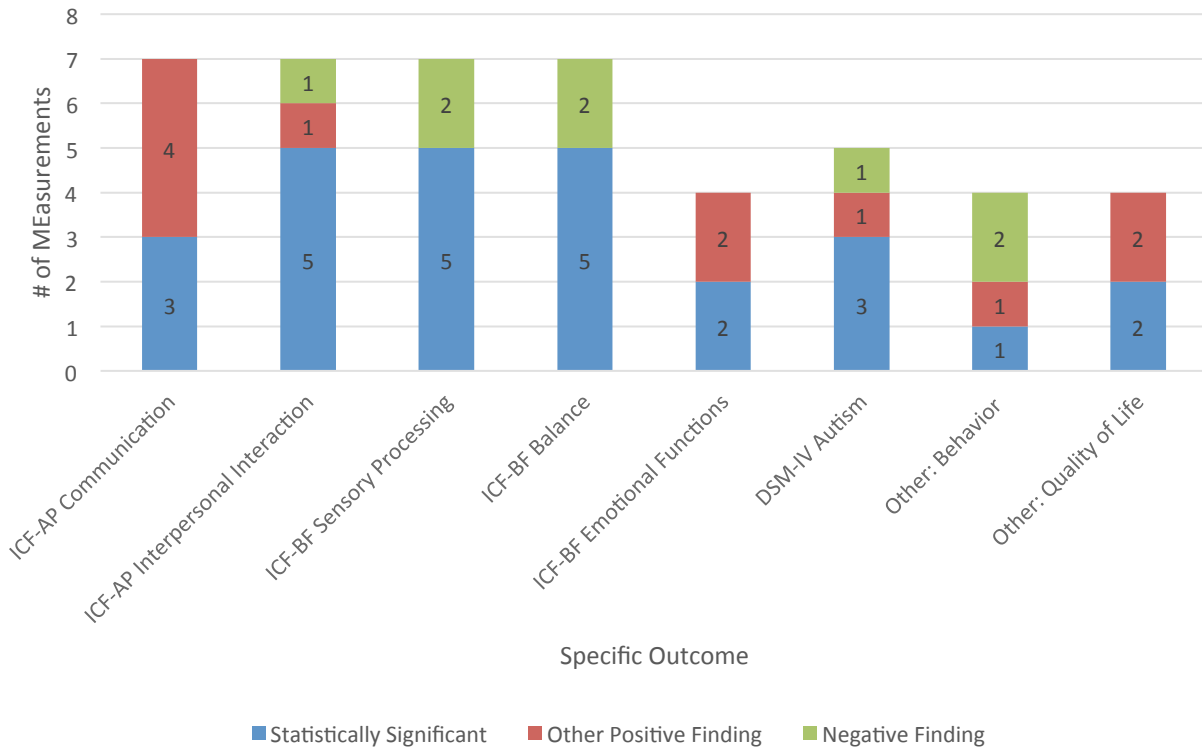


Figure 3. Measurement frequencies of specific outcomes. This figure displays the frequency of the most commonly measured specific outcomes and their respective significance levels.

Comparisons of Outcomes in EAA and EAT Studies

EAA and EAT research studies differed in the types of outcomes they addressed. Figure 4 illustrates percentages of EAA and EAT research articles that measured outcomes in each general category. As shown, EAA studies measured a broader variety of outcomes, with relatively more outcomes at the level of ICF-BF mental functions, ICF-AP, DSM-IV, and ‘other’ outcomes. Conversely, EAT research measured relatively narrower outcomes than EAA, but more outcomes at the level of ICF-BF movement functions and ICF-BF endocrine functions (i.e. cortisol and progesterone levels). EAT studies reported comparatively more significant outcomes than EAA studies: 52% (nine out of 17) of outcomes measured in EAT studies were statistically significant positive outcomes whereas 43% (23 out of 54) of outcomes measured in EAA studies were statistically significant positive outcomes.

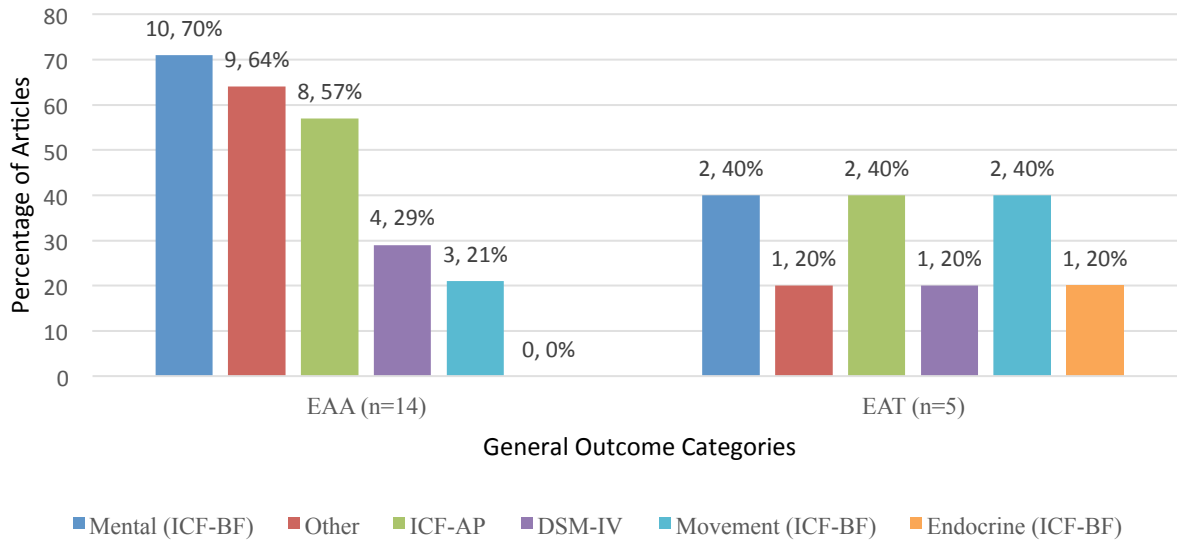


Figure 4. Percentage of measured outcomes in EAA and EAT studies. Bar chart displaying percentage of articles that address each of the general outcome categories, separated by EAA and EAT research articles for comparison.

Assessment Methods

In the 20 research articles, different approaches to measuring outcomes, e.g., by using standardized tests, skilled observations, etc., were coded 37 times. Of these 37 instances, standardized assessments were implemented 76% of the time (28 times), non-standardized questionnaires were used 8% of the time (3 times), and other means of measurement (such as skilled observation or salivary samples) were used 16% of the time (6 times). Many assessment methods were used in multiple studies; 4 papers used the Sensory Profile (Dunn, 1999) (Bass et al., 2009; Holm et al., 2013; Kern et al., 2011; Ward et al., 2013), 3 papers used skilled observations (Evans & Bingham, 2007; Holm et al., 2013; Nelson et al., 2011), two papers used the Vineland Activity Behavior Scales-II (Sparrow, Cicchetti, & Balla, 2006) (Ajzenman et al., 2013; Gabriels et al., 2012), two papers used the Social Responsiveness Scale (Constantino & Gruber, 2002) (Bass et al., 2009; Holm et al., 2013), two papers used the Bruininks-Oseretsky Test of Motor Proficiency (Bruininks, 2005) (Gabriels et al., 2012; Wuang et al., 2010), and two

papers used the Aberrant Behavior Checklist-Community (Aman & Singh, 1986) (Gabriels et al., 2012; Holm et al., 2013).

The person reporting the outcomes also varied; for example, skilled observations were often conducted by the researcher, while standardized assessment tools such as the Sensory Profile were often completed by the child's parent. Of the 20 research articles, researchers reported outcomes in 12 articles (60%) (Ajzenman et al., 2013; Evans & Bingham, 2007; Gabriels et al., 2012; Holm et al., 2013; Jenkins & Reed, 2013; Kang et al., 2013; Kern et al., 2011; Nelson et al., 2011; Silkwood-Sherer et al., 2012; Tabares et al., 2012; Taylor et al., 2009; Wuang et al., 2010), parents reported outcomes in 10 articles (50%) (Ajzenman et al., 2013; Bass et al., 2009; Candler, 2003; Gabriels et al., 2012; Hiromi et al., 2009; Holm et al., 2013; Keino et al., 2009; Kern et al., 2011; Lanning et al., 2014; Memishevikj & Hodzhikj, 2010), participants reported outcomes in three articles (15%) (Candler, 2003; Silkwood-Sherer et al., 2012; Zabriskie et al., 2005), and school teachers reported outcomes in one article (5%) (Ward et al., 2013). Of these 20 studies, only five attempted to blind the outcome-reporter to the study protocol, all of whom were researchers (Evans & Bingham, 2007; Kern et al., 2011; Silkwood-Sherer et al., 2012; Taylor et al., 2009; Wuang et al., 2010).

Twelve of the 20 research articles reported where outcomes were measured. Of those 12, six studies (50%) measured outcomes in an EAAT context (Evans & Bingham, 2007; Holm et al., 2013; Jenkins & Reed, 2013; Keino et al., 2009; Nelson et al., 2011; Tabares et al., 2012), five (42%) measured outcomes at the child's home (Ajzenman et al., 2013; Candler, 2003; Holm et al., 2013; Jenkins & Reed, 2013; Kern et al., 2011), three (25%) measured outcomes in a contrived healthcare or research setting (Ajzenman et al., 2013; Taylor et al., 2009; Wuang et al., 2010), two (17%) measured outcomes in the community (Holm et al., 2013; Jenkins & Reed,

2013), and one (8%) measured outcomes at school (Ward et al., 2013). The studies that measured outcomes in the community and school were all three EAA studies. The articles that measured outcomes in a contrived healthcare or research context were all EAT studies.

CHAPTER FOUR: DISCUSSION

The aim of this study was to determine the current state of knowledge pertaining to EAAT for children with autism in order to inform occupational therapy practice with this population and direct future research. While there are strengths and weaknesses within the literature, findings suggest there is great potential for the therapeutic use of the horse to impact the lives of children with ASD. A synthesis of these findings provides direction for future occupational therapy practice and research.

Appraisal of the Literature

Overall, this systematic mapping review revealed that literature pertaining to EAAT for children with autism is in preliminary stages. The majority of the research implemented single group pretest-posttest designs, while only one implemented the gold standard for quantitative research, a randomized control trial. There was also a paucity of literature aimed at developing the theoretical understanding of *why* EAAT may be effective for children with autism. Qualitative inquiry is often aimed at generating theory (Creswell, 2012), and there was an apparent lack of qualitative literature about EAAT for children with autism. Furthermore, while five conceptual articles proposed a theoretical basis for EAAT, each addressed a broad variety of conditions, not uniquely autism. Fleury and Sidani (2012) state that “theory provides an understanding of the problem that the intervention targets, the nature of the intervention, and the mechanisms underlying the anticipated improvement in outcomes” (p. 11). The lack of theoretical articles that address only autism indicates that the *understanding of the problem that the intervention targets* is not fully represented in the literature; in other words, the database analyzed in this study provided little direction concerning the unique characteristics of autism

that can be targeted and improved with EAAT. The following sections appraise EAT and EAA literature separately.

Appraisal of EAT Literature

The EAT literature was found to have varying strengths and weaknesses. One strength of the EAT literature was the consistency of theoretical rationales, interventions, and outcomes between HPOT studies conducted in the United States. Consistency between studies allows for stronger conclusions to be made about the field of HPOT for children with autism in the United States as a whole. Another strength is the depth of the theoretical rationale provided in HPOT studies from the United States. Fleury and Sidani (2012) claim that, “treatment strength is enhanced by a clear theoretical rationale for intervention design, with specified links that tie the intervention critical inputs to mediating processes and outcomes addressing the problem of interest” (p. 25). EAT outcomes were perhaps more likely to be significant than EAA outcomes due to the relatively more developed theory that guided EAT interventions.

While the consistency between HPOT studies conducted in the United States is a strength, the narrowness of the theories, interventions, and outcomes presented is a weakness. While the literature presents a few very well-developed intervention strategies backed by strong theoretical rationale, there are many possible interventions that are not addressed at all (i.e. grooming, tacking, groundwork). Therefore, U.S. HPOT may not be harnessing the full potential of the horse and the horse environment in order to benefit children with autism.

Another weakness of EAT literature is that it has not been meaningfully differentiated from EAA literature. EAT, by definition, is therapy led by a rehabilitation professional and therefore should include certain components vital to the rehabilitation process, including: evaluation, goal-setting, intervention, outcome measurement, re-evaluation, and discharge

planning. However, the EAT research studies were found to exclusively investigate only the intervention and outcome portions of this process, thereby excluding the very elements that should make EAT unique from EAA. Thus the EAT literature did not describe any interventions or address any outcomes that EAA literature did not also address; therefore, the additional benefit that the therapist provides as opposed to a riding instructor is elusive and not documented within the research.

