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Empowering children with post-traumatic stress disorder through horse connection in occupational therapy

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Doctoral Project

EMPOWERING CHILDREN WITH POST-TRAUMATIC STRESS DISORDER THROUGH HORSE CONNECTION IN OCCUPATIONAL THERAPY

by

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DEDICATION

To my family. A special feeling of gratitude to my loving parents, Paul and Michele Saccoccia for always supporting me, my brother James Saccoccia for being there through my darkest times, and my sister Nichole Saccoccia for her encouragement. Thank you all from the bottom of my heart.

In memory of Bailey Saccoccia, my first dog, who was with me at the beginning of my doctoral journey. You will always be the center of my world. I am grateful for our time together and the unconditional love through it all. My life is better after having the opportunity to love and care for a dog like you.

In memory of Quill, also known as "Handsome," who I will always consider my forever horse. It is with special feelings of gratefulness and appreciation that I share the positive impact you had and continue to have on my life. It is because of you I chose this path.

"Until one has loved an animal, a part of one's soul remains unawakened."

–Anatole France

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ABSTRACT

Childhood trauma and post-traumatic stress disorder (PTSD) is a growing mental health concern in pediatric occupational therapy (OT). More than two thirds of children report at least one traumatic event by age sixteen. Of the children with at least one reportable trauma, an estimated 3–15% of girls and 14–43% of boys will go onto develop PTSD. The consequences of undiagnosed and/or untreated pediatric PTSD include negative long-term health implications through adulthood that negatively impact quality of life. Negative implications may include depression, anxiety, substance abuse, high-risk sexual behavior, chronic diseases, and even suicide. Children with PTSD experience chronic stress responses that inhibits their willingness and interest to socialize, process social information, and develop relational skills towards others while performing daily activities. A two-part solution is discussed in this dissertation that includes educating occupational therapy practitioners (OTPs) about the benefits of incorporating equines for children with trauma and PTSD and review of a proposed program evaluation study. The proposed program evaluation study will help contribute to provider knowledge and research gaps of how horses impact pediatric social skills and their mental health. This

dissertation will also discuss a plan for program implementation, evaluation, funding, and dissemination.

PREFACE

This journey has been a remarkable start in the pursuit of understanding the horse-child connection. I am both humbled and honored by my professional experiences with horses and children. My decision to explore this specialty area of practice stems from two important, unforgettable animals in my life, Bailey and Quill. My relationships with these animals enriched and shaped my life in ways I could never have imagined. In their memory, I aspire to carry on their legacies to help others and someday contribute to future research.

It is my sincerest hope that this work serves as a testament to the boundless possibilities of occupational therapy in fostering advancement of clinical practice incorporating equines. May furthering our understanding of the horse-child connection in pediatric occupational therapy continue to help the lives of children and those alike within and beyond our profession.

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LIST OF ABBREVIATIONS

ACE..... Adverse Childhood Experience

ADHD..... Attention Deficit Hyperactivity Disorder

AHA.....American Hippotherapy Association

EAE..... Equine Assisted Education

EAGALA .....Equine Assisted Growth & Learning Association

EAT..... Equine Assisted Therapy

EFP.....Equine Facilitated Psychotherapy

ET.....Equine Therapy

OT .....Occupational Therapy

OTP..... Occupational Therapy Practitioner

PATH Intl.....Professional Association of Therapeutic Horsemanship International

PMH..... Pediatric Mental Health

PTSD..... Post-Traumatic Stress Disorder

TR .....Therapeutic Riding

CHAPTER ONE – Introduction

Children and families are experiencing significant stressors and traumatic exposures from a wide range of global, national, and local problems. Two out of three children will report a traumatic event by age 16 (Substance Abuse & Mental Health Services Administration, 2023). Some examples of these stressors include natural disasters, war, accidents, economic hardship, and experience or direct witnessing of abusive, neglectful, and/or violent behavior. Exposure and/or experience of traumatic events can put children at risk for developing post-traumatic stress disorder (PTSD). Traumatic occurrences longitudinally affect a child's health negatively through adulthood (CDC, 2023). Therefore, it is critical for occupational therapy practitioners (OTPs) to understand the rising mental health needs in pediatric PTSD as a public mental health crisis, as well as what occupational therapy (OT) interventions may help children (Tolliver & Hostutler, 2022).

Children who have existing pediatric mental health (PMH) disorders such as anxiety, depression, and attention deficit hyperactivity disorder are at a heightened risk for developing PTSD (Danese et al., 2020). According to McLaughlin et al., an estimated 3–15% of girls and 14–43% of boys develop PTSD (2023). With the added complexity of only an estimated 10% of children reporting their abuse, identifying traumatic experiences, and understanding changes in a child's behavior can be challenging, especially given the shared symptomatology across all PMHs.

Pediatric Post-Traumatic Stress Disorder and the Impact on Occupational Performance

Children with PTSD who experience heightened levels of stress have difficulties with socialization. Children may discontinue participation in activities that previously brought them joy by withdrawing from social events, activities, and occupations. They may also experience changes in mood and behavior, such as aggression (Moscholouri & Chandolias, 2021). When a child experiences an internal stress response, such as fight/flight, they are less able to control impulses and engage rational or logical executive functions such as decision making and problem solving. Internal stress responses that trigger their body's survival instinct can lead to difficulty registering social cues, processing social information, and relating to others. Repeated occurrences of stressful responses may also negatively impact their brain development resulting in shrinking of the prefrontal cortex, hippocampus, and growth of the amygdala (Smith & Pollak, 2020). These neurological changes can lead to difficulties in memory, learning, and regulating emotions and thoughts during social exchanges with others.

Pediatric Post-Traumatic Stress Disorder and Occupational Therapy

OTPs have a skill set in mental health and activity analysis that allows for careful examination of specific motor and process skills through observation. OTPs are trained to work with children and families to identify aspects of their daily life that have been affected by trauma and/or PTSD. Together, OTPs help to identify the child's strengths, understand sources of motivation, and deficits in occupational performance throughout the recovery process (AOTA, 2020). By promoting a child's engagement in health

supporting occupations, OTPs can help increase social supports, community engagement, coping strategies, and symptom stabilization/management (AOTA, 2018). OTPs have a distinct opportunity to contribute to current knowledge and research gaps in this specialty, educate providers (e.g., allied health, medical, educational etc.), and advocate for the OT scope of practice that incorporates horses.

Researchers report that strong social relationships and support can positively impact a child's health by helping them learn to respond to stress in healthy ways, enhance resiliency to stressful situations, reduce medical morbidity and mortality, and mediate the severity of symptoms (Chang et al., 2023). Research also reports children with PTSD who experience social support and have a belief in the existence of social support experience reduced psychological distress (Harandi et al., 2017). Therefore, social-based interventions are essential for children with PTSD so they can learn to feel safe, successful, and supported in social environments.

Utilization of horses as an intervention to support children with PTSD is beginning to show positive outcomes. While some OTPs have a general understanding of the benefits with animal-assisted interventions involving horses, some providers may not know the evidence-based benefits. OTPs may also be less familiar with understanding how to work with horses and how horses help people with mental health difficulties as opposed to individuals with more physical needs. Horses can be incorporated into OT practice as an occupation-based intervention that provides individuals across the age span with a variety of psychological and social benefits. They are particularly effective at promoting socialization. Due to their instinctive mentality, horses are especially sensitive

to non-verbal cues such as facial expressions and body position. Horses are also responsive to touch, body pressure, and vocalizations. Children with PTSD who may be unaware, unable, and unwilling to communicate their feelings, wants, and needs benefit from the authentic responses from the horse (Hojgaard-Boytler & Argentzell, 2023). Through this connection, children report feeling less alone throughout the therapeutic process and experience reductions in their trauma symptoms (Harvey et al., 2020; Moscholouri & Chandolias, 2021, Shelef et al., 2019; Signal et al., 2013).

Overview of Horses Benefits

There are several therapeutic attributes that make horses an invaluable therapeutic option in pediatric OT. In addition to the positive impacts of horse movement, horses offer a full body, immersive sensory experience for all the senses. They also provide natural opportunities for social interaction and attachment. The combination of these therapeutic attributes is irreplicable in any clinical setting and can offer numerous mental health benefits for children. Horses can positively impact psychological development, sensory processing, motor coordination and strength, and socialization (Frederick et al., 2015; Harvey et al., 2020; Hojgaard-Boytler & Argentzell, 2022; Johansen et al., 2016; Sharpe, 2014; Ward et al., 2022).

Significant provider knowledge and research gaps exist regarding horse interventions. Even though horses positively impact child development and PMH, less is known about how this happens and what mechanisms are involved. As a result of these foundational gaps, it can be difficult to confidently predict intervention efficacy. It is important to note that some research involving horses refers to positive

phenomenological changes that occur between horses and children in therapy, however these changes cannot yet be explained by theory. Without clearly identifiable mechanisms and supportive theoretical frameworks, interventions with horses lack the evidence needed to justify effectiveness.

Additionally, studies involving horses generally lack randomization, have low sample numbers, and are low level evidence study designs such as quasi-experimental or case studies that impact the efficacy of interventions (Naste et al., 2018). Systematic reviews have found that studies also lack control groups (Norwood et al., 2022) and utilize mixed methodologies that result in poor uniformity and generalizability across studies (Coman et al., 2018; Kendall et al, 2015; Maresca, 2020). Between known knowledge and research gaps, the efficacy of horse interventions has long been questioned and requires ongoing research.

The Proposed Solution

No studies have attempted to evaluate the quality of social interactions that occurs in OT utilizing equines for children with PTSD. Part of the solution discussed in this dissertation is to address the underlying provider and knowledge deficits in this area of practice through a proposed program evaluation study, *Unbridled*. *Unbridled* will provide a private OT service that incorporates horses as an intervention for five children who have PTSD between the ages 5–10 years old. The aim of *Unbridled* is to help children improve their mental health by improving socialization skills during daily activities through structured activities with a horse. Activities with the horse will consist of a combination of social cue prompting that orients the child's attention to the horse's social

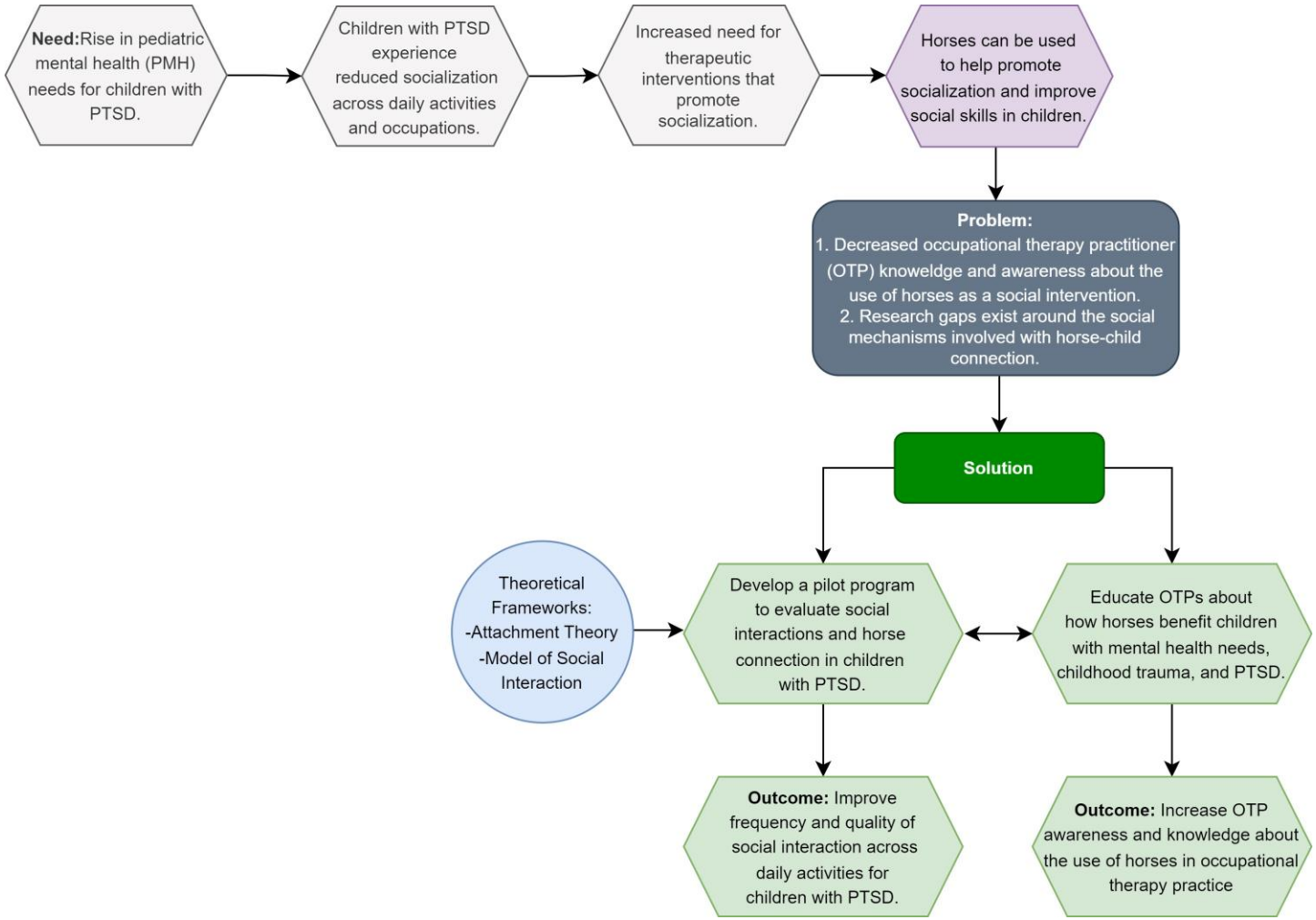
cues and behavior, hippotherapy, and social interactions with the horse. This program evaluation will utilize both a mixed method research design that collects both qualitative and quantitative data. Below in Figure 1.1 is the visual model for this dissertation that summarizes pediatric health needs, the problems faced in OT practice, and proposed solutions.