One final critique of EAT literature concerns the relatively few numbers of EAT articles. The rehabilitation professions that implement EAT are called to conduct evidence-based practice guided by clinical reasoning and empirical evidence (Dijkers, Murphy, & Krellman, 2012). Despite this call for practice to be informed by research, only 5 research articles (25% of all research articles) primarily addressed EAT for children with autism (the others address EAA and simulated horses).

EAA Literature

The breadth of EAA interventions, theories, and outcomes has both positive and negative implications for the field. A clear strength of EAA literature is that it addresses a broader variety of outcomes than HPOT studies conducted in the United States. However, the breadth of interventions and theories in the literature can be seen as a weakness or strength. The broader set of intervention activities implies that EAA may be more fully maximizing the therapeutic potential of the horse and horse-environment. However, the lack of intervention consistency across studies makes it difficult to draw conclusions about TR or EAA as a whole; each study must be examined individually to truly understand what intervention was implemented.

The theoretical bases provided in EAA literature are not consistent between studies, are not developed in conceptual articles specific to EAA, and often lack depth. As discussed earlier,

strong interventions are guided by a theoretical understanding of the specific aspects of the intervention that change the underlying problem, therefore leading to positive outcomes. It would be difficult for EAA providers to implement an intervention guided by theory considering the lack of a consistent theoretical rationale presented in EAA literature. This problem is further complicated by the fact that the individual that implements EAA is typically a riding instructor (Professional Association of Therapeutic Horsemanship International, 2014); while riding instructors are skilled in how to teach riding skills, they may not have training in the clinical reasoning skills required to translate theory into interventions that target the specific therapeutic needs of children with autism. The background of EAA providers and the lack of a consistent theoretical basis in the field may explain why a smaller percent of outcomes measured in EAA research were statistically significant positive outcomes.

Guidance for Practice

The evidence provided by this systematic mapping review brings to light an opportunity for a new occupational therapy treatment approach informed by both EAA and EAT literature. Engel (2007) proposed the term “equine-assisted occupational therapy” (p. 7) to describe occupational therapy that takes place within the equine environment. I suggest that the term *equine-facilitated occupational therapy* be implemented in order to remain congruent with PATH Intl terminology (PATH Intl is the governing board for therapeutic riding, equine-facilitated psychotherapy, equine-facilitated learning, and a variety of other EAAT treatment approaches). Regardless of terminology, this systematic mapping review provides an empirical basis for the use of EAAT interventions, theories, and outcomes that can be implemented within occupational therapy practice for children with autism.

Theoretical Rationale for Equine-Facilitated OT for Children with Autism

While this study has presented theory, intervention, and outcomes in different sections for the sake of clarity, a well-designed theoretical rationale explicates clear linkages between each of these aspects of treatment. In other words, strong theoretical rationales provide an explanation of a problem and explicit links to how the intervention addresses that problem to achieve related outcomes. Therefore, this section will propose a theoretical rationale for equine-facilitated OT by defining the characteristics of autism (i.e. the problem), describing specific EAAT intervention techniques that address the problem, and proposing related outcomes that may be achieved.

Dynamic systems theory as an organizing framework. Dynamic Systems Theory proposes that many systems dynamically interact in a mutually-influencing manner in order to influence childhood development (Thelen, 2005). In other words, the cognitive system, motor system, sensory system, the physical environment, the social environment, and the task performed by the child do not operate independently of one another; rather, all of these systems work together and are mutually influential. The interaction among each of these systems causes a process of self-organization, by which each system works more efficiently with the other systems. This theory is relevant to EAAT because it illuminates how many aspects—or systems—present with EAAT intervention can interact to simultaneously improve the child with autism's sensory processing, communication, social interaction, postural control, and volition. Each of the proposed mechanisms of change described below can be considered one system that interacts with each other system to affect pervasive change in children with autism.

Sensory processing. Children with ASD process sensory information differently than typically-developing children (Iarocci & McDonald, 2006). It is hypothesized that the child's inability to organize sensory information inhibits his ability to produce an adaptive response, and

contributes to stereotypic behaviors and temper tantrums (Kranowitz, 2005; Smith et al., 2005). Furthermore, Roley et al. (2015) demonstrated that sensory processing problems in children with autism are related to decreased social participation. Ayres' (1972) Sensory Integration Theory posits that a child's active involvement in activities that provide sensory input—particularly proprioceptive and vestibular input—have an organizing effect on the child's sensory system, thus improving adaptive behaviors and the child's ability to engage appropriately in everyday life.

Riding a horse requires the child to be actively involved in an activity that provides continual motion and therefore vestibular and proprioceptive input. The vestibular system can be further challenged by activities that challenge balance, such as “weaving through cones... intermittently stopping and starting, changing speed within the walk, and using half halts” (Ajzenman et al., 2013, p. 655). Bracher (2000) summed it up well when she wrote, “sensory integration has a role in [EAAT] particularly with regard to tactile stimulation, continual motion and subsequent vestibular stimulation” (p. 280). There is evidence that sensory integration approaches used within occupational therapy practice for children with autism lead to increased sensory processing and goal-directed behavior (Case-Smith & Bryan, 1999; Schaaf, Hunt, & Benevides, 2012). Therefore, engaging the child with autism in EAAT activities that provide input to vestibular, proprioceptive, and tactile systems may lead to outcomes of improved sensory processing, adaptive behaviors and social participation.

Differential reinforcement for communication. One of the hallmark characteristics of autism is impairment in communication. Children with autism acquire language later in life than typically-developing children or sometimes remain nonverbal for the entirety of their lives. Nonverbal communication, such as gaze, expression, gestures, and body posture is also markedly

different in this population as well (World Health Organization, 1992). Differential reinforcement for communication behaviors has been demonstrated to improve communication in children with autism (Goldstein, 2002). Horseback riding can be a very motivating activity, and therefore may be a particularly effective reinforcement.

During EAAT, the horse provides differential reinforcement by either doing what the child asks (i.e. walking, trotting, halting), or not, depending on the quality of the child's communication. For instance, when the child says "walk" the horse walks, providing an immediate reward for the child's successful communication. Nonverbal communication, such as squeezing the horse to transition from a walk to a trot, can also be reinforced. The type of communication required of the child can be manipulated by the therapist depending on the individualized goals of each participant. For instance, if the child is working on asking permission from his parents before starting an activity at home, the therapist can require that the child ask "please?" before allowing the horse to walk. For nonverbal children, assistive communication devices can be attached to the horse, as seen in Kern et al. (2011). EAAT interventions that implement differential reinforcement for communication are likely to lead to increased quantity and quality of verbal and nonverbal communication.

Structure and support for social interactions. Another hallmark characteristic of ASD is impairment in social interaction. Children with autism experience difficulty understanding others' emotions and experiencing shared enjoyment with others; ultimately children with ASD often have fewer peer relationships than typically-developing children (World Health Organization, 1992). There is evidence that interventions that provide support and structure during play activities with same-age peers enhance the social behaviors of children with ASD (Legoff & Sherman, 2006). Lanning et al. (2014) demonstrated that children with autism who

participated in 12 weeks of EAA improved in quality of life (including social functioning, behavior patterns, and self-esteem) in a similar manner as children who participated in a social circle intervention. EAAT interventions that support social skill development may include structured mounted games with same-age peers that promote cooperation, turn-taking, and following directions (i.e. red light-green light, Simon says, catch and throw). The support provided by the therapist to make these social interactions successful can be graded over time. EAAT interventions that provide structured social interaction with same-age peers are likely to increase quantity and quality of social behaviors.

Horse as a tool to elicit social responses. Children with autism are often described as being in a world of their own, as they often do not engage in social interactions with others. Sams, Fortney, and Willenbring (2006) demonstrated that children with autism who received occupational therapy that incorporated animals engaged in more social interaction and language use than children who received standard occupational therapy. The presence of animals elicits social responses from children with autism. Therefore, the horse can be used in a variety of ways during OT intervention to develop social skills. For instance, the activities of grooming or tacking the horse can be therapeutically implemented to promote joint attention, shared enjoyment, eye contact, and reciprocal conversation.

Challenging postural control. Children with autism often have impairments in gross motor function, including postural control (Fournier et al., 2010). Ajzenman et al. (2013) posited that hippotherapy challenges and improves the child's postural control because each step the horse takes forces the child to make postural adjustments in order to maintain stability. Silkwood-Sherer et al. (2012) noted that in addition to responding to the horse's movement, the child must also integrate a variety of vestibular, proprioceptive, and visual information while

riding the horse; the ability to organize sensory information to create a motor response is essential to postural control. Postural control can be further challenged by EAAT interventions such as weaving through obstacles and riding in different positions and at different gaits. It is hypothesized that increases in postural control improves fine motor control, thus allowing the child to better participate in a variety of meaningful activities that require fine and gross motor skills. There is evidence that physical therapy utilizing hippotherapy for children with autism increased both postural control and participation in activities such as grooming and dressing (Ajzenman et al., 2013; Silkwood-Sherer et al., 2012)

Mastering a new skill. Children with autism do not engage in play behaviors as often as typically-developing children (Restall & Magill-Evans, 1994). Based on the Model of Human Occupation (MOHO) (Kielhofner, 2002), it has been hypothesized that one reason that children with ASD do not engage in play behaviors is due to lack of personal causation, defined as “people’s belief in their own ability to affect their environment” (Restall & Magill-Evans, 1994, p. 118). The MOHO posits that personal causation contributes to the child’s volition, which refers to the child’s “motivation or inner drive to action” (Taylor et al., 2009). The experience of mastering a new skill, such as riding and caring for a large powerful horse, can increase feelings of competence and control, thus increasing personal causation and volition (Bracher, 2000). Taylor et al. (2009) demonstrated that 16 weeks of physical therapy utilizing hippotherapy as a treatment strategy increased volition during a standardized play activity for three children with autism. Therefore, equine-facilitated occupational therapy should incorporate activities within the equine environment that allow the child to feel a sense of control, competence, and mastery of a new skill, in order to increase the child’s personal causation and

volition. Such activities may include learning how to saddle the horse, learning to control the horse with reins, or mastering new horsemanship skills such as posting or jumping.

Dynamic interaction between these systems. As developed, EAAT intervention has the potential to simultaneously develop sensory processing, communication, social interaction, postural control, and volition of children with autism. Development in each of these systems is not isolated, but rather mutually influential. For example, while the movement of the horse provides organizing and calming input to a child with autism, he is better able to organize the tactile input of the reins in his hands, the auditory input of the instructor telling him to stop, and the proprioceptive input of his body atop the horse. With all of this organized sensory information, he is able to produce an adaptive response of pulling the reins and saying “woah”, for which he is rewarded by the horse immediately stopping. Thus, the sensory aspect of riding a horse and the positive reinforcement for communication are mutually-influential and work together to create positive outcomes. Furthermore, as the child masters new skills, his increased confidence and volition may spur him to attempt increasingly difficult tasks; perhaps he will advance his riding from walking to trotting, thus further developing his postural control. Simultaneous interactions and development between these systems is theorized to cause a process of self-organization whereby the systems work together more efficiently. This self-organization and efficient functioning is posited to transfer outside of the therapeutic environment and enhance the child’s ability to perform in everyday life (Thelen, 2005).

Recommendations for equine-facilitated occupational therapy. Equine-facilitated occupational therapy should include all of the attributes of good OT practice, including evaluation, goal-setting, intervention, outcome measurement, and re-evaluation. After individualized client goals have been established, many different treatment techniques,

empirically supported by EAAT literature, can be implemented to work towards the client's goals. Possible interventions that specifically target difficulties commonly experienced by children with autism include: the use of the horse's movement to promote sensory processing, differential reinforcement for communication, structure and support for social interactions with same-aged peers, using the horse as a tool to elicit social behaviors, and providing opportunities for the child to master a new skill. Each of these interventions need not be implemented in isolation from each other, but rather can be integrated into one holistic therapy. Therapists should choose intervention activities based on the individual child's needs and goals (as determined by an evaluation process), and measure outcomes directly related to those needs.

Guidance for Research

This systematic mapping review illuminated the strengths and gaps in EAAT literature for children with autism and therefore can guide future research. First, future inquiry should aim to develop and empirically test a theoretical basis for why and how EAAT benefits children with autism specifically. Autism differs greatly from other conditions often served by EAAT (such as cerebral palsy) and children with autism may benefit from the use of the horse in different ways than other EAAT recipients. Future research should also investigate the aspects of EAT that are unique from EAA. More information is needed about what assessments are used during evaluation, what goals are set, how therapists document progress, how the child is re-evaluated, and what criteria are used to determine discharge. In other words, future EAT literature should illuminate the unique contributions a therapist can provide in comparison to a riding instructor.

There is also room for improvement in outcome measurement. More studies should measure outcomes in the child's home, school and community to determine if benefits translate into the child's everyday life. Similarly, more studies should move beyond only measuring

performance capacities by implementing more outcome measures that assess the child's participation. For instance, two studies used the Social Responsiveness Scale (Constantino & Gruber, 2002) which measures "social awareness, social cognition, social communication, social motivation, and autistic mannerisms" (Bass et al., 2009, p. 1263). While these social skills are clearly important, researchers could also measure if the child is able to implement these skills in a manner that allows her to better participate in important occupations such as play, education, or social participation. Therefore, outcome measures such as the Social Profile, School Function Assessment, Childhood Assessment of Participation and Enjoyment, and the Test of Playfulness can be implemented in future studies to assess if increases in the child's performance capacities also translate into the child's ability to better participate in day-to-day life.

Finally, as the evidence-base for EAAT for children with autism grows and more is understood about how the horse can be therapeutically implemented to affect change, these findings need to be tested with increasingly rigorous approaches. Future studies should blind the person rating outcomes in order to eliminate bias, and implement more rigorous designs such as randomized control trials.

Limitations

The nature of conducting a systematic mapping review inherently involves certain limitations. First, a systematic mapping review does not include a formal quality assessment (Grant & Booth, 2009); therefore, while the present study determined the frequency of SS outcomes, it was not the intention of the study to evaluate the efficacy of EAAT interventions. Additionally, retrieval was restricted to only English articles; therefore, certain EAAT interventions, theories, and outcomes published in international literature may not be represented here.

In addition, the process of coding inherently involved making subjective decisions. While coding guidelines were implemented to make the process as objective as possible, individual coders inevitably had to make judgement calls. For example, the “Timed Up and Go”(Araujo, Silva, Costa, Pereira, & Safons, 2011) outcome measure could have been coded as ICF-BF “gait patterns” and “control of voluntary movement” or as ICF-AP “walking and moving.” When coding decisions were unclear they were brought to the entire research team for discussion. The implementation of guidelines also led to study limitations because they restricted the way in which information was obtained from each article. For instance, intervention descriptions in research articles could only be coded if they were provided in the methods section, so information about interventions was not coded if provided in another section of a research article. Furthermore, inter-rater reliability was only calculated on the broader questions on the DET, not the more detail-oriented questions (e.g. the specific name of an assessment measure). Although weekly meetings took place to ensure consistency in coding, there was no measure of inter-rater reliability for these smaller questions.

In categorizing outcomes, the research team decided to combine ICF activity and ICF participation into one category. This decision was made due to the similarity in definitions: activity is defined as “execution of a task or action” (World Health Organization, 2002, p. 10) and participation is defined as “involvement in a life situation” (World Health Organization, 2002, p. 10). Studies often did not provide enough information about the specific outcome and how it was measured in order to distinguish between the two. It is our general impression that more outcomes were measured at the level of activity than participation, and therefore the findings presented here may be biased towards participation; it may seem as if there are more outcomes at the level of participation than the literature actually presents.

Finally, within the field of EAAT as a whole, there is ambiguity in terminology. For instance, the terms “hippotherapy” and “therapeutic riding” have historically been used interchangeably, despite the current understanding in the US that these are two distinct treatment strategies, thus causing difficulty in understanding and interpreting the literature (D. Silkwood-Sherer & Warmbier, 2007). Further, the current definitions of certain terms still vary internationally. For example, in the United States the treatment strategy performed by a rehabilitation therapist is termed “hippotherapy,” while this type of treatment is called “therapeutic riding” in Sweden (Hammer et al., 2005). In order to maintain consistency and inter-rater reliability, all studies were coded based on the author’s use of terms.

Conclusion

EAAT literature pertaining to children with autism is in preliminary stages. A synthesis of this literature reveals gaps of knowledge that the profession of occupational therapy is uniquely situated to address. While EAA literature measures outcomes of importance to the field of occupational therapy (i.e. communication, sensory processing, social interaction), it lacks a consistent theoretical basis of *how* and *why* those outcomes are achieved. Occupational therapy’s knowledge base includes theoretical frameworks that may inform and guide *how* the horse can be therapeutically utilized and *why* certain interventions lead to related outcomes, specific to persons with autism. Therefore, the profession of occupational therapy is well-suited to develop and empirically refine a stronger theoretical rationale to guide EAAT intervention which may lead to better outcomes for children with autism.

Furthermore, EAAT research measures few outcomes that truly assess if the benefits of EAAT translate into the daily lives of children with ASD. Occupational therapy, which specializes in understanding and promoting engagement in daily life, is well-suited to advance

the field of EAAT by aiming to achieve outcomes not only at the level of the child's performance capacities, but also at the level of participation. In conclusion, I propose that a new treatment strategy—equine-facilitated occupational therapy—be implemented by OT practitioners and studied by OT researchers in order to contribute to and advance the growing body of knowledge of how the horse can be therapeutically implemented to benefit children with autism where they live their lives at home, school, and in the community.

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APPENDIX: DATA EXTRACTION TOOL

Section I. Broad Descriptors of Papers

Who are the Authors of the Paper?

Guideline: Write authors here:

What is the Title of the Paper?

Guideline: Write title here:

What Year was the Paper Published?

Guideline: Write year here:

In What Issue of What Journal Was the Paper Published?

Guideline: Write journal and journal issue here:

What is the impact factor of this journal?

Are Funding Sources Specified in the Article?

Guideline: Look in the Acknowledgements or fine print of the article. Funding sources refers here to anyone who pays for this research.

Is the Purpose or Aim of the Paper Stated?

Guideline: Aim or purpose must be explicit to check yes.

<input type="checkbox"/> Yes	<input type="checkbox"/> No
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What Is the Paper's Stated Purpose or Aim?

Guideline: If yes is checked above, then describe purpose/aim exactly.

Is this Paper a Research Report?

Guideline: Check yes if the primary focus of this paper is a research report and there is a systematic and apriori approach to data collection and analysis related to a purpose/aim. If yes, continue through the rest of the tool, being sure to complete the entire tool.

Guideline: In order to qualify as research, the paper must follow a traditional research format and have clearly stated headings: purpose/hypothesis, literature review, methods, results, and discussion sections.

<input type="checkbox"/> Yes	<input type="checkbox"/> No
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If not research, then what type of paper is this?

Guideline: If no, then choose one of the categories below that best describes this paper:

<input type="checkbox"/> Case report (non-research based)	<input type="checkbox"/> Historical pieces
<input type="checkbox"/> Conceptual/theoretical	<input type="checkbox"/> Non-research literature review
<input type="checkbox"/> Editorial	<input type="checkbox"/> Other

What Type of Paper Is Meant by "Other"?

If not research, does the paper merit further analysis?

Guideline: If the article gives useful information on any of the main section headings (i.e. Descriptors of Participants; Practitioners and Horses; Interventions; or Outcomes) then check yes below.

<input type="checkbox"/> Yes	<input type="checkbox"/> No
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Guideline: If yes, skip C and D, then continue through rest of tool, completing only the portions pertinent to the article. If no, answer C and D, then discontinue use of tool.

Explain the main message of the paper

Explain why this paper was chosen to exclude from analysis

<input type="checkbox"/> Incongruence between article and DET	<input type="checkbox"/> Other
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Does this study primarily focus on Horses, Mechanical Horses, or People?

<input type="checkbox"/>	Horse
<input type="checkbox"/>	Mechanical Horse
<input type="checkbox"/>	People

Section II. Research Approaches

Guideline: This section is filled out ONLY if the paper was categorized as having met the criteria for a research report (checked yes to #6). If section is used, must check yes to either 10, 12, or 14.

Does the Study Explicitly Specify a Research Approach/Design?

<input type="checkbox"/> Yes	<input type="checkbox"/> No
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If yes, write-in what the authors stated as the research design, and answer qualitative and quantitative questions below.

Did this Study Investigate a Specific Intervention?

Guideline: Only check yes if it is research.

<input type="checkbox"/> Yes	<input type="checkbox"/> No
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Did the Reported Study Use Only Qualitative Research Approaches?

Guideline: Check yes if qualitative methods were solely used. Do NOT check yes if both quantitative and qualitative methods were used. If no, skip to the next section.

<input type="checkbox"/> Yes	<input type="checkbox"/> No
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What Qualitative Research Approaches Were Used in the Reported Study?

Guideline: Only answer if Question #10 has been answered, "Yes."

<input type="checkbox"/> Action research	<input type="checkbox"/> Phenomenology
<input type="checkbox"/> Ethnography	<input type="checkbox"/> Qualitative Case Study
<input type="checkbox"/> Grounded theory	<input type="checkbox"/> No apparent approach
<input type="checkbox"/> Narrative	<input type="checkbox"/> Other

What other approach was used?

Did The Reported Study Use Only Quantitative Research Approaches?

Guideline: Check yes if quantitative methods are solely used. Do NOT check yes if both quantitative and qualitative methods were used.

<input type="checkbox"/> Yes	<input type="checkbox"/> No
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What Quantitative Research Approaches Were Used in the Reported Study?

Guideline: Only answer if Question #12 has been answered, "Yes."

<input type="checkbox"/> Descriptive	<input type="checkbox"/> Single group quasi-experimental
<input type="checkbox"/> Correlational	<input type="checkbox"/> Single subject design
<input type="checkbox"/> Group comparison (non-randomized)	<input type="checkbox"/> Quantitative Case Study
<input type="checkbox"/> Group comparison (randomized)	<input type="checkbox"/> No apparent approach
	<input type="checkbox"/> Other

Did The Reported Study Use Both Quantitative And Qualitative Methods?

Guideline: Check yes if both quantitative and qualitative methods were used, regardless of which method may have been dominant.

<input type="checkbox"/> Yes	<input type="checkbox"/> No
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If Yes, Was a Formal Mixed Methods Design Employed?

<input type="checkbox"/> Yes	<input type="checkbox"/> No
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If a Formal Mixed Methods Design Was Used, What Was It?

Section III. Descriptors of EAAT Recipients and/or Research Participants

Guideline: Yes may be checked for the following questions for both research and non-research papers as long as the paper describes EAAT recipients, practitioners, or significant others. For non-research papers if ANY descriptors of participants are provided, check yes, even if it is very broad information or very specific information about one person.

Guideline: Data about Horses should NOT be coded here, but in Section IV.

Guideline: If research, all of the following questions pertain only to research participants and rely solely on description provided in methods section.

If a group comparison design, the following questions pertain only to the experimental group, not the control group. If non-research, questions pertain to the most pertinent EAAT participants described in the article.

Does this Paper Describe recipients of EAAT, significant others of recipients, or practitioners of EAAT?

Guideline: If no description is provided, skip to Section IV.

Guideline: For conceptual articles, check Yes if articles if describes recipients of EAAT. For research, check Yes and categorize research participants.

Guideline: If research participant is a practitioner, all other information should be coded in the practitioner section (skip questions 16-19).

<input type="checkbox"/> Yes	<input type="checkbox"/> No
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If yes, check all that apply

<input type="checkbox"/> EAAT Recipient	<input type="checkbox"/> Family or Significant Others of EAAT recipients	<input type="checkbox"/> Practitioner	<input type="checkbox"/> Other
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If other, describe. Additionally, if family or significant other, please describe.

(Write-In Box in Access)

Guideline: The following questions apply only to participants specified in this question.

Were Ages Specified?

Guideline: To check yes, ages must be explicitly stated OR some reference to developmental stages must be evident (e.g., young children, adolescence, young adults, older adults, geriatric etc.).

Guideline: For non-research papers specify the general age groups, if apparent, but not specific age ranges (leave specific ages for intervention studies).

<input type="checkbox"/> Yes	<input type="checkbox"/> No
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What Age Ranges Were Specified?

Guideline: If yes is checked and exact ages are given, then check off all age groups that apply in the box below. Do NOT check any boxes below if only descriptions of age groups without exact ages were given.

<input type="checkbox"/> 0 – 5 years	<input type="checkbox"/> 41 – 50 years
<input type="checkbox"/> 5 – 10 years	<input type="checkbox"/> 51 – 60 years
<input type="checkbox"/> 11 - 15 years	<input type="checkbox"/> 61 – 70 years
<input type="checkbox"/> 16 – 21 years	<input type="checkbox"/> 71 – 80 years
<input type="checkbox"/> 21 – 30 years	<input type="checkbox"/> 81- 90 years
<input type="checkbox"/> 31 – 40 years	<input type="checkbox"/> > 90 years

If Exact Age Ranges Were not Specified, Then What Age Groups were Specified?