Conclusion

This dissertation and the program *Unbridled* has the potential to contribute to known provider knowledge and research gaps. The following chapters will further expand on the literature related to PMH, interventions involving the use of horses, and a proposed program evaluation study. By increasing an understanding of current PMH needs and how horses help to promote pediatric mental health through socialization, OTPs can understand how to provide meaningful occupation-based interventions that promote healing and a healthier quality of life.

Figure 1.1

Visual Model



CHAPTER TWO – Pediatric Mental Health Evidence Base

Children are experiencing significant stressors from a wide range of global, national, and local events, including war, the Covid-19 pandemic, hate crimes, gun violence, substance abuse, political distress, and economic hardship. These stressors not only negatively impact pediatric mental health (PMH) but can also negatively affect children's health throughout their adulthood (CDC, 2023). It is critical for occupational therapy practitioners (OTPs) to understand pediatric mental health needs and changes, including the rising prevalence in childhood trauma and pediatric post-traumatic stress disorder (PTSD). By deepening their understanding of pediatric mental health needs, OTPs can better understand the needs of children and incorporate promising and evidence-based interventions that will help children cope and thrive despite traumatic experiences.

Pediatric Mental Health

PMH is important for children to develop into adults who live long, healthy, and meaningful lives. A critical element of PMH involves socialization. Researchers report that strong social relationships and support can positively impact a child’s PMH by helping them learn to respond to stress in healthy ways, enhance resiliency to stressful situations, reduce medical morbidity and mortality, and mediate the severity of PMH disorder symptoms related to depression and anxiety (Chang et al., 2023). Since PMH disorders generally lead to disruptions and/or changes to a child’s socialization abilities, interests, and supports, it becomes critical to recognize the significance that socialization can have in promoting PMH.

In early childhood development, PMH and attachment are influenced by the social interactions that occur between primary caregivers and their infants following birth. John Bowlby theorized attachment as, "A behavior that results in a person attaining or maintaining proximity to some other clearly identified individual who is conceived as better able to cope with the world" (Bowlby, 1988, p. 27). Attachment theory states that responsive caregivers positively influence infant self-regulation which allows for healthy development and confident exploration in their environment (Bowlby, 1988). Attachment has been found to have long term health implications. Disruption in attachment can have detrimental effects on a child's social development, ability to form social relationships, and self-regulate their emotions through adulthood (Bowlby, 1988). Therefore, understanding a child's family dynamics and social history can be important for OTPs to consider when planning interventions and/or providing recommendations that would benefit the child.

Social determinants can impact PMH. Children are unable to control, change, or mitigate the stressful experiences they are exposed to throughout their childhood which makes consideration of social histories important for OTPs. For example, children cannot control where they live, who they live with, their caregivers' incomes, their caregivers' mental health, or their access to such resources as shelter, food, clothing, or healthcare. When children live in stressful environments that do not have adequate resources, they are more susceptible to developing a PMH disorder, particularly when the family is at or below the federal poverty criteria (Hoffman et al., 2020). OTPs can use this information to determine whether the environment or context of the child's life may be contributing to

daily functioning. Additionally, understanding social determinants may influence OTP recommendations for other community services and supports.

In addition to understanding what PMH is, it is also important to review historical contexts and trends over the last decade to understand pediatric health and social needs. Occupational therapy (OT) services that prioritize safe socialization experiences and social support can positively impact PMH. Therefore, it is essential to understand how PMH disorders influence socialization changes in children and how OTPs can respond to provide informed and effective services.

Pediatric Mental Health Disorders

Overview

According to the CDC, the most common mental health disorders among children in the United States ages 3–17 are anxiety, depression, behavioral disorders, and attention deficit hyperactivity disorder (ADHD) (CDC, 2023). The prevalence of these PMH disorders is concerning, as approximately one in three children have anxiety and one in five have depression (CDC, 2023). The rate at which children are diagnosed with these disorders has increased by 5% for both anxiety and depression since 2011 (CDC, 2023). Some children may also experience two or more comorbid conditions together such as anxiety and depression, or anxiety and ADHD. Children with anxiety, depression, and/or ADHD may experience disruptive sleep patterns, mood changes, difficulty concentrating, disrupted executive functions (e.g., variable attention, poor time management, difficulty planning etc.), somatic complaints such as headache or stomachache, emotional dysregulation such as crying, low energy, and low interest/participation in daily activities.

Other PMH disorders include adverse childhood experiences (ACEs), childhood trauma, and pediatric PTSD. ACEs, childhood trauma, and pediatric PTSD are growing national health concerns as trauma can negatively impact an individual's health through adulthood. Since trauma can lead to PTSD and significant changes in a child's behavior, development, and quality of life it is important for OTPs to understand the current problems faced by children.

Pediatric Trauma

Adverse Childhood Experiences

ACES are defined as traumatic experiences that occur in a child's immediate environment before age eighteen (Swedo et al., 2023; Webster, 2022). ACEs may consist of abuse (physical, mental, emotional, or sexual), neglect (physical or emotional), or household challenges (mental illness, substance abuse, divorce, or violence) that negatively impact a child's functioning, health, and/or quality of life (CDC, 2021). The Center for Disease Control reports that children with ACEs are at a higher risk of experiencing negative changes in their health involving brain development, immune system function, and may increase a child's susceptibility to injury, disease, and suicide (2023). ACEs are also associated with poor academic performance, educational achievements, and life opportunities (CDC, 2023; Webster, 2022). Lastly, children who experience ACEs, especially multiple ACEs, are more likely to experience poor health outcomes in adulthood that can negatively influence their quality of life (CDC, 2023).

The prevalence of ACEs across the United States varies from state to state. Two thirds of adult's report experiencing one ACE during their childhood (Swedo et al.,

2023). ACEs are highest among women, adults who are unable to work, adults with less than a high school education, adults between ages 25–34, and non-Hispanic American Indian or Alaska Native adults, and multi-racial adults (Swedo et al., 2023). Children who experience two or more ACEs before eighteen years are 44% more likely to have depressive disorder as an adult (CDC, 2023). Symptoms of ACEs may include but are not limited to, depression, high-risk behavior (e.g., smoking, drinking, substance abuse etc.), disordered eating, insomnia, difficulty concentrating, poor academic performance, and anxiety. Children experiencing ACEs benefit from therapeutic interventions to help promote positive coping strategies and encourage healthy life habits and routines to live a healthier quality of life.

Sexual abuse, the most common type of ACE, is defined as a child's involvement in sexual activity that violates the law, is non-consensual, that the child is not developmentally prepared for and/or cannot provide consent (CDC, 2022). Sexual abuse is considered a predictor for suicidal ideation (Bahk et al., 2017). In fact, children who experience sexual abuse are more likely to attempt/commit suicide (Bahk et al., 2017). This is especially important to consider when less than 10% of children report their abuse (Know & Tell, 2024). Children report feelings of shame, guilt, and fear which prevents them from reporting their abuse and seeking help. This information substantiates the phenomenon of sexual abuse trauma survivors reporting their trauma later in adulthood. Knowing the signs of sexual abuse is also important within the realm of childhood trauma and PTSD. Generally, children who are sexually abused exhibit a fear of being alone, detachment, self-harm, de-personalization, difficulty concentrating, and history of

suicidal ideation and attempts. Children who experience sexual abuse are also more likely to experience disruptions in daily occupations such as self-feeding, personal hygiene, and/or sleep disturbance. OTPs working with children that have experienced trauma need to know the signs and symptoms of sexual abuse, as this may require mandated reporting and referral to their pediatrician and/or other qualified providers.

Traumatic Childhood Experiences

A traumatic childhood event can be described as, "A frightening, dangerous, violent event that poses threat to a child's life or bodily integrity" (The National Child Traumatic Stress Network, n.d.). Traumatic childhood experiences can include physical injury from accidents, natural disasters, and/or abuse. In the United States, pediatric trauma is the leading cause of death in children over one year old (Oliver et al., 2018). Children who experience trauma may report somatic complaints, experience changes in bowel/bladder function, exhibit clinginess, change their eating habits, and/or experience sleep disturbance (The National Child Traumatic Stress Network, n.d.). Difficulties with these daily activities can also lead to difficulty interacting with others (The National Child Traumatic Stress Network, n.d.). When children experience recurring symptoms that persist beyond a month that cause disruption to psychological function, persistent avoidance of stimuli, and negative alterations in cognition that results in behavioral changes and sleep disruption, they may be experiencing PTSD. Children with these signs and symptoms benefit from referral to their pediatrician and/or other qualified mental health professionals (Taylor-Desir, 2022).

Pediatric Post-Traumatic Stress Disorder

PTSD is defined as a psychiatric disorder that may occur in people who have experienced a traumatic event, series of traumatic events, or set of traumatic circumstances (Taylor-Desir, 2022). Examples of life situations that may elicit a traumatic experience includes but is not limited to natural disasters, war, sexual assault, bullying, abuse, and/or a serious accident. The American Psychiatric Association estimates that one in eleven people will be diagnosed with PTSD in their lifetime (Taylor-Desir, 2022). Children or adults with PTSD experience intrusive thoughts, sleep disruption, startle responses, difficulty focusing/concentrating, and feelings of fear, sadness, anger, and/or detachment from people (Taylor-Desir, 2022).

Children who experience childhood trauma or have a pediatric mental health disorder are at a heightened risk of developing PTSD (Nelson et al., 2020). Pediatric PTSD is diagnosed following a comprehensive psychological evaluation by medical and mental health providers such as primary care physicians, psychiatrists, psychologists, and/or clinical social workers (National Institute of Mental Health, 2023). Diagnosis of PTSD varies across factors of how the traumatic event transpired as well as symptoms that are present including direct involvement, witnessing, and/or learning about a traumatic incident after it has occurred (Center for Substance Abuse Treatment, 2014; SAMHSA, 2016). While exposure to traumatic childhood experiences may not always yield a formal diagnosis of PTSD, many children continue to suffer from stress-related symptoms making it critical to monitor health and promote a child's awareness of their body and interoceptive sensations in OT intervention.

Of children with at least one reportable trauma, only 3–15% of girls and 14–43% boys become diagnosed with post-traumatic stress disorder (National Center for PTSD, 2022). Researchers report that numerous children may be undiagnosed or under-diagnosed due to changes in the diagnostic criteria for PTSD (Fariba & Gupta, 2023). Researchers also explain that a child's behavioral responses to trauma may vary making it difficult to identify (Fariba & Gupta, 2023). Additionally, few primary care physicians and pediatricians routinely or intentionally screen for PTSD (van den Berk-Clark et al., 2021). This information suggests that identifying children with PTSD can be difficult and there may be more children who are not identified as having this diagnosis when they otherwise may qualify. OTPs who complete thorough social histories and occupational profiles may be able to gather information that identifies risk factors related to PTSD, especially if families report traumatic histories, signs, and symptoms. OTPs may also help educate families navigate this systems-level problem and advocate with their medical providers.

Children with PTSD experience changes in their daily routines and activities that they sometimes may not understand. Children may also not comprehend their experiences fully and/or may even dissociate during a traumatic experience without understanding how to report and explain their experience to adults. Additionally, given the shared symptomatology of related PMH disorders such as anxiety, depression, behavioral problems, and/or ADHD, further consideration of PTSD is recommended as part of a routine thorough differential diagnostic rule-out in children. Therefore, it is imperative for medical providers and OTPs to understand the lower-than-expected prevalence of

pediatric PTSD, rising PMH needs, and how to best support families.

Children with PTSD experience reduced interest and willingness to socialize. Social situations may feel overwhelming for some children as some social experiences may stimulate triggering feelings or sensations that leads to nervous system dysregulation (Allen et al., 2021). Triggering experiences or fear of experiencing a triggering event publicly in social environments may lead a child with PTSD to experience fluctuations in their ability to emotionally regulate. As a result of this fear and stress being associated with social situations, the child's body releases hormones that activate an internal stress response. This stress response can inhibit a child's executive abilities to problem solve, make decisions, and rationalize, which can result in impulsive behavioral responses that lead to severe consequences and/or stigmatization such as aggression (Allen et al., 2021; Fariba & Gupta, 2023; Harandi et al., 2017; Nelson et al., 2020). Children with PTSD may begin to associate negative emotions to socialization and learn to avoid situations or environments with social experiences. Avoiding social relationships or connectedness to others can contribute to feelings of low self-worth, loneliness, and detachment as children learn to associate safety in less socially stimulating environments. Interestingly, research reports children with PTSD who experience social support and have a belief in the existence of social support experience reduced psychological distress (Harandi et al., 2017). Therefore, therapeutic social-based interventions are essential for children so that children with PTSD can learn to feel safe, successful, and supported in social environments.

Behavioral Effects of Childhood Trauma and Pediatric Post-Traumatic Stress Disorder: High-Risk Pediatric Behavior

Children who have experienced traumatic experiences are more likely to engage in high-risk pediatric behaviors (Contractor et al., 2017). High risk behaviors are commonly associated with substance abuse (tobacco, alcohol, and recreational drug use), violence (mental, emotional, physical, and/or firearm-related), sexual activity (unprotected sex and sexual abuse), self-harm (intentional self-injurious behavior), and disordered eating (Tariq & Gupta, 2023). High-risk pediatric behaviors are of significant concern as they can lead to unfavorable outcomes in a child's health and/or life. The CDC reports in the United States, overdose drug-related deaths have increased 30% in children ages 10–19 in 2020, followed by a 15% increase in 2021. In 2021, the total overdose drug related death count was estimated at 108,000 children (Tanz et al., 2022). Additionally, emergency department visits for adolescent females experiencing disordered eating doubled between 2019 and 2022 (Tolliver & Hostutler, 2022).

High-risk pediatric behavior is an indication of declining PMH (Tariq & Gupta, 2023). Children who engage in risky behaviors may be socially perceived by others as making unpredictable and unsafe decisions that lead to severe consequences. Children exhibiting risky behavior may be required to face consequences that change social relationships in their lives, inhibit opportunities for socialization such as expulsion from school, and/or lose privileges. OTPs need to be aware of the correlation between trauma and high-risk behaviors, and how these factors can negatively impact social relationships and experiences. OTPs may need to consider referral to community agencies and/or

mental health specialists to increase social support and/or psychological interventions for the child.

Behavioral Effects of Childhood Trauma and Pediatric Post-Traumatic Stress Disorder: Suicidal Ideation and Suicide

Children with unresolved childhood trauma and PTSD are more likely to experience suicidal ideation and/or attempt suicide (Bahk et al., 2017). Suicide is now the second leading cause of death in children between ages 10–14 (CDC, 2023). From 2007 to 2017, suicide rates tripled for children ages 10–14 (American Academy of Pediatrics, 2024). For every pediatric suicide, an estimated 100–200 suicide attempts occur in adolescents and young adults (American Academy of Pediatrics, 2024). Adolescents aged 12–17 are also experiencing a higher prevalence of PMH disorders involving suicidal ideation and are engaging in high-risk behaviors such as substance abuse (CDC, 2023). These PMH issues are not only increasing in prevalence, but they are also progressing to serious levels of concern such as attempted suicide or suicide. It is critical that children receive early therapeutic interventions to help process their trauma and learn positive coping strategies that help to promote healing and healthier outcomes.

Family Factors can Increase the Risk of Pediatric Suicide. Social determinants such as parental mental health and socioeconomic status can impact the context in which a child grows and develops. When children grow up in homes that are experiencing poverty, they are more likely to die from suicide than children who do not (Hoffmann et al., 2020). Other household risk factors associated with increased risk of pediatric suicide includes quality of a child's attachment to a primary caregiver, stressful family

relationships, family mental health disorders, and open access to firearms (Alvarez-Subiela et al., 2022; Wilson et al., 2023).

Social Determinants can Increase Risk of Suicidal Ideation. Racial discrimination is a growing problem worldwide that surfaces in the context of hate crimes, political shifts, and racial slurs experienced in-person and online globally. Children of minority races are at an increased risk for suicide and suicidal ideation, as they are more likely to experience unfair treatment based on their race (Coimbra et al., 2022). Racial discrimination is also associated with a poor quality of life through feelings of diminished well-being, poor self-esteem, and the development of mental health disorders (Coimbra et al., 2022).

Bullying Increases the Risk of Suicide. Bullying increases the risk of suicidal ideation and suicide. Children who are victims of bullying behavior tend to experience poor self-esteem and are at risk for developing long term health difficulties (Dilillo et al., 2015). Approximately 22% of children ages 12–18 reported bullying at school in 2019 (National Center for Education Statistics, 2022). Bullying can occur in person or online, also known as cyberbullying. In a meta-analysis on bullying behavior, researchers found that bullying behavior in any capacity is associated with heightened risk of suicidal ideation (Holt et al., 2015). Children who are victims of bullying behavior are more likely to isolate, in part to avoid negative social experiences and from internal feelings of anxiety and poor self-esteem in social situations (McLean Hospital, 2023).

Physical Effects of Childhood Trauma and Pediatric Post-Traumatic Stress Disorder: Obesity and Motor Impairment

Children who experience childhood trauma are more likely to experience elevations in body mass index and health issues involving obesity and food addiction in adulthood (Offer et al., 2022). Current pediatric health trends indicate that more children are suffering from obesity at younger ages. Prior to the Covid-19 pandemic, obesity affected nearly 20% of children between the ages of 2–19 (CDC, 2022). During the pandemic, more children were found to lead sedentary lifestyles due to prolonged amounts of screen time, disruptions in recreational/community programming, quarantine guidelines, and mandatory confinement (Currie et al., 2023). Following the pandemic, research indicates children engaged in less physical and leisure related activities (Chien, 2022). The pandemic contributed to the rise of childhood obesity due to elevated stress levels, missed natural opportunities for movement, exercise, and outdoor stimulation needed to develop their body coordination and maintain a healthy weight (Ferentinou et al., 2023). Additionally, chronic stress responses from daily stressors and/or childhood trauma can cause metabolic and hormonal disruptions, such as elevated cortisol, that functions as a protective mechanism to increase fat storage in the body (Miller & Lumeng, 2018). With rising numbers of children experiencing ACEs (e.g., Covid-19 pandemic), childhood trauma, and/or PMH disorders, more children are at risk of developing obesity related health problems that negatively impact their health into adulthood.

Obesity across the age span also has the potential to cause motor impairments, disability, and/or permanent health challenges that lead to the deterioration of an individual's overall health. Negative changes in physical health can negatively influence social interactions. For example, obese children and/or adults who present with poor core strength may experience changes to their posture, physical endurance, and ability to communicate confidently during social interactions. Obese children and/or adults may have trouble regulating respirations during activities and social interactions. Additionally, these motor impairments can lead to physical stressors such as fatigue and low activity tolerance which can impact confidence.

Increases in Sedentary Occupations. The average child is estimated to consume 7 hours online per day between televisions, smartphones, and other electronic devices (McGough, 2022). Research has also found that children are playing less outdoors. Outdoor play is associated with vigorous exercise opportunities. Children who do not get the recommended 60-minutes of vigorous exercise per day may be at risk for poor health outcomes that result in higher rates of obesity, diabetes, and reduced prosocial behavior (Loebach et al., 2021). Research has also found that children who do not play outdoors are more likely to engage in sedentary activities within their home (Loebach et al., 2021). Additional factors influencing a child's opportunity to engage in unstructured outdoor play also includes increased structured engagements related to school, enrollment in sports/club activities, parent perception of neighborhood safety, and social cohesion of the neighborhood (Loebach et al., 2021).

Regular physical activity and exercise is critical to support healthy physical and neurological functioning in children. Physical exercise helps increase the production of endorphins, improve blood circulation, and hormone regulation that can result in regulation of mood and energy levels (Patel & Zwibel, 2022). The internal changes that occur during exercise can also help a child's nervous system return to a homeostatic state, especially following stressful experiences. Prolonged periods of screen time that promote sedentary behavior can reduce a child's ability to experience these health benefits and increase the health risks associated with obesity and chronic stress. OTPs need to consider the rise in sedentary leisure habits and routines in children, as prolonged engagement can negatively impact motor coordination, endurance, and socialization opportunities.

Impact of Pediatric Post-Traumatic Stress Disorder on Occupational Performance

An elevated prevalence in PMH disorders may be an indication that more children need OT services and have experienced changes in socialization habits. PMH disorders cause significant disruptions to social behavior, routines, and lifestyle. Children who suffer from PMHs, such as PTSD, are more likely to spend time alone, withdraw or retreat from social experiences, experience a lack of interest in socialization opportunities, and/or experience behavioral changes in socialization including aggression (Altmann, E. O., & Gotlib, 1988). Changes in socialization can cause children to feel alone, unsupported, and have difficulty relating to others which reinforces the need for OT services that help to provide safe, relatable, and structured socialization opportunities.

Pediatric Mental Health Conclusion

PMH needs are rising evidenced by increased prevalence of PMH disorders such as PTSD, ACEs, childhood trauma, pediatric suicide and mortality, and pediatric obesity. Concerningly, symptoms of PTSD, traumatic experiences, and other common PMH disorders such as anxiety, depression, and ADHD overlap and share similarities in clinical presentation. Therefore, it is essential to ensure that a qualified medical and/or mental health provider assist in routine screening and a differential diagnosis process, gather comprehensive social and medical histories, and incorporate careful screening measures to ensure accurate diagnosis. The longitudinal impact from untreated PTSD can result in poor health outcomes through adulthood including developing social relationships with others. Early intervention is critical to promote a healthy and meaningful life. OTPs may help to identify signs and symptoms as well as aid in the referral process. OTPs can also help children with PTSD by incorporating supportive interventions that help to increase a child's perception of social support, teach healthy coping skills, and provide occupation-based interventions that promote engagement in safe social experiences.

CHAPTER THREE – Overview of Current Approaches and Methods Utilizing Horses for Pediatric Mental Health

Horses have functioned as intuitive social partners to humans through a variety of therapeutic contexts for several decades. They possess numerous skills that allow them to interact and form relationships with humans across cultures, regardless of their abilities. Incorporation of horses in occupational therapy (OT) is a growing area of practice where occupational therapy practitioners (OTPs) use horses as an occupation-centered intervention to promote aspects of health and well-being in children, adolescents, and adults through a combination of mounted and unmounted horse related activities and routines. Horses can also help individuals with mental health needs, however, there remain provider knowledge and research gaps that impact intervention efficacy and understanding what mechanisms promote effectiveness. Between the known positive effects horses have on children and the unprecedented rise in pediatric mental health (PMH) disorders, childhood trauma, and stress disorders such as post-traumatic stress disorder (PTSD), there is a need to explore research and provider knowledge gaps. Examining the use of horses in OT is important to ensure that OTPs understand and effectively utilize the full therapeutic potential of the horse to promote healing in children with PTSD.

Aspects of horse care, horse grooming, and horseback riding are all occupation-based activities and fall within the scope of OT. OTPs can work with horses through unmounted preparatory tasks such as caretaking or grooming of the horse, barn tasks, and nature-based outdoor learning opportunities. Mounted activities involving the horse's

movement is known as hippotherapy, which is where a licensed allied health provider uses the horse's movement to facilitate functional outcomes and development progress (AHA, 2022). Activities with horses promote occupational engagement in a purposeful and meaningful activity that has the potential to provide social support. Despite the compelling and functional use of horses as part of OT intervention, there are several research gaps in this area of practice that cannot explain how horses create positive changes in children with trauma and/or PTSD. The following questions were developed to guide a thorough literature review:

1. What research exists to support horse use in therapy having positive outcomes for children with mental health difficulties such as PTSD and/or childhood trauma?
2. What evidence exists about the therapeutic relevance regarding social interactions and/or the social relationship between children and horses?
3. What theories have been researched in equine assisted therapies (EAT) that explain possible mechanisms of socialization and horse-child connection?

This literature review resulted in an expansive search across other categories and related specialties including animal-assisted therapy (AAT) or animal-assisted intervention (AAI), EAT, equine facilitated psychotherapy (EFP), equine facilitated learning (EFL), equine-assisted counseling (EAC), hippotherapy, and therapeutic riding (TR). Several databases were included: Academic Search Premier, APA PsycInfo, and CINAHL. Key search terms consisted of: hippotherapy, mental health, mental, occupation, therapy, equine, equine therapy, animal assisted, behavior, interaction, horse human, trauma, horse-human interaction, therapeutic, horse, emotion, equine-assisted,

animal, social, post-traumatic stress, equine + assisted, psychological, therapeutic + interaction, therapeutic + horse, equine assisted intervention. The final literature that was selected for this review was focused on pediatric mental health (PMH) outcomes and social interactions with horses.

Equine Assisted Therapies and Occupational Therapy in the United States

EAT is an umbrella term that refers to a variety of therapeutic services offering horse intervention. Due to a proliferation of unregulated term utilization and definitions within this specialty, it is important to note the varied interpretations and ambiguity among different therapies incorporating horses within EAT. However, some EAT domains are regulated by national or international organizations that are also practiced by occupational therapists including hippotherapy (American Hippotherapy Association-AHA), therapeutic riding (Professional Association of Therapeutic Horsemanship International- PATH Intl.), and Eagala. The following sections will review the historical context and development of regulated equine services in the United States that are commonly practiced by OTPs.

Historical Overview

For centuries, horses have been used to promote the health of humans as far back as 460–377 before Christ (B.C. when Hippocrates, a Greek physician, wrote a chapter of a book on ‘natural exercise’ that mentioned horseback riding (AHA, 2022). In the 1950s, equestrian Olympian Lis Hartel utilized a horse to help her recover from complete paralysis secondary to polio and shared her story publicly (International Olympic Committee, 2024). Hartel’s story demonstrated the therapeutic power horses can have in

rehabilitation and recovery. Her story ultimately became a catalyst in the development in therapeutic riding (TR) (AHA, 2022). By 1969, the North American Riding for the Handicapped Association (NARHA) became the professional non-profit organization that was established to oversee TR in the United States. By 2011, NARHA was renamed to the Professional Association of Therapeutic Horsemanship International (Path Intl.) to represent their mission more accurately in TR facility accreditation and TR instructor credentialing internationally. TR instructors are required to become PATH certified to teach individuals with disabilities how to ride, as well as provide adaptive riding instruction (PATH International, 2023).

The 1960s–1980s was a time of transformation in the development of horse services provided by allied health providers such as physical therapists (PTs) and OTs in the United States. PTs and OTs had started to study horse movement internationally. Therapists traveled abroad to other countries to study the therapeutic benefits of using horse movement as a therapy tool. In early years of development within the United States, horses were used primarily to address physical health needs, however overtime this has expanded to support mental health needs too. Horses possess many unique qualities that often promote positive mental health outcomes, regardless of whether physical needs were the primary treatment concern. By 1992, the American Hippotherapy Association (AHA) was established by allied health professionals as the national non-profit organization that oversees therapeutic use of horse movement (AHA, 2022). To practice hippotherapy, allied health licensure from either a physical therapist, occupational therapist, or speech therapist is required. Although advised, the AHA does

not currently require advanced training or certification to practice hippotherapy despite the availability for advanced credentialing options in this area of practice.

In 1999, the Equine Assisted Growth and Learning Association (Eagala) Model was established to oversee professional standards for how horses were integrated into mental health treatment (Eagala, 2018). Within this model, mental health providers and equine specialists work together to provide mental health services to humans while using horses through unmounted or ground-based experiences. This internationally recognized model involves an optional specialized training and approach to provide high quality mental health interventions (Eagala, 2018).

Together, PATH Intl., the AHA, and Eagala are internationally and nationally recognized organizations that provide different resources and regulatory oversight for provider certifications, accreditation, and training courses for professionals that want to use horses in therapy. It is important to note these organizations differ regarding the clinical requirements, qualifications, and intervention associated within the realm of equine assisted services. OTPs can opt to be certified in any or none of the regulating organizations.