Guideline: If yes is checked and exact ages are NOT given, then check off all appropriate age descriptors in the box below. ONLY use the box below if exact ages have NOT been stated in the paper. Only check “adults (not specified further) if the age groups of adults are not further specified.

<input type="checkbox"/> Young children	<input type="checkbox"/> Older adults
<input type="checkbox"/> Adolescents	<input type="checkbox"/> Oldest old (geriatric)
<input type="checkbox"/> Adults (not specified further)	<input type="checkbox"/> All ages
<input type="checkbox"/> Young adults	<input type="checkbox"/> Other
<input type="checkbox"/> Middle aged adults	

What Other Age Descriptors Were Used?

Guideline: If other is checked above, then write other age descriptor using the author's language.

	<input type="checkbox"/> Standardized <input type="checkbox"/> Customized	
	<input type="checkbox"/> Standardized <input type="checkbox"/> Customized	

Were inclusion criteria specified?

<input type="checkbox"/> Yes <input type="checkbox"/> No
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Guideline: Inclusion criteria do not have to be explicit but do not over-interpret, but must be fairly obvious. Do not confuse with sampling strategies. Use author's original groupings (i.e. if authors stated "no previous experience on a horse" as inclusion criteria, code as inclusion criteria).

If Yes, Write in Below.

Were exclusion criteria specified?

<input type="checkbox"/> Yes <input type="checkbox"/> No
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Guideline: Exclusion criteria do not have to be explicit but do not over-interpret, but must be fairly obvious. Do not confuse with sampling strategies. Use author's original groupings (i.e. if authors stated "no previous experience on a horse" as inclusion criteria, code as inclusion criteria, not exclusion).

If Yes, Write in Below.

Section IV. Practitioners, Horses, and Facilities Involved in EAAT

Guideline: Any information about horses should be provided in this section, including if horses were described as research 'participants' or if data was gathered about the horse.

Guideline: Yes may be checked for the following questions for both research and non-research papers.

Was Any Information Provided About Practitioners?

Guideline: Check yes if one or more practitioners are described with detail further than just "instructor".

Guideline: If an intervention study, this question applies only to the practitioner involved in the intervention (not side-walkers, horse leaders, etc)

<input type="checkbox"/> Yes <input type="checkbox"/> No
--

Check all that apply

<input type="checkbox"/> Equine Professional	<input type="checkbox"/> Social Worker
<input type="checkbox"/> Occupational Therapist	<input type="checkbox"/> Mental health professional not otherwise specified
<input type="checkbox"/> Physical Therapist	<input type="checkbox"/> Speech/Language Pathologist
<input type="checkbox"/> Psychologist	<input type="checkbox"/> Therapeutic Riding Instructor
<input type="checkbox"/> Recreational therapist	<input type="checkbox"/> Other certifications or backgrounds

If checked other, describe other practitioners.

Were Other Certifications, Backgrounds, or Trainings Identified? (E.g. NARHA, PATH, drug-alcohol certification, Intervention-Specific Training)

Guideline: This question applies only to practitioners described in question 25 (not side-walkers, horse leaders, etc.). This is a broad question that can include any information given, even if it is vague.

<input type="checkbox"/> Yes <input type="checkbox"/> No
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(Write-in in Access)

Was Any Information Provided about Horses or Horse-Specific Equipment Involved in the Intervention?

Guideline: Check yes if any type of information at all about the horses is provided, including but not limited to horse qualities (age, size, breed, temperament, selection criteria), how horses were obtained (e.g., donated, purchased), horses' backgrounds or histories, how horses are cared for or maintained, training of horses for EAAT, frequency of usages in EAAT, how horses move, etc.

Guideline: This is only about the qualities of the horse that stand apart from the intervention (e.g. matching horse to participant is not coded here).

<input type="checkbox"/> Yes <input type="checkbox"/> No
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What Specific Information about the horses or horse-specific equipment was provided?

Guideline: If yes is checked above, then describe in detail information provided in the paper about the horse(s).

Were There Assessment Measures Used to Describe Horses?

Guideline: To be standardized, the assessment must be referenced in peer-reviewed literature. Do not include outcome measures used in pre-post research designs.

Guideline: When article refers to aspects of the horse for matching them to participant, code this information in Section V: Descriptors of EAAT Interventions (Were details of EAAT-related Interventions Provided?).

<input type="checkbox"/> Yes <input type="checkbox"/> No
--

If yes, fill out table below.

Name of Tool	Standardized?	What Does the Tool Measure?
	<input type="checkbox"/> Standardized <input type="checkbox"/> Customized	

	<input type="checkbox"/> Standardized <input type="checkbox"/> Customized	
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Was the Name of the Facility or Program Provided?

Guideline: Location of the facility is coded here. If the facility name is not given, then code location under Key Impressions.

<input type="checkbox"/> Yes	<input type="checkbox"/> No
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(write-in)

Was Any Information Provided about the Facility or Program in which the Intervention Occurred?

Guideline: Check yes if any type of information at all about the facility or facilities is provided above and beyond just the name of the facility or program, including but not limited to considerations of tax status (e.g., not for profit), insurance or certifications specific to provision of EAAT

<input type="checkbox"/> Yes	<input type="checkbox"/> No
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What Information about the Facility or Facilities was Provided?

Guideline: If yes is checked, then describe in detail information in the paper on the facility or facilities:

Section V. Descriptors of EAAT Interventions

Guideline: If research article, Information in this section should come exclusively from the Methods section.

Guideline: If group-comparison research, the questions below pertain only to the experimental group, not the control group.

Guideline: Must check Yes to only 30 or 32 (Not both).

Guideline: Yes may be checked for the following questions for both research and non-research papers as long as the paper describes interventions.

Does this Paper Predominantly Focus on One Primary Type of Equine Assisted Activity (EAA) OR Therapy (EAT)?

Guideline: Check yes if one type of EAAT is clearly the predominant focus of the paper even if other types of EAAT are also addressed. To check yes, consider BOTH equine-assisted activities AND therapies. If check yes continue to #31. If check no skip #31.

<input type="checkbox"/> Yes	<input type="checkbox"/> No
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What primary type of equine assisted **ACTIVITY** is the focus of this paper?

*Guideline: If yes is checked above AND the primary type of EAAT involves equine assisted activity, then classify according to the exhaustive and mutually exclusive categories below. Use definitions in document for 30a (definitions in quotations are from Path International.) Check only **one** box. Check 'none' if the type of EAAT involves equine assisted therapies. Check "other" if the intervention is described by authors in ways that significantly differ from the definitions below.*

<input type="checkbox"/> None <input type="checkbox"/> Equine-Assisted Activities (EAA) (unspecified) <input type="checkbox"/> Equine-Assisted/Facilitated Learning (EAL/EFL) <input type="checkbox"/> Therapeutic Driving <input type="checkbox"/> Therapeutic Horsemanship (unspecified)	<input type="checkbox"/> Therapeutic Horseback Riding/Therapeutic Riding <input type="checkbox"/> Therapeutic Vaulting <input type="checkbox"/> Other
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i. How do the authors differently describe the primary EAA that they focused on?

Guideline: If different from the definitions of the above categories or if 'other' is checked, then describe how the authors differently described the primary equine assisted activity that they focused on here.

What primary type of equine assisted **THERAPY** is the focus of this paper?

*Guideline: If yes is checked above AND the primary type of EAAT involves equine assisted therapy then, then classify according to the exhaustive and mutually exclusive categories below. Use definitions in document for 30b (definitions in quotations are from Path International.) Check only **one** box. Check 'none' if the type of EAAT involves equine assisted activities. Check "other" if the intervention is described by authors in ways that significantly differ from the definitions below.*

<input type="checkbox"/> None <input type="checkbox"/> Equine-Assisted Therapy – Not Otherwise Specified <input type="checkbox"/> Equine-Assisted/Facilitated Psychotherapy (EAP/EFP)	<input type="checkbox"/> Hippotherapy <input type="checkbox"/> Onotherapy <input type="checkbox"/> Other
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i. How do the authors differently describe the primary EAT that they focused on?

Guideline: If different from the definitions of the above categories or if 'other' is checked, then describe how the authors differently described the primary equine assisted therapy that they focused on here.

Does the Paper Additionally Focus on Another Type or Types of EAAT?

Guideline: Only address this question if check yes to #30. Check yes if, in addition to the paper's primary type of EAAT, another type or types of EAAT are also addressed.

<input type="checkbox"/> Yes	<input type="checkbox"/> No
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What Type or Types of EAA Does this Paper Additionally Address?

Guideline: If yes is checked, check which types of EAA are addressed. Do not check a box corresponding with the primary focus of the paper as this should be indicated in 30a. Since secondary types of EAA are not exhaustive and mutually exclusive, check all boxes that apply.

<input type="checkbox"/> None <input type="checkbox"/> Equine-Assisted/Facilitated Learning (EAL/EFL) <input type="checkbox"/> Therapeutic Driving <input type="checkbox"/> Therapeutic Horsemanship (unspecified)	<input type="checkbox"/> Therapeutic Horseback Riding/Therapeutic Riding <input type="checkbox"/> Therapeutic Vaulting <input type="checkbox"/> Other
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ii. What Secondary type or Types of EAA is meant by "other"?

Guideline: If different from the definitions of the above categories or if 'other' is checked, then describe how the authors differently described the primary equine assisted activity that they focused on.

What Type or Types of EAT Does this Paper Additionally Address?

Guideline: If yes is checked, check which types of EAT are additionally addressed. Do not check a box corresponding with the primary focus of the paper as this should be indicated in 30b. Since secondary types of EAT are not exhaustive and mutually exclusive, check all boxes that apply.

<input type="checkbox"/> None	<input type="checkbox"/> Hippotherapy
<input type="checkbox"/> Equine-Assisted Therapy – Not Otherwise Specified	<input type="checkbox"/> Onotherapy
<input type="checkbox"/> Equine-Assisted/Facilitated Psychotherapy (EAP/EFP)	<input type="checkbox"/> Other

ii. *What Secondary type or Types of EAT is meant by “other”?*

Guideline: If different from the definitions of the above categories or if ‘other’ is checked, then how do the authors differently describe the primary equine assisted therapy that they focused on.

Does the Paper Focus on Two or More Types of Equine Assisted Activity or Therapy, None of Which are Primary?

Guideline: This question is mutually exclusive with #30. If checked no at #30, check yes here. Paper should address 2 or more types of EAAT none of which are primary.

<input type="checkbox"/> Yes	<input type="checkbox"/> No
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What Type or Types of EAA Does this Paper Address?

Guideline: If yes is checked, check all types of EAA are addressed.

<input type="checkbox"/> None	<input type="checkbox"/> Therapeutic Horseback Riding/Therapeutic Riding
<input type="checkbox"/> Equine-Assisted/Facilitated Learning (EAL/EFL)	<input type="checkbox"/> Therapeutic Vaulting
<input type="checkbox"/> Therapeutic Driving	<input type="checkbox"/> Other
<input type="checkbox"/> Therapeutic Horsemanship (unspecified)	

iii. *What Secondary type or Types of EAA is meant by “other”?*

Guideline: If different from the definitions of the above categories or if ‘other’ is checked, then describe how the authors differently described the primary equine assisted activity that they focused on.

What Type or Types of EAT Does this Paper Address?

Guideline: If yes is checked, check all types of EAAT that are addressed.

<input type="checkbox"/> None	<input type="checkbox"/> Hippotherapy
<input type="checkbox"/> Equine-Assisted Therapy – Not Otherwise Specified	<input type="checkbox"/> Onotherapy
<input type="checkbox"/> Equine-Assisted/Facilitated Psychotherapy (EAP/EFP)	<input type="checkbox"/> Other

iii. *What Secondary type or Types of EAT is meant by “other”?*

Guideline: If different from the definitions of the above categories or if ‘other’ is checked, then how do the authors differently describe the primary equine assisted therapy that they focused on.

Were Theorized or Hypothesized Influences On Positive EAAT Outcomes Described?

*Guideline: Check yes if there is any clear theorized or hypothesized explanation of what influences or causes (e.g., independent variable, mechanism of action) positive changes resulting from EAAT. This is regarding to theory about **WHY** EAAT may work, and must directly relate to how the intervention is developed and outcomes are achieved. Click yes if theory is presented anywhere in the article.*

<input type="checkbox"/> Yes	<input type="checkbox"/> No
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What Favorable Influences Upon or Causes of Positive EAAT Outcomes Were Discussed or Specified?