Horses in Pediatric Mental Health

Horses offer an unparalleled multifaceted, outdoor, and therapeutic experience consisting of movement, sensory inputs, and naturally occurring socialization opportunities for children. There are several therapeutic attributes that make horses an invaluable and irreplicable therapeutic option including their social responsiveness to children, therapeutic movement, and immersive sensory experience for all the body

senses. Horses offer numerous mental health benefits for children including psychosocial improvements, sensory processing, stress reduction, empowerment, attachment and socialization (Frederick et al., 2015; Harvey et al., 2020; Hojgaard-Boytler & Argentzell, 2022; Johansen et al., 2016; Sharpe, 2014; Ward et al., 2022). Areas of equine research across a variety of EAT domains will now be discussed in relation to benefits including psychological, physical, emotional, and social benefits that can positively influence a child's mental health.

Psychological Benefits

Psychosocial skills consist of internal and external social behaviors that influence engagement in daily activities. Several studies have found that EAT benefits aspects of psychological health. Ward et al. (2022) completed a scoping review of mounted equine therapeutic studies and found participants demonstrated improved confidence, affect, self-esteem, self-efficacy, and self-control. Johansen et al. (2016) presented a case study of a female with social anxiety, alcoholism, and depression who was not responding to mainstream treatment. Researchers found statistically significant findings in decreased anger and improved self-esteem and self-image following equine intervention. In another study of mounted equine intervention, participants with eating disorders reported enhanced sense of mind-body connection and a new bodily experience that interrupted negative perceptions of their body (Sharpe, 2014; Ward et al., 2022). In a 5-week experimental study of equine assisted learning (EAL) with at risk teens, Frederick et al. (2015) reported increased hope and decreased depression levels. Lastly, as children gain independence with basic tasks involving the horse, task delegation and increased

responsibilities overtime have been found to promote self-esteem, reduce psychological symptoms of anxiety and depression, and positively influence behavior (Harvey et al., 2020).

Horses have been reported to reduce symptoms of depression, PTSD, anxiety, and externalizing behavior problems such as aggression (Kemp et al., 2014; Shelef et al., 2019). In their systematic review, as reported by Ward et al., horses also have a positive impact on self-esteem (Aviv et al., 2020; Burgon et al., 2018; Corring et al., 2013); self-image (Bachi et al., 2013); self-control (Bachi et al., 2013); self-efficacy (Burgon et al., 2018); and self-acceptance (Lanning et al., 2017) (2022). A randomized control trial for 34 children with ADHD consisted of twice weekly sessions for 12-weeks reported improved attention, focus, decreased impulsivity/hyperactivity, and quality of life (Oh et al., 2018).

Additionally, there is a growing body of research supporting horse interventions having a positive impact on the behavior of young children. Pendry et al. (2014) completed a randomized control trial of 131 children. After children completed the 11-week program of unmounted and mounted lesson activities that occurred once weekly for 90-minute sessions, researchers concluded children from this study moderately improved social competence, increased goal-oriented behavior, and increased self-management. Results in this study also found an increase in positive behaviors and decrease in negative behaviors that progressed throughout the program (Pendry et al., 2014). Another 10-week therapeutic riding (TR) program reported significant improvement in behavior relating to self-regulation (e.g., stereotypic behavior, hyperactivity) (Gabriels et al., 2015).

From internalizing behaviors such as eating disorders to externalizing behaviors of hyperactivity, horses can help children to feel less symptoms related to pediatric mental health disorders and promote positive feelings related to thoughts, feelings, and perception of self. Children were found to respond positively to both mounted and unmounted equine related activities. Psychological and psychosocial health benefits across several different PMH disorder groups demonstrates the positive effect horses can have on the mental health of children.

Physical Benefits

Horses provide an immersive sensory experience through movement in a natural outdoor environment. The horse's movement utilizes rhythmic, three-dimensional oscillations that trigger neuromuscular responses and stimulate postural reflexes (Guerino et al., 2015). While in a forward-facing seated position, the horse's movement mobilizes a child's pelvis in the same motion as ambulation and provides natural opportunities for core strengthening. A horse's movement also offers warmth and is gradable in terms of rhythm and speed to match the needs and preferences of different children (Ajzenman et al., 2013). Researchers discuss that the movement and sensory experience provided by the horse influences a child's neurological function and can help them to attain appropriate levels of alertness (Comen et al., 2018). When children experience a just-right level of alertness, they will build new neurological connections that support increased learning and focus. The horse's movement also naturally stimulates a child's vestibular system, allowing OTPs or other allied health professionals the opportunity to develop balance, righting, equilibrium responses, and body regulation through changes in

body position, weight shifting exercises, and changes in speed in the horse's movement (Ajzenman et al., 2013; Guerino et al., 2015; Moscholouri & Chandolias 2021; Vidal et al., 2021).

Horses provide interactive tactile experiences through interactions that take place during mounted and unmounted tasks involving caretaking and riding. Researchers report therapeutic animal interactions stimulate touch and naturally promote caregiving behavior that can activate the oxytocin system through a sensory exchange (Beetz et al., 2017). Researchers also explain the benefits of oxytocin help to modulate stress responses and reduce pain (Beetz et al., 2012). The benefits of oxytocin, such as decreasing various stress hormones, can help children to focus on the horse and engage in prosocial behavior.

Horse movement can also improve sensory processing skills in children. In their 2017 systematic review, Peter and Woods found seven other studies that reported improvement in sensory processing including changes in sensory seeking, sensory registration, sensory sensitivity, and overall sensory integration (Peters & Woods, 2017). Improved sensory processing can help a child feel ready to engage and learn during activities.

The environment in which horse services are provided offers natural elements involved with being outdoors. Outdoor stimulation allows children to experience natural elements through their body senses while also promoting sunlight exposure, opportunities to look at near and far distances and encourage healthy eye-muscle development, and visual sight of green spaces that can help to promote mindfulness and relaxation that

produce a wide range of positive effects on health (Fisher, 2021).

In summation, movement provided by the horse can help children develop their balance, core strength, and coordination. Horse movement also provides a variety of sensory inputs that can also help a child feel ready to engage and process sensory information. When the horse's movement is combined with natural outdoor elements that naturally stimulate the body senses, children experience positive changes in their health and social behavior.

Emotional Benefits

Horses have also been found to reduce stress. The rhythmic and gradable movement provided by the horse is predictable and soothing (Moscholouri & Chandolias, 2021; Vidal et al., 2021). In a systematic review by Hoagwood et al. (2017), children who experienced horse movement were found to significantly lower levels of distress and cortisol levels when compared with an experimental group of distressed children (Hoagwood et al., 2017). Other research within AAT has found touching or stroking animals can trigger a release of oxytocin and help to decrease side-effects of stress (Beetz et al., 2012; Scopa et al., 2019). Studies have also shown that horses help activate areas of the brain responsible for emotional regulation. Functional magnetic resonance imaging was used as a pre- and post-measure in a study of adolescents with gaming addiction and found that all participants were found to show increased functional connectivity from the amygdala, frontal orbital gyrus, and corpus callosum (Doo Kang et al., 2018).

Hojgaard-Boytler & Argentzell (2022) completed a qualitative study on eleven participants who had a mental health disorder and completed various length EAT

programs (Hojgaard-Boytler & Argentzell, 2022). Through a hermeneutic phenomenological approach, they identified elements of how working with horses helped children. Children who worked with horses felt less alone throughout the therapeutic process and found that horses functioned as a source of emotional comfort and friendship. Hojgaard-Boytler & Argentzell (2022) also found participants with EAT experienced positive emotions after working with horses by helping to build their confidence, take control of their daily life, establish social boundaries, improve mindfulness, and develop positive thinking patterns through predictable therapeutic routines that were at the level participants felt could be physically and mentally successful (Hojgaard-Boytler & Argentzell, 2022).

Soothing touch and horse movement can help stimulate feelings of calmness, emotional connection, and attachment. For children experiencing PMH disorders, childhood trauma, and/or PTSD it is important to provide therapeutic interventions that decrease side-effects of stress that can also promote positive emotional experiences for children so they can grow, develop, and learn healthy ways to cope.

Social Benefits

As a result of their instinctive mentality and intuitive nature of constantly observing, interacting, and responding to subtle changes in their environment, horses inherently interpret a range of cues from humans, including subtle changes such as facial expression. Horses' responses are generally perceived as authentic as they respond without prompting. Horses are also particularly observant of changes in touch/pressure, facial expressions, and changes in vocal intonation, volume, and frequency. These

dynamic and ever-changing inputs afford the horse the opportunity to understand and connect with a variety of individuals regardless of their ability (Scopa et al., 2019). Horses can work with a variety of children regardless of their language abilities, as they are able to communicate through other non-verbal means of communication such as body language, gestures, and/or facial expressions; including when words fail (Harvey et al., 2020; Moscholouri & Chandolias, 2021). With the help of a horse team and OTP, horses help create a safe and socially enriched environment that meets children where a child can feel empowered and communicate to their ability.

Research shows that children who ride horses and direct the movement (e.g., asking the horse to "go" or "walk" and the horse begins walking), found that children develop autonomy, control, accomplishment, and confidence (Grockienė et al., 2018). Children with disruptive mood dysregulation disorder (DMDD) have also been found to benefit from horse movement. Sauer & Gill (2020) found that equine therapy interventions helped children with DMDD improve social behaviors as a result of the equine's immediate feedback (Sauer & Gill, 2020).

Another study examined therapist perspectives that practiced with the Eagala model (unmounted equine activities) and reported improvements in children's psychosocial skills that were noted to positively impact behavior, especially regarding social skills. Therapist interviews found that children with anxiety and depression had to learn assertiveness by asking for help during therapeutic activities that create opportunities for problems and problem-solving to occur (Wilson et al., 2017). Additionally, therapists reported that when providing positive reinforcement of social

behavior in children, children were more willing to engage in challenging activities. Positive reinforcement helped bring the child's awareness to their social behavior (Wilson et al., 2017).

Horses function as a social partner and source of social support for children. Increasing a child's understanding of how their social behavior and communication influences a horse's response can help them learn how to communicate effectively. Through social interactions with the horse and OTP, the child can develop their connection in a therapeutic and supportive environment.

Pediatric Post-Traumatic Stress Disorder and Socialization

Children with PTSD experience stress responses that inhibit their ability to process social information, reduce their willingness to engage socially, and decrease their motivation to be in a social environment. Socialization with the horse and horse-child connection may be key in helping to promote mental health outcomes in children with PTSD and other related PMH disorders, however there are practice and knowledge gaps within this area of practice that cannot explain how horses accomplish these changes.

Horses help to reduce PTSD symptoms which can help promote a better quality of life and motivation to engage in new activities. In their 2016 systematic review, Phenow (2016) identified nine studies involving people who had experienced trauma who experienced positive outcomes in psychosocial improvements that were reported to occur from social interaction and attachment to the horse (Earles et al., 2015; Norwood et al., 2020; Phenow, 2016). Another study of 13 participants in a case series study reported statistically significant reductions in PTSD symptoms (Shelef et al., 2019). EAT

intervention for participants with sexual abuse histories have also reported significant reductions in stress and anxiety (Earles, et al., 2015).

Children with PTSD also experience reduced socialization. Children with PTSD may experience feelings or sensations that are associated between traumatic experiences and social activities. The fear and anticipation of triggering experiences in social environments can lead to reduced socialization and further compound feelings of loneliness, detachment, and hypervigilance that leads children to seek isolation (Allen et al., 2021; Harandi et al., 2017).

There are also physical skills that relate to socialization such as upright posture. As children improve their motor coordination and strength, such as maintaining upright posture, they are able to engage in tasks and social interactions more successfully and communicate with more confidence (Ajzenman et al., 2013; Moscholouri & Chandolias, 2021). After completion of a 12-week hippotherapy OT program, children experienced improvements to their motor skills which resulted in more engagement and socializing throughout therapeutic activities (Ajzenman et al., 2013).

In a qualitative EAP study for children with adverse childhood experiences (ACEs), research concluded that the skills associated with horse communication functioned as a mechanism for awareness and regulation (Craig, 2020). Participant interviews also found that communication competencies translated to other personal relationships which helped mitigate negative effects of ACEs (Craig, 2020). Another quantitative observational study measured the impact of equine assisted education (EAE) intervention through convenience sampling of families with a history of domestic

violence and/or drug or alcohol abuse. Researchers found following the EAE intervention, families reported reductions in domestic violence, particularly for those where talk-based therapies were previously ineffective (Hemingway et al., 2019).

Socialization is a key element that is naturally embedded within EAT and can have a positive impact on a child's social skills and mental health. Several EAT studies have found that children experience improvements to their social skills including the areas of social functioning, social cognition, and social communication (Ajzenman, 2013; Bass, 2009; Bernstein et al., 2000; Hoagwood et al., 2017; Pendry, 2014). The interactional exchanges between the horse and child are authentic and occur naturally without prompting or bias, suggesting that responsiveness is a key element in providing the child with immediate and direct feedback. When children are provided with that direct feedback and experience natural consequences, they can become more aware of how their actions yield a response from the horse (Moscholouri & Chandolias, 2021). Once children realize that their social actions lead to a response from the horse, this can increase their motivation and engagement throughout the therapeutic experience and provide them the confidence they need to socialize with the horse.

The horse can also provide the child the opportunity to safely practice and develop their social skills without judgment. Positive and supporting experiences can decreases symptoms of anxiety and post-traumatic stress disorder (Norwood, 2022). Other social partners that exist within the horse team include the occupational therapist, horse therapy team, barn staff, and/or peers which can lead to opportunities to develop, practice, and generalize socially oriented skills. High or heightened levels of

stress, which is common amongst children with mental health difficulties and who have experienced trauma, can inhibit a child's ability to process social information and develop the relational skills they need to be successful in social situations (Moscholouri & Chandolias, 2021). This is a particular concern for children who experience stress and anxiety at such a high level, that they are unable to communicate their thoughts, needs, and/or wants effectively with others. Researchers have reported the horse's adaptable and rhythmical movement can help reduce anxiety and improve motor coordination by providing calming and predictable sensory experience that naturally promotes socialization, interaction, and motivation (Beetz et al., 2012; Grockienė et al., 2018, Harvey et al., 2020, Hoagwood et al., 2017; Moscholouri & Chandolias, 2021;). Therefore, the rhythmical and predictable movement of the horse becomes an integral mechanism in the sensory exchange occurring between the child and horse that can promote a calming effect that aids socialization.