Guideline: Check all that apply.

<input type="checkbox"/> Benefits of other therapeutic practices (e.g. CBT, SLP)	<input type="checkbox"/> Physical exercise
<input type="checkbox"/> Cerebellar stimulation	<input type="checkbox"/> Qualities of the barn/stable/outdoor environment (context)
<input type="checkbox"/> Connection with nature/spiritual connection	<input type="checkbox"/> Recreation or leisure benefits
<input type="checkbox"/> EAAT inherently motivates participation	<input type="checkbox"/> Responsibility of taking care of a horse
<input type="checkbox"/> Exposure therapy	<input type="checkbox"/> Sensory activities while on the horse
<input type="checkbox"/> Group reflection of equine experience	<input type="checkbox"/> Size and power of the horse
<input type="checkbox"/> Handling the horse	<input type="checkbox"/> Social interactions/skills

<input type="checkbox"/> Horse-human interaction (relationship, bond)	<input type="checkbox"/> Strength-based (capitalize on participants' strengths and abilities)
<input type="checkbox"/> Interaction with involved practitioners/helpers/volunteers	<input type="checkbox"/> Task-related behaviors (problem solving tasks, sequencing tasks"
<input type="checkbox"/> Learning a new skill	<input type="checkbox"/> Temperature of the horse
<input type="checkbox"/> Movement of the horse (pelvic movement, proprioceptive input from movement)	

What Other Explanations of Positive EAAT-related Outcomes were Given?

Guideline: If other was checked, then provide a written description of the explanation.

Were Details of EAAT-related Interventions Provided?

Guideline: Check yes if any explanation of what actually occurred during the intervention was provided. If no, skip to question 35.

Yes No

What Therapeutic Interventions During Sessions Were Described?

Guideline: If yes above, then check all that apply.

<input type="checkbox"/> Activities on the horse (put ball in basket, ring on cone, etc.)	<input type="checkbox"/> Memory skills
<input type="checkbox"/> Application of experience to daily life	<input type="checkbox"/> Perceptual / spatial skills
<input type="checkbox"/> Barn activities and maintenance (mucking stalls, playing in the hay, etc.)	<input type="checkbox"/> Riding ground course (Obstacles used like ground poles, cones, barrels, hills; or figures like serpentine, figure 8)
<input type="checkbox"/> Being with the horse (as in "in the moment")	<input type="checkbox"/> Riding the horse
<input type="checkbox"/> Body language communication	<input type="checkbox"/> Riding the horse in different positions (prone, backwards, sideways, standing, etc.)
<input type="checkbox"/> Cognitive tasks	<input type="checkbox"/> Safety behaviors
<input type="checkbox"/> Family Participation	<input type="checkbox"/> Sensory activities (touch the hay, smell the horse, etc.)
<input type="checkbox"/> Following verbal commands	<input type="checkbox"/> Speech and Language Activities
<input type="checkbox"/> Gait and speeds (walk, trot, canter)	<input type="checkbox"/> Social Activities
<input type="checkbox"/> Getting to know the horse	<input type="checkbox"/> Steering the horse (as opposed to the therapist/instructor steering)
<input type="checkbox"/> Grooming the horse	<input type="checkbox"/> Stretching/strengthening/exercise activities (not on the horse—before or after)
<input type="checkbox"/> Groundwork	<input type="checkbox"/> Stretching/strengthening/exercise activities (while on the horse)
<input type="checkbox"/> Group Session	<input type="checkbox"/> Tacking the horse
<input type="checkbox"/> Holding the reins	<input type="checkbox"/> Vaulting (on the horse)
<input type="checkbox"/> Integration of other therapeutic practices (CBT, SLP, play-therapy, etc)	<input type="checkbox"/> Other
<input type="checkbox"/> Individual Session	
<input type="checkbox"/> Matching the horse to the participant for the intervention	

iv. What other interventions were described?

Guideline: If other was checked, then provide a written description of the explanation.

Were Numbers or Durations of Intervention Sessions Stated?

Guideline: Check yes if any explanations were provided of how many individual sessions occurred, of how long each session was, or of 'dosages'.

Yes No

Described Stated Durations of EAAT Sessions

Guideline: Provide written description of durations. These can be durations of individual sessions and/or #s of sessions in a designated program.

Were any Other Treatments or Therapies in Addition to EAAT Provided to the Experimental Group as Part of the Research Design?

Guideline: If off-the horse processing/reflection that builds upon the horse experience occurs, it does not qualify as other treatment. Check no.

Section VI. Intervention Outcomes

Guideline: Only complete this section in reference to people (not horses or mechanical horses).

Guideline: If research, Rely solely on information given in the outcomes section. It is up to the researcher's judgment whether to code the outcome given by the entirety of an outcome measure, or to code outcomes given by individual subscales.

Guideline: Yes may be checked for the following questions for both research and non-research papers as long as the paper describes or claims specific outcomes.

Guideline: If non-research, outcomes coded here should be specific to EAAT interventions only.

Were There Assessment Measures for Outcomes?

Guideline: To be standardized, the assessment must be referenced in peer-reviewed literature.

Guideline: The intent of this question is to gather the method(s) the author used to measure outcomes, therefore skilled observation, interview, focus group, as well as standardized assessments should all be coded here.

Guideline: When adding assessments to the dropdown list, spell out entire name of assessment first, with abbreviations in parentheses afterwards.

Yes No

Name of Tool	Standardized?	What Does the Tool Measure?
	<input type="checkbox"/> Standardized <input type="checkbox"/> Customized	
	<input type="checkbox"/> Standardized <input type="checkbox"/> Customized	
	<input type="checkbox"/> Standardized <input type="checkbox"/> Customized	
	<input type="checkbox"/> Standardized <input type="checkbox"/> Customized	
	<input type="checkbox"/> Standardized <input type="checkbox"/> Customized	

Were EAAT Outcomes Identified Using DSM-IV Diagnostic Criteria or Language?

Guideline: If any DSM-IV categories were used to describe outcomes of EAAT, describe below in writing. Language and terminology used in the DSM-IV must be explicitly used in article. Use DSM-IV guidelines to make this determination. If no, skip to 39..

Guideline on Levels of Significance: Check statistically-significant ("SS") ONLY if it is a research report, and statistics were provided demonstrating a significant change. Check "other important finding" if authors claim there was a clinically-important or somehow other important finding in quantitative studies, qualitative studies, or for outcomes claimed by conceptual articles. "Other important finding" can also be used if the statistics did not show significance but the authors elaborated that results trended in a positive direction, and some benefits were achieved despite not being statistically significant. Check "no finding" if item was measured but no outcome was found.

Yes No

Were DSM-IV Disorders Usually First Diagnosed in Infancy, Childhood, or Adolescence Specified as Outcomes?

Yes No

If Yes, Classify Findings. Check All that Apply.

SS Other Important Finding No Finding

If provided, specify in detail outcomes related to Disorders Usually First Diagnosed in Infancy, Childhood, or Adolescence that were identified and classify the significance of the findings.

<input type="checkbox"/> Attention-deficit and disruptive behavior disorders	<input type="checkbox"/> SS	<input type="checkbox"/> Other important finding	<input type="checkbox"/> No finding
<input type="checkbox"/> Communication disorders	<input type="checkbox"/> SS	<input type="checkbox"/> Other important finding	<input type="checkbox"/> No finding
<input type="checkbox"/> Feeding and eating disorders of infancy or early childhood	<input type="checkbox"/> SS	<input type="checkbox"/> Other important finding	<input type="checkbox"/> No finding
	<input type="checkbox"/> SS	<input type="checkbox"/> Other important finding	<input type="checkbox"/> No finding

<input type="checkbox"/> Learning disorders	<input type="checkbox"/> SS	<input type="checkbox"/> Other important finding	<input type="checkbox"/> No finding
<input type="checkbox"/> Mental retardation	<input type="checkbox"/> SS	<input type="checkbox"/> Other important finding	<input type="checkbox"/> No finding
<input type="checkbox"/> Motor skill disorders (developmental coordination disorder)	<input type="checkbox"/> SS	<input type="checkbox"/> Other important finding	<input type="checkbox"/> No finding
<input type="checkbox"/> Other disorders of infancy, childhood, or adolescence (Separation anxiety, Selective mutism, Reactive attachment disorder, Stereotypic movement disorder)	<input type="checkbox"/> SS	<input type="checkbox"/> Other important finding	<input type="checkbox"/> No finding
<input type="checkbox"/> PDD – Asperger’s disorder	<input type="checkbox"/> SS	<input type="checkbox"/> Other important finding	<input type="checkbox"/> No finding
<input type="checkbox"/> PDD - Autistic disorder	<input type="checkbox"/> SS	<input type="checkbox"/> Other important finding	<input type="checkbox"/> No finding
<input type="checkbox"/> PDD – Childhood disintegrative disorder	<input type="checkbox"/> SS	<input type="checkbox"/> Other important finding	<input type="checkbox"/> No finding
<input type="checkbox"/> PDD - NOS	<input type="checkbox"/> SS	<input type="checkbox"/> Other important finding	<input type="checkbox"/> No finding
<input type="checkbox"/> PDD – Rett’s disorder	<input type="checkbox"/> SS	<input type="checkbox"/> Other important finding	<input type="checkbox"/> No finding
<input type="checkbox"/> Pervasive developmental disorders	<input type="checkbox"/> SS	<input type="checkbox"/> Other important finding	<input type="checkbox"/> No finding
<input type="checkbox"/> Tic disorders			
<input type="checkbox"/> Article does not specify			

Were DSM-IV Delirium, Dementia, and Amnestic and other Cognitive Disorders Specified as Outcomes?

Yes No

If Yes, Classify Findings. Check All that Apply.

SS Other Important Finding No Finding

If provided, specify in detail outcomes related to Cognitive Disorders that were identified and classify the significance of the findings.

<input type="checkbox"/> Dementia – Alzheimer’s type with early onset	<input type="checkbox"/> SS	<input type="checkbox"/> Other important finding	<input type="checkbox"/> No finding
<input type="checkbox"/> Dementia – Alzheimer’s type with late onset	<input type="checkbox"/> SS	<input type="checkbox"/> Other important finding	<input type="checkbox"/> No finding
<input type="checkbox"/> Dementia – Due to Creutzfeldt-Jakob disease	<input type="checkbox"/> SS	<input type="checkbox"/> Other important finding	<input type="checkbox"/> No finding
<input type="checkbox"/> Dementia – Due to head trauma	<input type="checkbox"/> SS	<input type="checkbox"/> Other important finding	<input type="checkbox"/> No finding
<input type="checkbox"/> Dementia – Due to HIV disease	<input type="checkbox"/> SS	<input type="checkbox"/> Other important finding	<input type="checkbox"/> No finding
<input type="checkbox"/> Dementia – Due to Huntington’s disease	<input type="checkbox"/> SS	<input type="checkbox"/> Other important finding	<input type="checkbox"/> No finding
<input type="checkbox"/> Dementia – Due to multiple etiologies	<input type="checkbox"/> SS	<input type="checkbox"/> Other important finding	<input type="checkbox"/> No finding
<input type="checkbox"/> Dementia – Due to Parkinson’s disease	<input type="checkbox"/> SS	<input type="checkbox"/> Other important finding	<input type="checkbox"/> No finding
<input type="checkbox"/> Dementia – Due to Pick’s disease	<input type="checkbox"/> SS	<input type="checkbox"/> Other important finding	<input type="checkbox"/> No finding
<input type="checkbox"/> Dementia – NOS	<input type="checkbox"/> SS	<input type="checkbox"/> Other important finding	<input type="checkbox"/> No finding
<input type="checkbox"/> Dementia – Vascular dementia	<input type="checkbox"/> SS	<input type="checkbox"/> Other important finding	<input type="checkbox"/> No finding
<input type="checkbox"/> Dementia – article does not specify	<input type="checkbox"/> SS	<input type="checkbox"/> Other important finding	<input type="checkbox"/> No finding

Were DSM-IV Substance Related Disorders Specified as Outcomes?

Yes No

If Yes, Classify Findings. Check All that Apply.

SS Other Important Finding No Finding

If provided, specify in detail outcomes related to Substance Related Disorders that were identified and classify the significance of the findings.