Researchers also explain that horses provide a means of comfort. Horses function as a non-reactive social support for children that help to support them throughout the therapy experience, making children feel less alone, supported, and not judged (Hojgaard-Boytler & Argentzell, 2023). The perspective of the horse functioning as a supportive social partner makes horses distinguishable from other AATs.

Impact of Pediatric Post-Traumatic Stress Disorder on Occupational Performance

Children who suffer from PTSD are more likely to spend time alone, discontinue participation in activities, roles, habits, and routines that previously brought them joy, and withdraw or retreat from social experiences. They may also experience changes in

behavior including aggression (Altmann & Gotlib, 1988). Heightened levels of stress, which can be triggered by social situations, can also inhibit a child's ability and willingness to socialize, process social information, and develop relational skills toward others (Moscholouri & Chandolias, 2021). Children with PTSD also experience recurring and/or chronic stress responses, such as fight or flight, which reduces their ability to control impulses and engage logical executive function and increases their risk of experiencing severe consequences and/or stigmatization (Allen et al., 2021; Harandi et al., 2017). As a result of experiencing prolonged stress responses, children with PTSD are at risk for developing structural neurological changes to their brain such as shrinking of the prefrontal cortex and hippocampus; as well as increasing the amygdala (Nelson et al., 2020). Changes to these areas of the brain cause difficulties in memory, learning, and regulating emotions and thoughts. All together a history of traumatic experiences paired with chronic stress responses can lead children to feel low self-worth, loneliness, detached, and even suicide which can in turn, reduce engagement in meaningful, daily activities.

Analysis of Equine Assisted Therapy Research

EAT research, including hippotherapy, has faced scrutiny. EAT studies generally lack randomization, have low sample numbers, and are low level evidence study designs such as quasi-experimental, case studies etc. (Naste et al., 2018). Systematic reviews have found that studies lack control groups (Norwood et al., 2022) and utilize mixed methodologies that result in poor uniformity and generalizability across studies (Coman et al., 2018; Kendall et al, 2015; Maresca, 2020). Additionally, equine research generally

lacks standardized assessment measures and standardized procedures/protocols that prevent intervention replicability (Maresca, 2022).

Research within EAT and related subdomains also presents gaps in knowledge related to underlying theoretical constructs, frameworks, and the potential underlying mechanisms that lead to changes. Literature has also been more heavily focused on outcomes within specialty populations and less focused on supportive theory and underlying mechanisms that lead to mental health changes (Nelson et al., 2016). Lacking information in these areas results in practice and knowledge gaps.

One practice factor that influences interpretation of therapeutic outcomes is the varied models and interventions that are used across therapists and EAT related therapies. For example, some models include unmounted therapeutic interventions, such as the Eagala model. Comparatively, other models offer exclusive mounted therapeutic interventions; and occasionally some models consist of both unmounted and mounted therapeutic interventions.

There is an unequivocal difference in AAT and animal assisted interaction (AAI) showing substantially more research within the area of canine research when compared to equines. Peters et al. (2020) completed a systematic review of EAT and found 28 studies reported improvement in a variety of areas including yet not limited to communication, socialization, coordination, and body regulation because of working with horses (Peters et al., 2020). Ongoing research is needed with horses to strengthen the current body of evidence, identify mechanisms that lead to positive changes, and apply theoretical constructs.

There are varying degrees of shareable protocols and interventions available within EAT research. In the systematic review completed by Peters et al. (2020), 97% of studies describe the interventions at varying levels of detail, which can lead to difficulty generalizing outcomes across disciplines and populations (Peters et al., 2020). They also found that in 94% of the articles reviewed, riding the horse was identified as an essential intervention component (Peters et al., 2020; Wood et al., 2020). Additionally, EAT services occur variably across studies, such as through a group or individual service which can also influence the research outcomes (Peters et al, 2020).

There is an emphasis in equine research on motor development and improvement especially in measurement outcomes (Peters et al., 2020). Considering the historical context of EAT, physical rehabilitation was hugely influential at the beginning when practices expanded to the United States. Overtime, EAT research has expanded into the mental health realm and other areas impacting development including socialization and sensory processing. Horse research involving socialization and sensory processing are generally quantitative focused. In a systematic review of autism and EAT, authors identified that 32 out of 33 articles were quantitatively focused (Peters et al, 2020). Points of measurement include a combination and/or variation of questionnaires, observation, standardized assessment, and biofeedback tools that measure vitals such as heart rate; with results reported through statistical analysis, thematic analysis, and/or qualitative reviews.

Strengthening the body of equine research is critical to furthering the developments of practice. Research in this area also is important for educating

professionals on how to use horses effectively in therapeutic interventions. Furthering our understanding of underlying mechanisms that create positive impacts and outcomes will be important to standardize treatment approaches, reinforce the therapeutic relevance and uniqueness of the horse, and educate OTPs.

Theory in Equine Assisted Therapy

Throughout EAT literature, theoretical frameworks and applications for practice are limited. Lacking theoretical applications prevents providers from understanding how change occurs as well as how to provide interventions that yield positive outcomes. When looking at the social benefits of the horse-human or horse-child connection, attachment theory is the most researched. Attachment theory helps to explain how bonding occurs between the horse and child, however there are also some limitations relating to the generalization of how attachment occurs between a primary caregiver and child to a horse and child (Bachi, 2013).

Attachment Theory Overview

Attachment theory was developed by John Bowlby in the 1960s. He defined attachment as, “A behavior that results in a person attaining or maintaining proximity to some other clearly identified individual who is conceived as better able to cope with the world” (Bowlby, 1988, p.26). In the context of Bowlby’s work, attachment refers to the connection between an infant and primary caregiver. Attachment theory emphasizes that in order for children to have a healthy attachment with a caregiver, the caregiver must be responsive to the infant’s cry. Bowlby found that children who develop healthy attachment are better suited to confidently explore their environment (Bowlby, 1988).

Attachment theory is frequently referenced across the literature regarding the horse-child bond. Throughout review of the literature, it is important to note that attachment theory also varies in how it is applied. For example, this theory can be applied to the horse-human relationship and/or the full equine experience. In a systematic review of theoretical applications within equine related studies, approximately 25% of studies reviewed refer to "attachment" with horses and explain the benefit of horse-human interaction as having strong therapeutic value (Peters et al., 2020). Researchers explain that horses provide opportunity for healthy, attentive, and responsive interactions with children that help children develop feelings of safety, trust, and reductions in stress (Hoagwood et al., 2017). In a literature review of over 175 articles, physical contact with an animal has been shown to reduce stress and promote social behavior to help form attachment. Nurturing touch is another essential quality provided by a responsive caregiver that promotes bonding and is especially necessary within the context of initial attachment when an infant experiences dysregulation (Bowlby, 1988; Scopa et al., 2019).

On the contrary, there are also conflicting perspectives about how this theory becomes generalized to horse-human relationships. Some researchers state that it is not possible to generalize emotional attachment with an animal as extensions of the attachment established in early infancy between a child and primary caregiver (Bachi, 2013). Others explain that the responsiveness and bond between a horse and human is so strong from consistent responsiveness, that it has the potential to provide emotional support. Attachment theory does explain what is needed for a healthy attachment to occur, such as responsivity, which makes it applicable to animals such as horses, as

horses have the capacity to provide this attention and interest to humans. Attachment theory does not explain how animals form new relationships with humans.

Attachment theory becomes more challenging to explain when other researchers introduce the idea of the therapeutic alliance. A therapeutic alliance is naturally occurring in OT that incorporates horses due to the presence of the horse, OTP, and child. The therapeutic alliance provides opportunities for attachment between the OTP and child (or other horse staff assisting the OTP). Attachment theory and the therapeutic alliance all share natural socialization opportunities. Regardless of the therapeutic alliance, horses offer socialization opportunity that can lead to healthy attachment. The support for this view is perpetuated by the fact that the horse is considered a facilitator of therapeutic rapport and a responsive social partner due to their ability to instinctually sense, react, and respond to humans (Bachi, 2013).

Theoretical applications in EAT that explain social interactions between the horse-child relationship are relevant and necessary to understand how a horse and child bond. Several studies have proposed a variety of theories and hypotheses to help explain the mechanisms of the therapeutic equine experiences and treatment. Despite popularity in Bowlby's attachment theory being the most popularly referenced in EAT literature, a research gap exists involving theory as no theories can explain the mechanisms for social interaction between the horse and child and how the horse-child connection develops.

Model of Social Interaction

Socialization in a child's life plays a critical role in their mental health. A study reports that children who receive social support from family, peers, teachers, and

providers are less likely to develop PTSD than children without social support (McLaughlin, 2023). Social interactions vary across cultures and contexts. The Model of Social Interaction (MSI) is an OT-based theory that explains the social enactment skills that occur during social exchanges. The analysis of social exchanges can be applied to horses and children through the MSI through a process of intake, processing, output, and feedback (Doble & Magill-Evans, 1992). Analyzing interactions with this framework will help providers understand the small units of interaction that occur between social exchanges of the horse and child. Assessing interactions is necessary to determine whether interventions are effective as well as determine how interactions occur and change as a result from working with horses.

The MSI could also be used to understand interactions that may also occur between the child and therapist or the child and horse therapy team. Doble & Magill-Evans (1992) explain that it is essential for OTPs to have a framework to help promote an understanding of social interactions and relationships in relation to occupational performance. Additionally, the MSI can assist OTPs to identify the child's social processing skills, interactional strengths, and help inform treatment planning (Doble & Magill-Evans, 1992). Having both animal and human interactions during therapeutic experiences with equines could also help OTPs to understand how a child's interactions may be similar or different and may also pose an opportunity for generalization. Unlike attachment theory, the MSI is not well researched. Therefore, application of this theory may vary, as well as interpretation. However, with a second theory, the MSI would be able to provide a different perspective and perhaps help identify processes or mechanisms

involved with social interaction.

Together, attachment theory and the MSI could help to inform social interactions in OT. These theories may help to explain how the horse-child connection is established and what is happening during interactions. Naturally there are limitations with each theory, however the MSI could help to identify key mechanisms involving the horse-child connection, where there exists a critical knowledge and practice gap.

Conclusion

Horses can have a powerful influence on a child's quality of life, from reducing symptoms of depression or anxiety to improving feelings of self-esteem and mood. Horses are a social ally and partner that show a willingness to engage children in a way that is different from humans. Interactions and socialization with horses can have a variety of positive influences on children across a wide variety of diagnostic categories, especially children PTSD. Socialization is well supported across the literature as improving PMH, however it is unclear what mechanisms are involved within horse-child interactions and how this can lead to favorable mental health outcomes. Identifying such mechanisms about the horse-child connection may help inform future OT practice.

CHAPTER FOUR – Description of the Proposed Program

Pediatric mental health (PMH) needs have been on the rise over the last decade (U.S. Department of Health & Human Services, 2022). Left untreated, pediatric post-traumatic stress disorder (PTSD) can negatively influence a child's health and quality of life through their adulthood (Tsehay et al., 2020). Children with PTSD have considerable difficulties in socialization, a critical area of development that is needed to establish and maintain healthy relationships throughout the lifespan. A proposed program, *Unbridled,* is a 10-week occupational therapy (OT) program that incorporates horses for children with PTSD. Through a series of interventions that involve social interactions with the horse and a combination of hippotherapy, mounted, and unmounted activities children will form attachment with the horse and learn self-regulation and coping skills.

Overview of the Problems

Pediatric Mental Health

Pediatric trauma can occur through a variety of situations and circumstances. From experiencing and/or witnessing traumatic events, any child is potentially at risk for developing a PMH health disorder such as anxiety or PTSD. Naturally, as occurrences of traumatic events and experiences increase through war, immigration, the Covid-19 pandemic, hate crimes, gun violence, drug misuse, political distress, and economic hardship, more children are being exposed to trauma and are at an elevated risk of developing PTSD. Instances of adverse childhood experiences (ACEs), such as abuse and/or neglect, are also on the rise (CDC, 2023). Regardless of the trauma source, pediatric OT services can help meet the growing PMH needs of children by teaching

coping strategies and promoting engagement in occupational activities with horses.

Pediatric PTSD develops following experience and/or direct witnessing of a traumatic event. It is followed by the manifestations of intrusive thoughts, avoidance of associated stimuli, negative modifications in mood, and alterations in arousal (Fariba & Gupta, 2023). Of the estimated 60% of children exposed to a potentially traumatic event, about 30% of children will go on to develop PTSD (Fariba & Gupta, 2023). Despite growing PTSD concerns, researchers report that numerous children may have been inappropriately undiagnosed and/or misdiagnosed (Gupta & Fariba 2023). Researchers explain that the behavioral symptoms associated in young children (six years and younger) can vary significantly making it difficult to identify and diagnose (Gupta & Fariba 2023). Additionally, researchers have examined screening practices for PTSD and found that few primary care physicians intentionally screen for this diagnosis (van den Berk-Clark et al., 2021). Therefore, it is imperative that occupational therapy practitioners (OTPs) understand signs and symptoms of pediatric PTSD, as well as encourage screening as part of a thorough differential diagnostic rule-out; especially where PTSD shares symptomatology in other PMH disorders such as anxiety, depression, and attention deficit hyperactivity disorder (ADHD).

Children diagnosed with PTSD may also experience other PMH comorbidities such as anxiety and depression which can result in sleep disturbance, difficulty concentrating/learning, changes in behavior such as increased irritability, disordered eating, and difficulty with socializing (Substance Abuse and Mental Health Services Administration, 2023). Children with PTSD are also more likely to engage in high-risk

behavior and avoid social encounters that may trigger familiar feelings or sensations previously associated with their traumatic experience (Allen et al., 2021). Triggering experiences and/or fear of experiencing a triggering event publicly in social environments can lead to stigmatization and further compound anxiety and feelings of loneliness, detachment, and hypervigilance that leads children to seek isolation (Allen et al., 2021; Harandi et al., 2017). Avoiding social interaction can negatively impact a child's occupational performance in daily roles, routines, and activities and lead to difficulty in building meaningful and satisfying social relationships.