<input type="checkbox"/> Alcohol use disorders – dependence or abuse	<input type="checkbox"/> SS	<input type="checkbox"/> Other important finding	<input type="checkbox"/> No finding
<input type="checkbox"/> Amphetamine use disorders – dependence or abuse	<input type="checkbox"/> SS	<input type="checkbox"/> Other important finding	<input type="checkbox"/> No finding
<input type="checkbox"/> Cannabis use disorders - dependence or abuse	<input type="checkbox"/> SS	<input type="checkbox"/> Other important finding	<input type="checkbox"/> No finding
<input type="checkbox"/> Cocaine use disorders – dependence or abuse	<input type="checkbox"/> SS	<input type="checkbox"/> Other important finding	<input type="checkbox"/> No finding
<input type="checkbox"/> Hallucinogen use disorders – dependence or abuse	<input type="checkbox"/> SS	<input type="checkbox"/> Other important finding	<input type="checkbox"/> No finding
<input type="checkbox"/> Inhalant use disorder – dependence or abuse	<input type="checkbox"/> SS	<input type="checkbox"/> Other important finding	<input type="checkbox"/> No finding
<input type="checkbox"/> Opioid use disorder – dependence or abuse	<input type="checkbox"/> SS	<input type="checkbox"/> Other important finding	<input type="checkbox"/> No finding
<input type="checkbox"/> Phencyclidine use disorder – dependence or abuse	<input type="checkbox"/> SS	<input type="checkbox"/> Other important finding	<input type="checkbox"/> No finding
<input type="checkbox"/> Polysubstance-related disorder – dependence	<input type="checkbox"/> SS	<input type="checkbox"/> Other important finding	<input type="checkbox"/> No finding
<input type="checkbox"/> Sedative, hypnotic, or anxiolytic use disorder – dependence or abuse	<input type="checkbox"/> SS	<input type="checkbox"/> Other important finding	<input type="checkbox"/> No finding
<input type="checkbox"/> Substance related disorder – article does not specify	<input type="checkbox"/> SS	<input type="checkbox"/> Other important finding	<input type="checkbox"/> No finding

Were DSM-IV Schizophrenia Spectrum or Other Psychotic Disorders Specified as Outcomes?

Yes No

If Yes, Classify Findings. Check All that Apply.

SS Other Important Finding No Finding

If provided, specify in detail outcomes related to Psychotic Disorders that were identified and classify the significance of the findings.

<input type="checkbox"/> None	<input type="checkbox"/> SS	<input type="checkbox"/> Other important finding	<input type="checkbox"/> No finding
<input type="checkbox"/> Schizophrenia - Catatonic type	<input type="checkbox"/> SS	<input type="checkbox"/> Other important finding	<input type="checkbox"/> No finding
<input type="checkbox"/> Schizophrenia - Disorganized type	<input type="checkbox"/> SS	<input type="checkbox"/> Other important finding	<input type="checkbox"/> No finding
<input type="checkbox"/> Schizophrenia - Paranoid type	<input type="checkbox"/> SS	<input type="checkbox"/> Other important finding	<input type="checkbox"/> No finding
<input type="checkbox"/> Schizophrenia - Residual type	<input type="checkbox"/> SS	<input type="checkbox"/> Other important finding	<input type="checkbox"/> No finding
<input type="checkbox"/> Schizophrenia - Undifferentiated type	<input type="checkbox"/> SS	<input type="checkbox"/> Other important finding	<input type="checkbox"/> No finding
<input type="checkbox"/> Schizophrenia – article does not specify	<input type="checkbox"/> SS	<input type="checkbox"/> Other important finding	<input type="checkbox"/> No finding

Were DSM-IV Mood Disorders Were Specified as Outcomes?

Yes No

If Yes, Classify Findings. Check All that Apply.

SS Other Important Finding No Finding

If provided, specify in detail outcomes related to Mood Disorders that were identified and classify the significance of the findings.

<input type="checkbox"/> Depressive disorder - Major depressive disorder	<input type="checkbox"/> SS	<input type="checkbox"/> Other important finding	<input type="checkbox"/> No finding
<input type="checkbox"/> Depressive disorder - Dysthymic disorder	<input type="checkbox"/> SS	<input type="checkbox"/> Other important finding	<input type="checkbox"/> No finding
<input type="checkbox"/> Depressive disorder – NOS	<input type="checkbox"/> SS	<input type="checkbox"/> Other important finding	<input type="checkbox"/> No finding
<input type="checkbox"/> Depressive disorder – article does not specify	<input type="checkbox"/> SS	<input type="checkbox"/> Other important finding	<input type="checkbox"/> No finding
<input type="checkbox"/> Bipolar disorder - Bipolar 1 disorder	<input type="checkbox"/> SS	<input type="checkbox"/> Other important finding	<input type="checkbox"/> No finding
<input type="checkbox"/> Bipolar disorder - Bipolar 2 disorder	<input type="checkbox"/> SS	<input type="checkbox"/> Other important finding	<input type="checkbox"/> No finding
<input type="checkbox"/> Bipolar disorder - Cyclothymic disorder	<input type="checkbox"/> SS	<input type="checkbox"/> Other important finding	<input type="checkbox"/> No finding
<input type="checkbox"/> Bipolar – article does not specify	<input type="checkbox"/> SS	<input type="checkbox"/> Other important finding	<input type="checkbox"/> No finding

Were DSM-IV Anxiety Disorders Specified as Outcomes?

Yes No

If Yes, Classify Findings. Check All that Apply.

SS Other Important Finding No Finding

If provided, specify in detail outcomes related to Anxiety Disorders that were identified and classify the significance of the findings.

<input type="checkbox"/> Agoraphobia without history of panic disorder	<input type="checkbox"/> SS	<input type="checkbox"/> Other important finding	<input type="checkbox"/> No finding
<input type="checkbox"/> Generalized anxiety disorder	<input type="checkbox"/> SS	<input type="checkbox"/> Other important finding	<input type="checkbox"/> No finding
<input type="checkbox"/> Obsessive-compulsive disorder	<input type="checkbox"/> SS	<input type="checkbox"/> Other important finding	<input type="checkbox"/> No finding
<input type="checkbox"/> Panic disorder with agoraphobia	<input type="checkbox"/> SS	<input type="checkbox"/> Other important finding	<input type="checkbox"/> No finding
<input type="checkbox"/> Panic disorder without agoraphobia	<input type="checkbox"/> SS	<input type="checkbox"/> Other important finding	<input type="checkbox"/> No finding
<input type="checkbox"/> Post-traumatic stress disorder	<input type="checkbox"/> SS	<input type="checkbox"/> Other important finding	<input type="checkbox"/> No finding
<input type="checkbox"/> Social phobia	<input type="checkbox"/> SS	<input type="checkbox"/> Other important finding	<input type="checkbox"/> No finding
<input type="checkbox"/> Specific phobia	<input type="checkbox"/> SS	<input type="checkbox"/> Other important finding	<input type="checkbox"/> No finding
<input type="checkbox"/> Anxiety disorder – article does not specify	<input type="checkbox"/> SS	<input type="checkbox"/> Other important finding	<input type="checkbox"/> No finding

Were DMS-IV Somatoform Disorders Specified as Outcomes?

Yes No

If Yes, Classify Findings. Check All that Apply.

<input type="checkbox"/> SS	<input type="checkbox"/> Other Important Finding	<input type="checkbox"/> No Finding
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If provided, specify in detail outcomes related to Somatoform Disorders that were identified and classify the significance of the findings.

<input type="checkbox"/> Body dysmorphic disorder	<input type="checkbox"/> SS	<input type="checkbox"/> Other important finding	<input type="checkbox"/> No finding
<input type="checkbox"/> Hypochondriasis	<input type="checkbox"/> SS	<input type="checkbox"/> Other important finding	<input type="checkbox"/> No finding
<input type="checkbox"/> Pain disorder	<input type="checkbox"/> SS	<input type="checkbox"/> Other important finding	<input type="checkbox"/> No finding
<input type="checkbox"/> Somatoform disorder NOS	<input type="checkbox"/> SS	<input type="checkbox"/> Other important finding	<input type="checkbox"/> No finding
<input type="checkbox"/> Somatoform disorder – article does not specify	<input type="checkbox"/> SS	<input type="checkbox"/> Other important finding	<input type="checkbox"/> No finding

Were DSM-IV Dissociative Disorders Specified as Outcomes?

<input type="checkbox"/> Yes	<input type="checkbox"/> No
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If Yes, Classify Findings. Check All that Apply.

<input type="checkbox"/> SS	<input type="checkbox"/> Other Important Finding	<input type="checkbox"/> No Finding
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If provided, specify in detail outcomes related to Dissociative Disorders that were identified and classify the significance of the findings.

<input type="checkbox"/> Dissociative amnesia	<input type="checkbox"/> SS	<input type="checkbox"/> Other important finding	<input type="checkbox"/> No finding
<input type="checkbox"/> Dissociative Fugue	<input type="checkbox"/> SS	<input type="checkbox"/> Other important finding	<input type="checkbox"/> No finding
<input type="checkbox"/> Dissociative identify disorder	<input type="checkbox"/> SS	<input type="checkbox"/> Other important finding	<input type="checkbox"/> No finding
<input type="checkbox"/> Depersonalization disorder	<input type="checkbox"/> SS	<input type="checkbox"/> Other important finding	<input type="checkbox"/> No finding
<input type="checkbox"/> Dissociative disorder NOS	<input type="checkbox"/> SS	<input type="checkbox"/> Other important finding	<input type="checkbox"/> No finding
<input type="checkbox"/> Dissociative disorder - article does not specify	<input type="checkbox"/> SS	<input type="checkbox"/> Other important finding	<input type="checkbox"/> No finding

Were DSM-IV Eating Disorders Specified as Outcomes?

<input type="checkbox"/> Yes	<input type="checkbox"/> No
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If Yes, Classify Findings. Check All that Apply.

<input type="checkbox"/> SS	<input type="checkbox"/> Other Important Finding	<input type="checkbox"/> No Finding
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If provided, specify in detail outcomes related to Eating Disorders that were identified and classify the significance of the findings.

<input type="checkbox"/> Anorexia nervosa	<input type="checkbox"/> SS	<input type="checkbox"/> Other important finding	<input type="checkbox"/> No finding
<input type="checkbox"/> Bulimia nervosa	<input type="checkbox"/> SS	<input type="checkbox"/> Other important finding	<input type="checkbox"/> No finding
<input type="checkbox"/> Eating disorder NOS	<input type="checkbox"/> SS	<input type="checkbox"/> Other important finding	<input type="checkbox"/> No finding
<input type="checkbox"/> Eating disorder - article does not specify	<input type="checkbox"/> SS	<input type="checkbox"/> Other important finding	<input type="checkbox"/> No finding

Were DSM-IV Sleep Disorders Specified as Outcomes?

<input type="checkbox"/> Yes	<input type="checkbox"/> No
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If Yes, Classify Findings. Check All that Apply.

<input type="checkbox"/> SS	<input type="checkbox"/> Other Important Finding	<input type="checkbox"/> No Finding
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If provided, specify in detail outcomes related to Sleep Disorders that were identified and classify the significance of the findings.

<input type="checkbox"/> Dyssomnias	<input type="checkbox"/> SS	<input type="checkbox"/> Other important finding	<input type="checkbox"/> No finding
<input type="checkbox"/> Parasomnias	<input type="checkbox"/> SS	<input type="checkbox"/> Other important finding	<input type="checkbox"/> No finding
<input type="checkbox"/> Sleep disorder - article does not specify	<input type="checkbox"/> SS	<input type="checkbox"/> Other important finding	<input type="checkbox"/> No finding

Were DSM-IV Impulse-Control Disorders Not Elsewhere Classified Specified as Outcomes?

<input type="checkbox"/> Yes	<input type="checkbox"/> No
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If Yes, Classify Findings. Check All that Apply.

<input type="checkbox"/> SS	<input type="checkbox"/> Other Important Finding	<input type="checkbox"/> No Finding
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If provided, specify in detail outcomes related to Impulse-Control Disorders that were identified and classify the significance of the findings.

<input type="checkbox"/> Intermittent explosive disorder	<input type="checkbox"/> SS	<input type="checkbox"/> Other important finding	<input type="checkbox"/> No finding
<input type="checkbox"/> Kleptomania	<input type="checkbox"/> SS	<input type="checkbox"/> Other important finding	<input type="checkbox"/> No finding
<input type="checkbox"/> Pyromania	<input type="checkbox"/> SS	<input type="checkbox"/> Other important finding	<input type="checkbox"/> No finding
<input type="checkbox"/> Pathological gambling	<input type="checkbox"/> SS	<input type="checkbox"/> Other important finding	<input type="checkbox"/> No finding
<input type="checkbox"/> Trichotillomania	<input type="checkbox"/> SS	<input type="checkbox"/> Other important finding	<input type="checkbox"/> No finding
<input type="checkbox"/> Impulse-control disorder NOS	<input type="checkbox"/> SS	<input type="checkbox"/> Other important finding	<input type="checkbox"/> No finding
<input type="checkbox"/> Impulse-control disorder - article does not specify	<input type="checkbox"/> SS	<input type="checkbox"/> Other important finding	<input type="checkbox"/> No finding

Were DSM-IV Adjustment Disorders Specified as Outcomes?