Horses offer naturally occurring socialization opportunities for children. Research reports that children with PTSD who feel supported and have a belief in the existence of social support, experience reduced psychological distress (Harandi et al., 2017). Therefore, social-based interventions such as horses are an important consideration in OT practice. Horses are known for their observant and responsive instincts. They also offer therapeutically gradable movement experiences that can provide a just right level of sensory input needed to calm a child. The combination of all these therapeutic attributes is irreplicable in any other clinical setting and offer numerous mental health benefits for children including psychosocial improvements, sensory processing, stress reduction, empowerment, attachment and socialization (Frederick et al., 2015; Harvey et al., 2020; Hojgaard-Boytler & Argentzell, 2022; Johansen et al., 2016; Sharpe, 2014; Ward et al., 2022; Wilson et al., 2017).

Equine Intervention and Research Gaps

Horses have functioned as intuitive and social partners to humans through a variety of therapeutic contexts for several decades. These animals possess numerous skills that allow them to interact and form relationships with humans across cultures, regardless of their abilities. Through incorporation of horses in OT, OTPs can use horses as an occupation-centered intervention to promote all aspects of health and well-being in children, adolescents, and adults through a combination of mounted and unmounted horse related activities. Horses can also be used to help children with mental health needs, however, there remains to be knowledge and research gaps about what mechanisms are involved.

Overview of Explanatory Model

With higher occurrences of childhood trauma, abuse, and neglect more children are at risk for PTSD. Since pediatric PTSD can cause long term, negative health implications through adulthood, it is essential to develop programs and interventions that can effectively provide social support and facilitate healing.

Children with PTSD experience significant changes in socialization. Children experiencing PMH disorders are more likely to spend time alone, experience a lack of interest in daily activities, and experience socialization difficulties when interacting with peers (Altmann, E. O., & Gotlib, 1988). Children who are unable to be mentally present in social interactions with others, because of chronic internal stress responses, are more likely to miss and/or misinterpret social cues from others. Research shows that children with PTSD that receive social support experience reductions in psychological distress

(Harandi et al., 2017). This information suggests that social support is a critical element of OT intervention for children with PTSD. Horses can be used as a social partner and source of social support that help children feel better.

Horses promote socialization naturally through verbal and non-verbal communications. Due to their instinctive mentality and intuitive nature through constant observing, interacting, and responding to subtle changes in their environment, horses interpret cues from children with and without direction or prompting. Horses' responses to children are perceived as authentic and can help promote emotionally safe and trusting relationships. They are attentive to subtle changes in touch/pressure, facial expressions, and changes in vocal intonation, volume, and frequency. These dynamic and ever-changing inputs afford the horse the opportunity to understand the individuals more deeply (Scopa et al., 2019). Horses do not require spoken language to interact and can work with a variety of children regardless of communication abilities through body language, gestures, touch, and/or facial expressions; including when words fail (Harvey et al., 2020; Moscholouri & Chandolias, 2021). In the context of pediatric PTSD, where children experience recurrent and/or chronic stress responses, children may have difficulty expressing their thoughts and emotions. Considering horses can respond intuitively to children regardless of their ability to verbalize those thoughts and emotions, horses can function as an excellent adjunct to OT intervention.

Incorporation of horses is a specialized area of practice. Some OTPs may or may not be familiar with this intervention. It is important for OTPs to understand how horses can help children with a variety of needs, especially children with trauma, PTSD, and

mental health needs. Educating OTPs about the known benefits horses provide children may help to influence their interest in practicing or referring children to OTPs practicing within this specialty. Numerous research studies highlight the mental health benefits that horses can provide children, however no study has evaluated social interactions as it relates to the horse-child connection and how this relationship impacts a child's mental health. Ongoing research is needed within this specialty area of practice to understand horse-child interactions and connections.

Another solution that would help to reduce the practice gap includes proposal of a program evaluation study, *Unbridled*. This proposed evaluation study would consist of assessing social interactions of children with PTSD and providing direct, 1-hour OT sessions to children with PTSD for 10 weeks. This program would specifically measure and monitor social interactions between the child and horse and help provide insights into the child's capacity to socialize and develop improvements in their social skills.

Program Overview: *Unbridled*

The proposed program, *Unbridled*, will provide OT services to five children with a medical diagnosis of PTSD between the ages of 5–10 years. The main goal of this program is to improve the quality of social interactions children have with others, promote social engagement with activities they want and need to do, and promote healthy social relationships with others. Services will be provided on an individual basis for 10-weeks. Interventions will be directed by the OTP and consist of a combination of mounted and unmounted activities that incorporate:

- Social cue prompting by the OTP to help bring the child's attention to the horse's social responses and behavior.
- Activities that promote problem solving to achieve desired actions and results with the horse. Example: asking the horse to 'walk.'
- Hippotherapy
- Social interactions with the horse.

Ten-Week Intervention Overview

Activities completed with the horse will include routine body scans, relaxation exercises such as deep breathing, and stretching to help children develop coping skills to manage triggers and regulate stress responses. Throughout the 10-weeks, social interactions will be supported through basic activities such as grooming and progressed through directing and partnering with the horse. A table reviewing the 10-week intervention plan describes the overview of interventions throughout the 10 weeks (see Appendix A for the weekly therapeutic intervention plan). For example, in the first week with the horse, the child will be introduced to the horse and taught how to be safe around the horse as they get familiar with the routine of preparing the horse for work. Activities will include greeting the horse, gaining the horse's attention, and showing positive affection. As sessions progress each week, skills will carry over, increase in complexity, and be applied to natural activities that occur with the horse. For example, on week 9 the child will be expected to go outdoors on a trail or path with the horse. The child will be expected or cued to monitor the horse's behavior (helping to keep them in the moment), process multi-sensory inputs, and make decisions on what direction to travel while

simultaneously experiencing the horse's movement.

Session Format

Individual sessions will follow a similar format each week. Refer to Figure 4.1 to review an individual session format. Sessions will start with a greeting, donning safety equipment, and interacting with the horse during the grooming routine. Once this routine is completed, the child will be transitioned into the riding arena by the OT. The horse leader will tack the horse and lead the horse into the arena. After transitioning onto the horse, the child will continue therapeutic activities that work on elements of interoception (increasing awareness of their internal body sensations), mindfulness (breathing exercises), body awareness (stretching exercises), followed by the main activity outlined in the 10-week protocol that was previously referenced. Sessions will end with a cool down and involve slowing the horse's movement, cooling out the horse, and grooming the horse. It's important to note that the levels of assistance needed for tasks will vary and gradually decrease overtime depending on the needs and abilities of the child. Within all aspects of the sessions, social interactions with the OTP, horse team, and horse would be therapeutically facilitated to promote success, positivity, and independence while also challenging the child at a 'just right' level of engagement.

Figure 4.1

Individual Session Format

Estimated Time	Task
3–5 Minutes	Greeting and parent/child check-in followed by donning safety equipment.
15 Minutes	Unmounted therapeutic activity: Greet the horse, assist with gathering brushes and materials necessary to prepare the horse for mounted activities, and complete the horse brushing protocol.
3–5 Minutes	5 minutes of preparatory activities: Horse leader to tack and transition horse. At this time, any relevant pretest therapy data may also be collected.
30–35 Minutes	Mounted therapeutic activity: • Part 1 (5 minutes): Warm up- Arm circles x10 each side, reaching/stretching forward, backward, down to feet, and interoception focus consisting of a full body scan/deep breathing yoga exercise (eyes closed and eyes open). • Part 2 (15–20 minutes): Therapeutic activity (refer to the Weekly Therapeutic Intervention Plan) that will consist of opportunities to socialize and interact with the horse. • Part 3 (5 minutes): Child's Choice (e.g., trail ride, horse game, trot etc.).
5–10 Minutes	10 minutes of cool down/restoration tasks. During this time, trained horse staff assist with relocating the horse to cross ties. The child is then directed by the OTP to proceed to complete unmounted horse grooming activities, with fading levels of support. The session will end following restoration of safety equipment.

Program Scenario

Jason is a 6-year-old boy who has a history of trauma. He was recently placed with his grandparent following maternal neglect due to excessive soiling that compromised skin integrity. His father recently died from a drug overdose. Jason's life

changed completely, and he began to demonstrate aggressive behavior at school and with family especially toward his biological mother. With family, Jason has a difficult time separating from his grandmother. He developed behavioral refusal patterns, especially when leaving the house. The family has tried to work through tantrums however they have been unsuccessful.

Jason's family wanted him to find activities and hobbies that motivate him and help develop independence with activities of daily living, such as tying his shoes independently. The family reported they attempted shoe-tying at home, however Jason refused to complete this task. Jason has a passion for animals. Jason was later referred to pediatric OT that incorporates equines.

Jason was immediately drawn to the horse. His grandmother stood near as he helped to brush the horse and was taught basic safety throughout grooming tasks. Jason began riding the horse and actively participated in the horse preparation routine with fading levels of assistance and support. One day while riding, Jason's shoe accidentally slid off and the horse stopped. The OTP raised awareness of the horse's response and handed the shoe back to Jason and said, "Your horse stopped, I think he is waiting for you to put your shoe back on." Jason was instantly motivated to attempt this task for the horse. Jason was provided with back chaining support for task sequencing and minimal assistance for balancing while he attempted to don his shoe while seated on the horse. Once Jason donned his shoe, the horse began moving again. As time went on, Jason was encouraged to complete elements of shoe-tying through other fine motor activities such as lacing. Within a few sessions, Jason became independent in shoe-tying. Jason felt

proud of his accomplishment. His family also reported improvements in his mood, self-confidence, and functional independence at home.

Program Outputs and Outcomes

Unbridled seeks to provide services to five children who are diagnosed with PTSD that are between the ages of 5 to 10. The interventions provided during *Unbridled* will help to teach children with PTSD coping skills and strategies needed for successful social interactions and participation in meaningful occupation-based activities. Activities will help to develop interoceptive awareness and practice application of relaxation and coping strategies. Social interactions that occur during all activities will be facilitated and reinforced by the OTP and program developer to help facilitate horse-child connection and partnership.

Six-months following program completion, a check-in will be completed with families through secure video conferencing services. Follow-up interview questions will include open-ended questions to assess prevalence of their child's PTSD symptoms, socialization patterns, social relationships at home, and independence in age-appropriate daily activities (e.g., self-care, personal hygiene, chores etc.).

Upon program completion, *Unbridled* envisions a world where all children feel safe and empowered to live their best life. Strategies learned throughout the program will help children with PTSD to manage internal stress responses that inhibit social interaction that promotes participation across daily activities. Additionally, resources and support would be provided to families when/if necessary, such as referrals to mental health providers.

Information from *Unbridled* will help to inform interventions and further an understanding of social interactions that occur in sessions. Studying interactions and the social behavior of the horse and child, in relation to mental health, may help to inform mechanisms of horse-child connection. Information obtained from this program will be shared with OTPs in the form of a poster presentation and/or publication in a peer reviewed journal such as the American Journal of Occupational Therapy.

Overview of Program Stakeholders

Multiple financial and operational stakeholders would be involved in the development of *Unbridled*. At the micro level, families would be involved in enrolling their children for services. A licensed OTP would also be responsible for providing the services. Other horse staff, such as the horse leader and side walkers would also have direct involvement in the services provided. At the meso level, the barn and horse owners would be involved in providing the necessary assets needed to conduct equine services such as the riding arenas (indoor and outdoor), barn, and horse. Insurance companies would also be a meso level financial stakeholder as they would be responsible for the reimbursement of services. Other medical providers would also help function as a referral source. At the macro level, local area agencies and state organizations will be useful when considering referrals, developing policy, legislative updates/changes, and reimbursement regulations as access to quality care for mental health services is a New Hampshire priority, particularly with Center for Medicaid and the Department of Health and Human Services.

Full Logic Model for Stakeholders

Stakeholders will need to understand the short, intermediate, and long-term projected outcomes of the program. This information will be presented with a logic model that will provide a visual graphic of *Unbridled's* resources, intervention activities, and outcomes. The following logic model presents an overview of the program *Unbridled* (see Appendix B for the full logic model and Appendix C for the simplified logic model).

Program Participants and Resources

Method of Recruitment

Recruiting children who are diagnosed with PTSD may be possible through collaboration with pediatricians or mental health agencies that are local to the barn where *Unbridled* services take place. However, research indicates that children with PTSD are often under-diagnosed, which could present a challenge to recruit children. Education may benefit local medical providers such as pediatricians and related staff about current pediatric mental health trends in pediatric trauma and the lower-than-expected post-traumatic stress disorder prevalence. Through education and partnering with local pediatrician offices, children may become identified and be eligible to get the help they need either through referral to *Unbridled* and/or other mental health professionals. This may also provide an opportunity to advertise the program with brochures and handouts for medical providers to share with families.

Children between the ages of 5–10 were selected due to having a range of skills. Children within this age range are also on the younger side of the pediatric age spectrum and present with a unique opportunity to be provided with early intervention that

promotes good quality of life. Children in this age range are also more independent in a variety of areas when compared to preschool aged children. For example, children within this age range have a higher expressive and receptive vocabulary, are aware of their emotions, and an emerging awareness about others' emotions (CDC, 2021). Developmentally they are also increasing their independence as they gain responsibilities and understanding of how things are connected (CDC, 2021). All these considerations make children between the ages 5–10 an ideal candidate to receive pediatric OT services that incorporate horses as they can engage, understand, learn, and process their feelings throughout the therapeutic experience.

Personnel

The person responsible for *Unbridled* is an OTP and author of this dissertation. The operating OTP is responsible for carrying out the program in terms of education, recruitment, direct care, intervention planning, program evaluation, and data management. Additional responsibilities will include communications such as contracting with a local barn and horse owner and providing education needed to provide a high-quality therapeutic service.

Other roles involved in providing this pediatric OT service includes the horse owner (owner of the therapeutic horse), barn owner (owner of the facility), pediatrician or pediatric nurse practitioner (healthcare provider responsible for identifying, diagnosing, and referring), and family (caregivers that provide the recipient of OTP service, release of health information, and permission to participate). The OTP, horse owner, barn owner, medical staff, and family will need to have consent for treatment to clear possible

medical contraindications and open lines of communication to be updated on any pertinent changes to the child's health or development and ensure humane treatment of the horse.

Additional roles involved in providing the direct service include a therapeutic horse (docile and sound horse that provides therapeutic horse movement), horse leader (personnel responsible for leading the horse and monitoring status of the horse), and side-walker (personnel that are responsible for helping to assist the OTP). Horse experience is preferred for both horse leader and side walker positions, however in the event a candidate does not have horse experience, additional training can be provided by the OTP. All staff must complete orientation and introductory training to ensure responsibilities and safety standards are maintained. Information to be covered through the orientation includes a review of behavioral expectations before, during, and following sessions. Additional topics include barn rules, principles of compassionate care, role on therapy team, safety procedures, and a list of responsibilities. Content will be reviewed verbally and provided in written format.

Setting

Unbridled will take place in an existing local barn that has an indoor arena, outdoor arena, outdoor riding options, and on-site parking. Barns with Professional Association for Therapeutic Horsemanship International (PATH Intl.) certification are preferred, however other locations may be considered. Additional areas needed include a safe crosstie area for the child to complete horse preparation tasks such as grooming. The indoor arena would be used for the child's session for one hour with access to existing

materials located inside the arena including yet not limited to jumping poles, jumping standards, and barrels to help implement therapeutic activities. These pieces of equipment may be needed to help set-up and arrange therapeutic activities. For example, barrels arranged at either end of the arena would function as a station that contains therapeutic activities that the OTP and/or child can easily access or reach while walking by.

Outreach Plan

Initial outreach will include calling up to three local pediatricians' office managers to discuss and offer a free education in-service about horses helping children with trauma and PTSD in OT. At this presentation, the developer of *Unbridled* and author of this dissertation will provide information about the benefits horses can provide to children with PTSD and the program offerings of *Unbridled* would be explained. Other options include contacting local school social workers and/or counselors and providing in-services that educate others about the program and referral process.

Brochures would be provided as a resource to help advertise and disseminate information about the program. Other outreach would include electronic advertisement through social media such as Facebook, Instagram, and/or LinkedIn. Digital content would consist of various pictures and videos to help show people in the local community OT services look like while working with horses and education about the benefits for children with PTSD. A link would be available for families interested in signing up. Over time, the goal would also be to expand the program by serving children who have experienced trauma and do not have a medical diagnosis of PTSD. Expansion efforts may also include educating other local area agencies and/or mental health organizations such

as the National Alliance on Mental Health (NAMI) of New Hampshire about this program.

Anticipated Program Barriers

Implementation of *Unbridled* may lead to unexpected changes that present challenges in program participation. Identified barriers to participation and/or program completion includes changes in the horse team/staff, horse availability, child attendance, and funding delays and difficulties. These barriers will now be discussed in further detail below.

Consistency in the horse team and horse are essential for the child's therapeutic experience. Children with PTSD require predictable routines and staff to help them feel secure. To reduce changes in staff, weekly check-ins would take place to ensure support and communication of any concerns of unforeseen difficulties. Ensuring a competitive hourly wage will also help to promote employee retention. To ensure horse owner satisfaction, horse rental fees will be paid in full as part of a written contract with the barn owner.

In the event the horse becomes sick or lame, a horse change would be required. To prevent being without an alternative horse, it would be important to select a barn that has several horses to select from. At the beginning of the program, short biographies about each therapy horse would be provided to the family and child. Horse selection and changes would always be at the discretion of the OTP. Prior to starting the program, families would be informed of the possibly of a horse change. Horses that unexpectedly develop lameness during treatment would require an immediate horse change or potential

ending of session, in which the barn and horse owners would be promptly notified and involved to manage and oversee safe and human horse treatment.

Weekly attendance for all staff and the child is critical across the 10-week intervention plan to ensure all content is delivered within a reasonable time frame. Some children may miss sessions due to illness, schedule conflicts, and/or potential emergencies. In the event of circumstantial changes, every attempt to make-up sessions would be provided or accommodated within the 10-week period of treatment. In the event families opt out of the program or wish to discontinue prematurely, a follow up communication would be attempted to gain information about what led to that decision.

Families will incur a weekly participation fee to help offset program expenses. Medical insurance claims will also be submitted for each individual session. In the event of private funding sources through donations or sponsorships become available, these funds may be applied to program expenditures that influence the family's overall out-of-pocket expenses.

Conclusion

The aim of *Unbridled* is to positively influence the lives of children who have PTSD so they can live a healthier quality of life. This program envisions a world where all children feel safe and empowered to live their best life. By promoting socialization through incorporation of the horse in OT, children can learn to establish, develop, and maintain healthy relationships that may function as social supports in their lives. Additionally, the scope of *Unbridled* may contribute to furthering an understanding of how horses impact social interactions in children with PTSD and help contribute to

research and knowledge gaps.

CHAPTER FIVE – Program Evaluation Research Plan

The program *Unbridled* will provide an occupational therapy (OT) service that incorporates horses as an intervention for children who have post-traumatic stress disorder (PTSD) between the ages 5–10 years. The aim of *Unbridled* is to help children promote their mental health by improving socialization skills through structured activities with a horse. Activities with the horse will consist of a combination of mounted and unmounted activities. A program evaluation is proposed for *Unbridled* to ensure a meaningful therapeutic experience to children, inform future programming, educate families and professionals, and advocate to financial stakeholders.

Review of Equine Research

There are both knowledge and methodological gaps in equine and occupational therapy research. Studies vary in the service provided as well as the interventions completed. Additionally, equine research generally utilizes a variety of mixed methodologies, which impacts generalizability across studies (Coman et al., 2018; Kendall et al., 2015; Maresca et al., 2020). Variability and lack of consistent standardized measures, standardized procedures, and protocols inhibit evidence-based intervention replicability and generates questions around effectiveness (Maresca et al., 2020). Equine research also lacks application of theoretical constructs to explain mechanisms that cause change.

While some occupational therapy practitioners (OTPs) have a general understanding of the benefits with animal-assisted interventions (AAI) involving horses, some providers may not know evidence-based benefits horses can provide children. OTPs

may also be less familiar with understanding how to work with horses and how horses help people with mental health difficulties as opposed to individuals with physical needs. OTPs have a differentiated skill set in mental health and activity analysis that allows for careful examination of specific motor and process skills through skilled observation. OTPs also have a unique opportunity to contribute to current knowledge and research gaps in this specialty, educate providers (e.g., allied health, medical, educational etc.), and advocate for the OT scope to support mental health while working with equines. A proposed program evaluation study design will be discussed that will help contribute to gaps in knowledge and research.

Unbridled: Vision and Program Overview

Unbridled envisions a world where children feel safe and empowered to live their best life. The aim of this program is to provide pediatric OT services to children with PTSD that will experience positive changes to their mental health through improved socialization and relational connectedness with horses. No studies have attempted to evaluate the quality of social interactions that occurs in OT utilizing horses for children with PTSD. The proposed program evaluation study, *Unbridled*, that involves assessment of children's social interaction may help provide important information about the horse's impact on the socialization skills of children with PTSD.

Unbridled will be completed with a mixed method research design. Information collected throughout the program will consist of both qualitative and quantitative data that is collected through a combination of standardized assessments and interviews at the beginning and end of the 10-week program.

Methods

Five children between the ages of 5–10 years with a medical diagnosis of PTSD will be recruited for this program. Children will participate for 10-weeks and receive individual OT services. All participants with their families will be required to sign informed consents, medical permission to participate from their primary care provider/pediatrician, and a waiver of responsibility.

Summative Data Collection

The OT service that incorporates horses will be the independent variable for *Unbridled*. Children will participate in social interactions with the horse, unmounted preparatory tasks such as grooming, and mounted horse activities such as hippotherapy. The OTP will use a combination of natural occurring social interactions and provide social prompts/cues that direct the child's attention to the horse's social cues and behavior that help the child learn how to interact with the horse effectively and safely. The social prompts directed to bringing the child's attention to the horse will help teach the child about the horse's experience and allow the child to engage in a way that creates positive responses from the horse.

Quantitative Measures & Analysis

Occupational skills that occur during socialization are the dependent variable and will be measured with a standardized, observation-based assessment with the Evaluation of Social Interaction (ESI). The ESI evaluates two social exchanges completed by the child and helps to identify underlying occupational performance skills involved with social interaction (e.g., looks, turn toward, gesticulates, produces speech etc.) (Evaluation

of Social Interaction, n.d.). The ESI will be administered at week one and ten of the program. Results from each time point will be compared to determine if there were any changes.

The Canadian Occupational Performance Measure (COPM) is a standardized, client centered outcome measure that will be used to identify challenges in the child's occupational performance during daily activities (COPM, 2024). This assessment helps to provide insight to the child's perceptions of their occupational performance that help determine areas of priority necessary for individualized goal setting. The COPM will be administered at week one and ten of the program. Results from each time point will be compared to determine if there were any changes.

The Pediatric Symptom Checklist will be completed to monitor health symptoms throughout the program. A baseline measure will be collected upon the first week and repeated on the tenth week. Results will be compared to determine if there were any changes in symptoms.

Quantitative results from the standardized assessments and checklist will be entered into a database such as excel and then analyzed using a data software analytic program such as SAS or SPSS. Given the small number of participants, no control group, and the expectation that there will be positive change in social skills, it is anticipated that a one tailed t-test would be utilized to help determine if positive change occurred in children's social skills.

Qualitative Measures & Analysis

Semi-structured interviews will take place with both the children and parents or

caregivers at the end of the program. Interviews will help to gain perspective on the child's experience, relationship with the horse, and response to program participation. Semi-structured child interviews consisting of 5 open-ended questions will be conducted on the tenth week of the program by the OTP. Information collected in these interviews will include the child's relationship with the horse, their feelings, and moods while with the horse, their comfort socializing, and how they feel the horse helped them. Semi-structured caregiver interviews will also consist of 5 open-ended questions and be conducted on the tenth week of the program. The OTP will ask questions about the parent or caregiver's perception of their child's growth/changes in social behavior, symptoms, independence in daily tasks/activities, and the influence of the horse-child relationship.

Interviews will be recorded to ensure integrity of responses and for ease of thematic analysis. Interviews will take place in a private confidential space and are anticipated to last approximately 30 minutes each. Qualitative results (audio recordings) from the semi-structured parent and child interviews will be entered into a software program such as NVIVO by the OTP to allow for thematic analysis of each question.

Data Management

Data will be collected through a combination of methods. Assessments and notes will be completed through a secure electronic medical record documentation system. Paperwork such as medical releases, waivers, and evaluation forms will be stored at the office of *Unbridled* with coded files in a locked cabinet. Audio content from interviews will be saved to a password protected computer with the data backed up on cloud storage.

Confidentiality

An application will be made to Boston University's Institutional Review Board (IRB) to ensure that data collected in the program evaluation protects the rights and welfare of participants. The OTP and author of this paper will oversee the development of an informed consent form that will detail participant recruitment, data collection, administration of assessments and interviews, any benefits or risks, data storage, data analysis and process for reporting concerns and withdrawal.

Confidentiality will be protected through a variety of measures. All names will have a coding system and will be used on all assessments. Program assessments and information will be stored in a locked cabinet onsite. Families will sign informed consent forms to participate in the program evaluation and will be provided a copy of their rights, including the process for reporting concerns or withdrawal.

Anticipated Strengths & Limitations

A program evaluation of *Unbridled* is important to assess the impact, the processes, and the quality of the program. It will help provide data that may suggest future rigorous research. It will also help to inform, educate, and advocate for OT services incorporating horses. The results will be used to provide knowledge about whether horses may impact occupational skills associated with social interactions in children with PTSD. Program evaluation results may also be used to help educate OTPs, medical providers, educators, and other healthcare providers that work with children who have PTSD.

Limitations of a program evaluation for *Unbridled* include the small number of

participants and lack of a control group. Having a small number of participants may result in negative results which could threaten the viability of the program and success in receiving reimbursement for the service; however, since a program evaluation study of this nature has not been completed before, a smaller sample may help to inform future feasibility and replication on a larger scale. Another limitation is the information from participants is subjective and with a small n, represents only those participants views. Finally, with a small sample of participants should there be any program attrition, this will further limit the information gathered.

Stakeholders

Several stakeholders will need to be involved to help promote the success of *Unbridled* including children and their families enrolled in the program, local healthcare or education providers, volunteers, barn/horse personnel, and financial reimbursement sources such as insurance companies. In this chapter, a review of the stakeholders involved, stakeholder engagement and collaboration, methods, data collection, and a review of possible limitations and anticipated challenges will be discussed (see Appendix D for a comprehensive list of stakeholder questions).

Unbridled's key stakeholder are children with PTSD. Resources provided by the family may include financial support, medical insurance, and transportation. As the program is designed for children under 18, children and their families are considered essential primary stakeholders. Communications with families would occur prior to program implementation for planning, acquiring background health information, and medical doctor referrals and clearance to participate in mounted equine intervention such

as riding, as well as throughout program implementation, and through program evaluation.

Recruiting children and families into *Unbridled* through referral sources, such as medical and/or educational providers, is essential to connect children with PTSD to this therapeutic service. Referral sources have an essential role in program evaluation as they may have suggestions that help to market and advertise this service. Communications with medical and educational providers would take place through all aspects of program planning, implementation, and evaluation as they have direct interactions with families and can provide informed recommendations that assist the recruitment of children into *Unbridled,* including future referrals. Communications may occur through phone and email initially, with plans to meet and provide educational information. For recruitment efforts, an electronic flyer *Unbridled* will also be sent to referral sources to disseminate information about the program through different locations such as local elementary schools and pediatrician offices.