<input type="checkbox"/> Yes	<input type="checkbox"/> No
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If Yes, Classify Findings. Check All that Apply.

<input type="checkbox"/> SS	<input type="checkbox"/> Other Important Finding	<input type="checkbox"/> No Finding
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If provided, specify in detail outcomes related to Adjustment Disorders that were identified and classify the significance of the findings.

<input type="checkbox"/> Adjustment disorder – with depressed mood	<input type="checkbox"/> SS	<input type="checkbox"/> Other important finding	<input type="checkbox"/> No finding
<input type="checkbox"/> Adjustment disorder – with anxiety	<input type="checkbox"/> SS	<input type="checkbox"/> Other important finding	<input type="checkbox"/> No finding
<input type="checkbox"/> Adjustment disorder – with mixed anxiety and depressed mood	<input type="checkbox"/> SS	<input type="checkbox"/> Other important finding	<input type="checkbox"/> No finding
<input type="checkbox"/> Adjustment disorder – with disturbance of conduct	<input type="checkbox"/> SS	<input type="checkbox"/> Other important finding	<input type="checkbox"/> No finding
<input type="checkbox"/> Adjustment disorder – with mixed disturbance of emotions and conduct	<input type="checkbox"/> SS	<input type="checkbox"/> Other important finding	<input type="checkbox"/> No finding
<input type="checkbox"/> Adjustment disorder – unspecified	<input type="checkbox"/> SS	<input type="checkbox"/> Other important finding	<input type="checkbox"/> No finding
<input type="checkbox"/> Adjustment disorder - article does not specify	<input type="checkbox"/> SS	<input type="checkbox"/> Other important finding	<input type="checkbox"/> No finding

Were DSM-IV Personality Disorders Specified as Outcomes?

<input type="checkbox"/> Yes	<input type="checkbox"/> No
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If Yes, Classify Findings. Check All that Apply.

<input type="checkbox"/> SS	<input type="checkbox"/> Other Important Finding	<input type="checkbox"/> No Finding
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If provided, specify in detail outcomes related to Personality Disorders that were identified and classify the significance of the findings.

<input type="checkbox"/> Antisocial personality disorder	<input type="checkbox"/> SS	<input type="checkbox"/> Other important finding	<input type="checkbox"/> No finding
<input type="checkbox"/> Avoidant personality disorder	<input type="checkbox"/> SS	<input type="checkbox"/> Other important finding	<input type="checkbox"/> No finding
<input type="checkbox"/> Borderline personality disorder	<input type="checkbox"/> SS	<input type="checkbox"/> Other important finding	<input type="checkbox"/> No finding
<input type="checkbox"/> Dependent personality disorder	<input type="checkbox"/> SS	<input type="checkbox"/> Other important finding	<input type="checkbox"/> No finding
<input type="checkbox"/> Histrionic personality disorder	<input type="checkbox"/> SS	<input type="checkbox"/> Other important finding	<input type="checkbox"/> No finding
<input type="checkbox"/> Narcissistic personality disorder	<input type="checkbox"/> SS	<input type="checkbox"/> Other important finding	<input type="checkbox"/> No finding
<input type="checkbox"/> Obsessive-compulsive personality disorder	<input type="checkbox"/> SS	<input type="checkbox"/> Other important finding	<input type="checkbox"/> No finding
<input type="checkbox"/> Paranoid personality disorder	<input type="checkbox"/> SS	<input type="checkbox"/> Other important finding	<input type="checkbox"/> No finding
<input type="checkbox"/> Schizotypal personality disorder	<input type="checkbox"/> SS	<input type="checkbox"/> Other important finding	<input type="checkbox"/> No finding
<input type="checkbox"/> Schizoid personality disorder	<input type="checkbox"/> SS	<input type="checkbox"/> Other important finding	<input type="checkbox"/> No finding
<input type="checkbox"/> Personality disorder NOS	<input type="checkbox"/> SS	<input type="checkbox"/> Other important finding	<input type="checkbox"/> No finding

Were DSM-IV Other Conditions that may be a Focus of Clinical Attention Specified as Outcomes?

<input type="checkbox"/> Yes	<input type="checkbox"/> No
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If Yes, Classify Findings. Check All that Apply.

<input type="checkbox"/> SS	<input type="checkbox"/> Other Important Finding	<input type="checkbox"/> No Finding
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If provided, specify in detail outcomes related to Other Conditions that were identified and classify the significance of the findings.

<input type="checkbox"/> Problems of abuse or neglect – child physical abuse	<input type="checkbox"/> SS	<input type="checkbox"/> Other important finding	<input type="checkbox"/> No finding
<input type="checkbox"/> Problems of abuse or neglect – sexual abuse of child	<input type="checkbox"/> SS	<input type="checkbox"/> Other important finding	<input type="checkbox"/> No finding
<input type="checkbox"/> Problems of abuse or neglect – neglect of child	<input type="checkbox"/> SS	<input type="checkbox"/> Other important finding	<input type="checkbox"/> No finding
<input type="checkbox"/> Problems of abuse or neglect – adult physical abuse	<input type="checkbox"/> SS	<input type="checkbox"/> Other important finding	<input type="checkbox"/> No finding
<input type="checkbox"/> Problems of abuse or neglect – adult sexual abuse	<input type="checkbox"/> SS	<input type="checkbox"/> Other important finding	<input type="checkbox"/> No finding
<input type="checkbox"/> Problems of abuse or neglect - article does not specify	<input type="checkbox"/> SS	<input type="checkbox"/> Other important finding	<input type="checkbox"/> No finding

Were EAAT Outcomes Identified Related to ICF Bodily Functions?

Guideline: Check yes if any explanation of outcomes that relate to bodily functions as defined by the ICF were provided. Author does not need to use explicit ICF language, it is up to the clinical rational of the researcher to map onto the ICF framework. If there is a direct link to the subdomains listed in the ICF (in boxes below), then interpretation is appropriate. If yes is checked, proceed to the following questions, being certain to check level of significance.

Guideline: For research reports, yes is checked ONLY if identified outcomes were integrated into the research approach (data must be gathered and analyzed, cannot be reported as a subjective sidenote)

Guideline on Levels of Significance: Check “SS” ONLY if it is a research report, and statistics were provided demonstrating a significant change. Check “other important finding” if authors claim there was a clinically-important or somehow other important finding in quantitative studies, qualitative studies, or for outcomes claimed by conceptual articles. Check “no finding” if item was measured but no outcome was found.

Guideline: The following outcome measures can be coded under ICF BF: Timed-Up and Go Test (TUG) is coded as control of voluntary movement AND gait patterns.

<input type="checkbox"/> Yes	<input type="checkbox"/> No
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Were Outcomes Pertaining to Global Mental Functions Identified?

<input type="checkbox"/> Yes	<input type="checkbox"/> No
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If Yes, Classify Findings. Check All that Apply.

<input type="checkbox"/> SS	<input type="checkbox"/> Other Important Finding	<input type="checkbox"/> No Finding
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If provided, specify in detail outcomes related to Global Mental Functions that were identified and classify the significance of the findings.

<input type="checkbox"/> Consciousness	<input type="checkbox"/> SS	<input type="checkbox"/> Other important finding	<input type="checkbox"/> No finding
<input type="checkbox"/> Energy and Drive (motivation, appetite, impulse control)	<input type="checkbox"/> SS	<input type="checkbox"/> Other important finding	<input type="checkbox"/> No finding
<input type="checkbox"/> Intellectual	<input type="checkbox"/> SS	<input type="checkbox"/> Other important finding	<input type="checkbox"/> No finding
<input type="checkbox"/> Orientation (time, place, person)	<input type="checkbox"/> SS	<input type="checkbox"/> Other important finding	<input type="checkbox"/> No finding
<input type="checkbox"/> Psychosocial (interpersonal skills, social interactions)	<input type="checkbox"/> SS	<input type="checkbox"/> Other important finding	<input type="checkbox"/> No finding
<input type="checkbox"/> Temperament and Personality	<input type="checkbox"/> SS	<input type="checkbox"/> Other important finding	<input type="checkbox"/> No finding
<input type="checkbox"/> Sleep	<input type="checkbox"/> SS	<input type="checkbox"/> Other important finding	<input type="checkbox"/> No finding
<input type="checkbox"/> Other	<input type="checkbox"/> SS	<input type="checkbox"/> Other important finding	<input type="checkbox"/> No finding

Were ICF Outcomes of Specific Mental Functions Identified?

<input type="checkbox"/> Yes	<input type="checkbox"/> No
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If Yes, Classify Findings. Check All that Apply.

<input type="checkbox"/> SS	<input type="checkbox"/> Other Important Finding	<input type="checkbox"/> No Finding
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If provided, specify in detail outcomes related to Specific Mental Functions that were identified and classify the significance of the findings.

<input type="checkbox"/> Attention	<input type="checkbox"/> SS	<input type="checkbox"/> Other important finding	<input type="checkbox"/> No finding
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<input type="checkbox"/> Calculation	<input type="checkbox"/> SS	<input type="checkbox"/> Other important finding	<input type="checkbox"/> No finding
<input type="checkbox"/> Emotional Functions	<input type="checkbox"/> SS	<input type="checkbox"/> Other important finding	<input type="checkbox"/> No finding
<input type="checkbox"/> Higher level cognitive functions (volition, organization)	<input type="checkbox"/> SS	<input type="checkbox"/> Other important finding	<input type="checkbox"/> No finding
<input type="checkbox"/> Language	<input type="checkbox"/> SS	<input type="checkbox"/> Other important finding	<input type="checkbox"/> No finding
<input type="checkbox"/> Memory	<input type="checkbox"/> SS	<input type="checkbox"/> Other important finding	<input type="checkbox"/> No finding
<input type="checkbox"/> Perception	<input type="checkbox"/> SS	<input type="checkbox"/> Other important finding	<input type="checkbox"/> No finding
<input type="checkbox"/> Psychomotor (appropriate affect, response time, excitement)	<input type="checkbox"/> SS	<input type="checkbox"/> Other important finding	<input type="checkbox"/> No finding
<input type="checkbox"/> Sensory Processing	<input type="checkbox"/> SS	<input type="checkbox"/> Other important finding	<input type="checkbox"/> No finding
<input type="checkbox"/> Sequencing Complex Movement (praxis)	<input type="checkbox"/> SS	<input type="checkbox"/> Other important finding	<input type="checkbox"/> No finding
<input type="checkbox"/> Thought	<input type="checkbox"/> SS	<input type="checkbox"/> Other important finding	<input type="checkbox"/> No finding
<input type="checkbox"/> Other	<input type="checkbox"/> SS	<input type="checkbox"/> Other important finding	<input type="checkbox"/> No finding

Were ICF Outcomes Pertaining to Sensory Functions or Pain Identified?

Yes No

If Yes, Classify Findings. Check All that Apply.

SS Other Important Finding No Finding

If provided, specify in detail outcomes related to Sensory Functions that were identified and classify the significance of the findings.

<input type="checkbox"/> Auditory	<input type="checkbox"/> SS	<input type="checkbox"/> Other important finding	<input type="checkbox"/> No finding
<input type="checkbox"/> Pain	<input type="checkbox"/> SS	<input type="checkbox"/> Other important finding	<input type="checkbox"/> No finding
<input type="checkbox"/> Proprioception	<input type="checkbox"/> SS	<input type="checkbox"/> Other important finding	<input type="checkbox"/> No finding
<input type="checkbox"/> Smell	<input type="checkbox"/> SS	<input type="checkbox"/> Other important finding	<input type="checkbox"/> No finding
<input type="checkbox"/> Taste	<input type="checkbox"/> SS	<input type="checkbox"/> Other important finding	<input type="checkbox"/> No finding
<input type="checkbox"/> Touch	<input type="checkbox"/> SS	<input type="checkbox"/> Other important finding	<input type="checkbox"/> No finding
<input type="checkbox"/> Temperature	<input type="checkbox"/> SS	<input type="checkbox"/> Other important finding	<input type="checkbox"/> No finding
<input type="checkbox"/> Vestibular	<input type="checkbox"/> SS	<input type="checkbox"/> Other important finding	<input type="checkbox"/> No finding
<input type="checkbox"/> Visual	<input type="checkbox"/> SS	<input type="checkbox"/> Other important finding	<input type="checkbox"/> No finding
<input type="checkbox"/> Other	<input type="checkbox"/> SS	<input type="checkbox"/> Other important finding	<input type="checkbox"/> No finding

Were ICF Outcomes of Voice and Speech Functions Identified?

Yes No

If Yes, Classify Findings. Check All that Apply.

SS Other Important Finding No Finding

If provided, specify in detail outcomes related to Speech Functions that were identified and classify the significance of the findings

<input type="checkbox"/> Alternative vocalization	<input type="checkbox"/> SS	<input type="checkbox"/> Other important finding	<input type="checkbox"/> No finding
<input type="checkbox"/> Articulation	<input type="checkbox"/> SS	<input type="checkbox"/> Other important finding	<input type="checkbox"/> No finding
<input type="checkbox"/> Fluency and rhythm of speech	<input type="checkbox"/> SS	<input type="checkbox"/> Other important finding	<input type="checkbox"/> No finding
<input type="checkbox"/> Voice	<input type="checkbox"/> SS	<input type="checkbox"/> Other important finding	<input type="checkbox"/> No finding
<input type="checkbox"/> Other	<input type="checkbox"/> SS	<input type="checkbox"/> Other important finding	<input type="checkbox"/> No finding

Were ICF Outcomes of Hematological, Immunological and Respiratory Systems Identified?

Yes No

If Yes, Classify Findings. Check All that Apply.

SS Other Important Finding No Finding

If provided, specify in detail outcomes related to Hematological, Immunological and Respiratory System Functions that were identified and classify the significance of the findings

<input type="checkbox"/> Cardiovascular (heart rate)	<input type="checkbox"/> SS	<input type="checkbox"/> Other important finding	<input type="checkbox"/> No finding
<input type="checkbox"/> Haematological (blood pressure)	<input type="checkbox"/> SS	<input type="checkbox"/> Other important finding	<input type="checkbox"/> No finding
<input type="checkbox"/> Immunological	<input type="checkbox"/> SS	<input type="checkbox"/> Other important finding	<input type="checkbox"/> No finding
<input type="checkbox"/> Respiratory system (breathing)	<input type="checkbox"/> SS	<input type="checkbox"/> Other important finding	<input type="checkbox"/> No finding
<input type="checkbox"/> Other	<input type="checkbox"/> SS	<input type="checkbox"/> Other important finding	<input type="checkbox"/> No finding

Were ICF Outcomes Related to Digestive, Metabolic and Endocrine Systems Identified?

Yes No

If Yes, Classify Findings. Check All that Apply.

SS Other Important Finding No Finding

If provided, specify in detail outcomes related to Digestive, Metabolic and Endocrine System Functions that were identified and classify the significance of the findings.

<input type="checkbox"/> Related to digestive system	<input type="checkbox"/> SS	<input type="checkbox"/> Other important finding	<input type="checkbox"/> No finding
<input type="checkbox"/> Related to endocrine system	<input type="checkbox"/> SS	<input type="checkbox"/> Other important finding	<input type="checkbox"/> No finding
<input type="checkbox"/> Related to metabolism	<input type="checkbox"/> SS	<input type="checkbox"/> Other important finding	<input type="checkbox"/> No finding
<input type="checkbox"/> Other	<input type="checkbox"/> SS	<input type="checkbox"/> Other important finding	<input type="checkbox"/> No finding

Were Outcomes of Musculoskeletal and Movement-related Functions Identified?

Yes No

If Yes, Classify Findings. Check All that Apply.

SS Other Important Finding No Finding

If provided, specify in detail outcomes related to Musculoskeletal and Movement-related Functions that were identified and classify the significance of the findings.

Joints and Bones			
<input type="checkbox"/> Mobility of joint	<input type="checkbox"/> SS	<input type="checkbox"/> Other important finding	<input type="checkbox"/> No finding
<input type="checkbox"/> Mobility of bone	<input type="checkbox"/> SS	<input type="checkbox"/> Other important finding	<input type="checkbox"/> No finding
<input type="checkbox"/> Stability of joint	<input type="checkbox"/> SS	<input type="checkbox"/> Other important finding	<input type="checkbox"/> No finding
Muscle			
<input type="checkbox"/> Muscle endurance	<input type="checkbox"/> SS	<input type="checkbox"/> Other important finding	<input type="checkbox"/> No finding
<input type="checkbox"/> Muscle power	<input type="checkbox"/> SS	<input type="checkbox"/> Other important finding	<input type="checkbox"/> No finding
<input type="checkbox"/> Muscle tone	<input type="checkbox"/> SS	<input type="checkbox"/> Other important finding	<input type="checkbox"/> No finding
Movement			
<input type="checkbox"/> Control of voluntary movement	<input type="checkbox"/> SS	<input type="checkbox"/> Other important finding	<input type="checkbox"/> No finding
<input type="checkbox"/> Gait patterns	<input type="checkbox"/> SS	<input type="checkbox"/> Other important finding	<input type="checkbox"/> No finding
<input type="checkbox"/> Involuntary movement	<input type="checkbox"/> SS	<input type="checkbox"/> Other important finding	<input type="checkbox"/> No finding
<input type="checkbox"/> Motor reflex	<input type="checkbox"/> SS	<input type="checkbox"/> Other important finding	<input type="checkbox"/> No finding
<input type="checkbox"/> Sensations related to muscle and movement	<input type="checkbox"/> SS	<input type="checkbox"/> Other important finding	<input type="checkbox"/> No finding
<input type="checkbox"/> Other	<input type="checkbox"/> SS	<input type="checkbox"/> Other important finding	<input type="checkbox"/> No finding

Were EAAT Outcomes Identified Related to ICF Bodily Structures?

Guideline: Check yes if any explanation of outcomes that relate to bodily structures as defined by the ICF were provided. If yes, proceed to the following questions, being certain to check if statistically SS were identified. In order for a finding to be identified as statistically significant, the paper must report on a specific research study, meeting all criteria for research.

Guideline: Author does not need to use explicit ICF language, it is up to the clinical rational of the researcher to map onto the ICF framework. If there is a direct link to the subdomains listed in the ICF (in boxes below), then interpretation is appropriate.

Yes No

If Yes, What Bodily Structure Outcomes were Described?

Were EAAT Outcomes Identified Related to Activity/Participation in the ICF?

Guideline: Author does not need to use explicit ICF language, it is up to the clinical rational of the researcher to map onto the ICF framework. If there is a direct link to the subdomains listed in the ICF (in boxes below), then interpretation is appropriate.

Guideline: Refer to ICF definitions of Activity and Participation when considering where to code outcomes. "Activity is the execution of a task or action by an individual. Participation is involvement in a life situation" (WHO, 2002, p. 10).

Guideline: In order to code as activity/participation the outcome must be related to task behavior that occurs in any context.

Yes No

If Yes, Classify Findings. Check All that Apply.

SS Other Important Finding No Finding

If provided, specify in detail outcomes related to activity/participation that were identified and classify the significance of the findings.

<input type="checkbox"/> Carrying and Handling Objects	<input type="checkbox"/> SS	<input type="checkbox"/> Other important finding	<input type="checkbox"/> No finding
<input type="checkbox"/> Civic Participation	<input type="checkbox"/> SS	<input type="checkbox"/> Other important finding	<input type="checkbox"/> No finding
<input type="checkbox"/> Communication (reception and production)	<input type="checkbox"/> SS	<input type="checkbox"/> Other important finding	<input type="checkbox"/> No finding
<input type="checkbox"/> Community Participation	<input type="checkbox"/> SS	<input type="checkbox"/> Other important finding	<input type="checkbox"/> No finding
<input type="checkbox"/> Domestic life (household tasks)	<input type="checkbox"/> SS	<input type="checkbox"/> Other important finding	<input type="checkbox"/> No finding
<input type="checkbox"/> Education	<input type="checkbox"/> SS	<input type="checkbox"/> Other important finding	<input type="checkbox"/> No finding
<input type="checkbox"/> General tasks and demands (single task, routines)	<input type="checkbox"/> SS	<input type="checkbox"/> Other important finding	<input type="checkbox"/> No finding
<input type="checkbox"/> Interpersonal interactions and relationships	<input type="checkbox"/> SS	<input type="checkbox"/> Other important finding	<input type="checkbox"/> No finding
<input type="checkbox"/> Learning and applying knowledge	<input type="checkbox"/> SS	<input type="checkbox"/> Other important finding	<input type="checkbox"/> No finding
<input type="checkbox"/> Play	<input type="checkbox"/> SS	<input type="checkbox"/> Other important finding	<input type="checkbox"/> No finding
<input type="checkbox"/> Recreation and Leisure	<input type="checkbox"/> SS	<input type="checkbox"/> Other important finding	<input type="checkbox"/> No finding
<input type="checkbox"/> Religion and Spirituality	<input type="checkbox"/> SS	<input type="checkbox"/> Other important finding	<input type="checkbox"/> No finding
<input type="checkbox"/> Self-care	<input type="checkbox"/> SS	<input type="checkbox"/> Other important finding	<input type="checkbox"/> No finding
<input type="checkbox"/> Walking and Moving	<input type="checkbox"/> SS	<input type="checkbox"/> Other important finding	<input type="checkbox"/> No finding
<input type="checkbox"/> Work	<input type="checkbox"/> SS	<input type="checkbox"/> Other important finding	<input type="checkbox"/> No finding
<input type="checkbox"/> Any other activity	<input type="checkbox"/> SS	<input type="checkbox"/> Other important finding	<input type="checkbox"/> No finding

Where Were Outcomes Measured?

Community
 Contrived health care or research setting
 EAAT Context
 Home
 School
 Work
 Other*

*(write- in for other)

Were Any Other Additional Quantitative Outcomes Identified?

Yes No

If yes, write-In additional outcomes and classify their significance

Guideline: Include all quantitative finding not captured elsewhere in the tool, including personal factors.

Guideline: Mutually exclusive significance, only check one level of significance for each outcome.

Guideline: Any outcomes related to the horse should be coded as "horse – _____" (horse as a prefix) to differentiate between people and horse outcomes.

Guideline: Horse outcomes related to horse height, wither height, or hands high, can be coded as the outcome "height of withers."

	<input type="checkbox"/> SS	<input type="checkbox"/> Other Important Finding	<input type="checkbox"/> No Finding
	<input type="checkbox"/> SS	<input type="checkbox"/> Other Important Finding	<input type="checkbox"/> No Finding
	<input type="checkbox"/> SS	<input type="checkbox"/> Other Important Finding	<input type="checkbox"/> No Finding

	<input type="checkbox"/> SS	<input type="checkbox"/> Other Important Finding	<input type="checkbox"/> No Finding
	<input type="checkbox"/> SS	<input type="checkbox"/> Other Important Finding	<input type="checkbox"/> No Finding
	<input type="checkbox"/> SS	<input type="checkbox"/> Other Important Finding	<input type="checkbox"/> No Finding

Were Any Additional Qualitative Findings or Outcomes Identified?

Guideline: If themes were provided list major themes with brief description. Remain close to author's language and quote when possible.

<input type="checkbox"/> Yes	<input type="checkbox"/> No
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VII. Levels of Effectiveness, Appropriateness & Feasibility

Guideline: This section should only be completed for papers classified as research.

Does this Paper Provide Empirical Evidence of Effectiveness or Ineffectiveness Regarding the Intervention?

Guideline: Effectiveness relates to “whether the intervention achieves intended outcomes and so is concerned with issues such as: Does the intervention work? What are the benefits and harm? Who will benefit from its use?” (Evans, 2003, p. 80).

<input type="checkbox"/> Yes	<input type="checkbox"/> No
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If yes, explain the nature of the evidence

(Write-In Access)

Does this Paper Provide Empirical Evidence of Appropriateness or Inappropriateness Regarding the Intervention?

Guideline: Appropriateness addresses “the impact of the intervention from the perspective of its recipient. It is concerned with the psychosocial aspects of care reflected in questions like: What is the experience of the consumer? What health issues are important to the consumer? Does the consumer view the outcomes as beneficial?” (Evans, 2003, p. 81).

Guideline: Only check yes if information is given from the viewpoint of people coded as participants in section III. The data must explicitly represent the participants’ perspectives.

<input type="checkbox"/> Yes	<input type="checkbox"/> No
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If yes, explain the nature of the evidence

(Write-In Access)

Does this Paper Provide Empirical Evidence of Feasibility or Lack of Feasibility Regarding the Intervention?

<input type="checkbox"/> Yes	<input type="checkbox"/> No
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If yes, explain the nature of the evidence

Section VIII. Key Impressions

Write key impressions about this article below.