Volunteers are another stakeholder group. They will be sought to ease the logistical demands and financial expenditures associated with implementation of *Unbridled*. The function of volunteers may vary depending on their knowledge and training. Opportunities include assisting with research and data collection, assist in the direct OT service incorporating the horse, and overseeing logistical tasks that help with basic communications and/or correspondence. Recruitment of volunteers will require electronic and printed communications that advertise the volunteer opportunity and the program needs. Possible areas considered to help recruit volunteers includes local

universities or high schools (e.g., Dover High School, the University of New Hampshire etc.), New Hampshire Occupational Therapy Association, and various social media platforms that are connected to different communities, other schools, barns, and specialty groups that have interest and/or experience in horses.

Barn owners, managers, horse owners, and/or horse personnel (e.g., side walkers, horse leaders etc.) are also essential stakeholders for *Unbridled* to operate. This group of individuals will be referred collectively as barn and horse staff. Barn and horse staff are important as they work directly with the horse and assist the OTP during therapy. Their role is essential as this involves careful monitoring, planning, and communication to ensure the safety of the horse and to ensure humane treatment. They also provide the resources and amenities that allow a program such as *Unbridled* to operate, such as horses and the environment (e.g., indoor arena). Barn and/or horse personnel may directly support the horse during OT sessions and may be able to help anticipate potential safety needs and concerns that promote the success of the program. They may also be helpful in problem solving with expected changes that arise that result in the need to make immediate changes such as switching horses. Communications would need to occur through all phases of program planning, implementation, and program evaluation.

Financial stakeholders may consist of a group of individuals and/or organizations that provide reimbursement, private sponsorships, and/or donations that help cover out of pocket expenses for families to receive services through *Unbridled*. Financial stakeholders may make it possible for families with less resources to receive the care they need, especially if medical insurance is a barrier. They will help to inform program

evaluation by providing input on expenditures and advise on strategies that help promote access to other financial resources and/or community connections at all phases from program planning through program evaluation. Sourcing financial stakeholders for *Unbridled* would consist of meeting with local business owners, barns, and/or organizations that promote gatherings with business owners (e.g., Greater Dover Chamber of Commerce).

Another financial stakeholder consists of insurance companies who reimburse or cover OT, as they are invested in improving the health and wellbeing of subscribers and their family members. Communicating with insurance stakeholders allows the OTP to understand what medical and/or therapeutic information is needed for successful insurance claim processing to yield reimbursement. Reimbursement from insurance companies will help to cover expenditures related to the horse and facility rental fees, barn/horse personnel wages, and the direct service provided by the OTP. Therefore, communications with reimbursement stakeholders are important through all phases of program planning and implementation.

Stakeholder Engagement

Engagement with community stakeholders will vary throughout the process due to variation in roles, interests and responsibilities that help to facilitate program development and implementation. Community stakeholder collaboration and communication will also vary throughout the program and depend on communication preferences. Communications will occur both informally and formally through various communication methods involving in-person meetings, written communication such as

letter, electronic methods such as email, phone calls, and videoconference meetings.

Stakeholder Collaboration

Stakeholders will work together to provide the direct OT services offered through *Unbridled.* From the time of arrival, the OTP will greet and check-in with the family and child, while the barn and horse staff will help lead, gather, assess the horse's health/soundness, and prepare the horse. The OTP will assist the child in donning safety equipment such as a gait belt and helmet. Unmounted therapeutic activities would begin that consist of grooming and interacting with the horse. Following these activities, the child and horse would relocate to the indoor riding area to complete activities that facilitate interaction and teaming between the horse and child. The child would be assisted by the OTP to mount the horse and begin riding, while either volunteers or barn and horse staff function as a horse leader and side walker. Any additional volunteers would be allocated to assist the OTP in providing the therapeutic service or logistical management.

Simplified Logic Model for Use with Stakeholders

Use of the logic model will serve as a visual reference to overview *Unbridled.* Stakeholders will need to understand the short, intermediate, and long-term projected outcomes of the program (see Appendix C for the simplified logic model). This information will be presented with a logic model that will provide a visual graphic of *Unbridled* resources needed, interventions, and outcomes.

Preliminary Exploration and Confirmatory Process with Stakeholders

Meetings with stakeholders are beneficial to the project investigator to assist with raising awareness about the program, identifying referral sources, and exploring resources. Meeting preferences will be determined with each stakeholder based on their availability prior to program implementation. Any missed meetings or request for additional meetings will be accommodated.

Information about *Unbridled* will be presented visually in the form of digital presentations or documents, unless there is a request for paper copies. Meetings will be routinely structured in a way that outlines a meeting agenda and objectives. Active stakeholder participation will be encouraged through interactive activities and discussion. The meeting will include initial introductions and review the purpose/intent of meetings which is to help children with PTSD to improve their socialization skills. Stakeholder(s) will have an opportunity to discuss their role and anticipated contributions.

Through active stakeholder engagement and collaboration, this would provide an opportunity to make any changes or adjustments that are in line with known policies, data needs, and reimbursement strategies that help to determine plausibility and successful programming. Therefore, it will be critical to structure meetings in a way that facilitates stakeholder participation.

Program Evaluation Research Questions for Stakeholders

It is important to prepare and generate a list of potential questions to stakeholders in preparation for effective meetings. A list of summative and formative questions to be asked to stakeholders throughout the program evaluation process (see Appendix D for a

summary of stakeholder questions) was developed to guide the OTP while engaging various stakeholders. Each group of stakeholders will be asked relevant and applicable questions related to their role to maximize their engagement, specialties, and interests.

Conclusion

The proposed program evaluation study design for *Unbridled* utilizes a mixed method study design consisting of both quantitative and qualitative data collection. Quantitative data collection will consist of measuring social interaction of children with PTSD, their engagement and satisfaction with daily routines, and health symptoms. Qualitative data collection will consist of semi-structured interviews with the parents/caregivers and the child (separately). Semi-structured interviews will help to provide further insight regarding the horse-child bond and whether that attachment or connection was perceived to be a positive influence on the child's mental health. The hoped for outcomes include understanding whether the horse impacted the child's socialization skills and whether there are changes in the quality of the child's social interactions. Additional hoped for outcomes include gathering positive changes in data regarding the child's improved perception of engagement and satisfaction with daily activities, as well as improved health symptoms. Together, through active stakeholder engagement and collaboration, *Unbridled* may help inform practice and contribute to provider knowledge and research gaps.

CHAPTER SIX – Dissemination Plan

The proposed program, *Unbridled*, incorporates horses for children with post-traumatic stress disorder (PTSD). *Unbridled* will work with children ages five to ten. The program was developed by a licensed occupational therapist (OT) with advanced training in horsemanship and hippotherapy. Services will also be overseen and operated by the OT and will take place at a Professional Association of Therapeutic Horsemanship International (PATH Intl.) accredited barn. *Unbridled* will run for 10-weeks with the goal of improving social interactions in children with trauma. The program will seek to promote healthy attachment with the horse through a combination of unmounted grooming activities, mounted activities involving hippotherapy, and social interactions with the horse. Activities will help to facilitate attachment by bringing attention to the child and horse's body language, sensory experience, and body movement. Results from this program, as well as how horses provide benefits to children with PTSD, will be disseminated to educate others, inform OT practice, and contribute to knowledge and provider gaps.

Program Goals

The goals of the program *Unbridled* are to improve the frequency and quality of social interactions of children with PTSD. Social interactions will be measured using the Evaluation of Social Interaction and through qualitative interviews of both the child and their caregiver. Findings of *Unbridled* will need to be disseminated through various sources to help educate others regarding program outcomes. It is hoped that the program will provide evidence needed to support the use of horses for improved social interactions

in children with PTSD. The description and results of the program will be presented at professional conferences and prepared as a manuscript for a peer reviewed journal such as the American Journal of Occupational Therapy (AJOT) and People and Animals: The International Journal of Research and Practice. Please refer to a summary of measurable short-term and long-term goals needed for dissemination in Table 6.1.

Table 6.1

Long-Term and Short-Term Dissemination Goals

Long Term Goal
Unbridled will function as a pilot program to inform pediatric occupational therapy interventions involving horses that aim to promote improved pediatric mental health outcomes in children with PTSD.
Short Term Goals
Increase OT awareness of the impact of horses on social interactions for children with trauma histories through a professional poster presentation at a professional (national and/or state) conference.
Share qualitative and quantitative program findings in the form of a professional poster and/or journal publication.
Establish collaborative relationships with occupational therapy practitioners and other equine or rehabilitation professionals to assist with sharing educational information and expanding partnerships for future research.

Target Audience

The primary audience for presentations and publications will be occupational therapy practitioners (OTPs) which includes OTs, occupational therapy assistants (OTAs), as well as graduate students in OT. Dissemination methods will introduce OTPs to the benefits of horse use for children with trauma histories. Beyond the therapeutic benefits of the horse movement and taking place in a natural, outdoor, and community-

based environment, OTPs will learn the significance and benefits of the horse-child connection and social interactions with horses. OTPs have an opportunity to facilitate interactions and experiences in a way that promotes trust, attachment, and relationship building with the horse.

OTPs have distinct knowledge and skills to support children with trauma. From their medical background to training in psychology, OTPs understand the importance of engaging individuals through occupation-based, purposeful activities. Through skilled observation, activity analysis, and careful assessment of motor and process skills that comprise occupational performance, OTPs have skills to be able to break down complex tasks into simple steps to promote successful task completion (AOTA, 2020). The OTP perspective can enrich the therapeutic equine experience for children with trauma through active participation in occupation-based activities with the horse and ensure a "just right" level of task complexity to promote successful task completion and positive social interaction.

The secondary audience would consist of equine, health, and rehabilitation professionals. Professionals that use horses in therapy such as social workers, counselors, therapeutic riding instructors, and/or other mental health providers may also find value and relevance between the social interactions between the child and horse. Health and rehabilitation professionals who also work with equines, such as speech language and physical therapy professionals who incorporate hippotherapy into practice may also benefit from learning about the mental health benefits of horse and child bonding. These professionals may benefit from learning this information as they may look to evidence to

support this intervention and/or begin integrating socialization more intentionally throughout their practice to positively influence the mental health of the individuals they serve. Additionally, educating the secondary audience about how to facilitate social interactions with the horse may also benefit other providers.

OTPs can use horses to promote active occupational engagement in a purposeful and meaningful context to help promote and develop socialization skills. Through careful evaluation of socially oriented occupational behavior during these activities, OTPs can further understand what changes in social interactions take place. Sharing results from *Unbridled* will be important to help to inform practices of other professionals who use horses and contribute to research gaps within this specialty area of practice.

Key Messages

Primary Audience

Social interactions with horses are an effective intervention that can positively impact pediatric mental health (PMH) for children with trauma histories and PTSD. The horse offers natural opportunities for socialization, safe attachment, and connection which results in an increased therapeutic engagement. Increased engagement can also help to decrease psychological stress through perception and experience of social support from the horse. The social support experienced by the child also has the potential to decrease symptoms such as self-harm and suicidal behavior (Muela et al., 2021). Practicing OTPs would benefit from education about this intervention and how it can promote PMH. When OTPs who work with horses understand how effective horses can be in promoting PMH through socialization with the horse, they may learn new strategies

that help inform their interventions with horses and children.

Secondary Audience

Equine, health, and rehabilitation professionals may also find it beneficial to understand how horses benefit pediatric PMH and what research exists to support interventions that lead to improvements to PMH. The horse can function as a social ally and partner to the child. Overtime, social interactions with the horse can lead to positive changes that impact the child in other areas such as improved concentration, mood, and/or motivation. Equine, health, and rehabilitation professionals may find it relevant to be aware of these benefits and programs as they can function as a referral source and/or may incorporate such interventions into their practice (Harvey et al., 2020; Hoagwood et al., 2017; Grockienė et al., 2018).

Sources/Messengers

For the primary audience of OTPs, a source for this educational dissemination would be through the national organization that provides guidance and educational content for OT practices known as the American Occupational Therapy Association (AOTA). Presenting at the annual conference, an AOTA promoted event, would be an opportunity to present information to a variety of OTPs. The author's attendance at the AOTA annual conference would also create networking opportunities to enlist additional spokespersons, research partners, and additional educational opportunities such as podcasts and guest speaking opportunities. Other organizations that involve dissemination include the American Hippotherapy Association, the regulating agency that oversees certification and educational content to allied health professionals, such as

OTPs, physical therapists, and speech therapists that use horses in therapy. The AHA may also support educational opportunities through continuing education workshops or classes for allied health professionals.

Advisory partners on this dissertation that specialize in this area of practice may also help to disseminate information. Some advisory partners may include Gina Taylor, MS, OTR/L, HPCS and Professor Donna Latella, OTR/L. Gina Taylor is an occupational therapist that is certified in hippotherapy and therapeutic riding instruction. She specializes in hippotherapy and engages elements of nature into her therapeutic activities (Taylor, 2023). Professor Donna Latella has educational and practical experience in animal-assisted therapy with both canines and equines (Quinnipiac Today, 2023). Having experience from OT practitioners specializing in these fields, especially in different states, may help to facilitate networking, resource sharing, researching, and collaborating.

Expanding into other professional areas, such as equine professionals, would also be important to promote collaboration across discipline, background, and specialties. Working with equine professionals would also provide an opportunity to educate and advocate for the role of OTPs working with equines. Cindy Burke, BS, MBA, Path Intl CTRI, ATRI, Mentor, Lead Site Visitor, Path Intl ESMHL is a certified riding instructor and head equestrian coach for Special Olympics New Hampshire and has over 20-years of experience working with horses. Cindy Burke has a large network and extensive experience within therapeutic riding. Additionally, contacting the Professional Association of Therapeutic Horsemanship International (PATH-International) could also be a way to share information with other horse professionals.

Dissemination Activities

Dissemination of the program will occur through a variety of methods including printed journal publications, educational brochures/handouts/in-services, a professional poster at a national level conference, social networking and media, and guest speaking opportunities (see Appendix E for a summary of dissemination activities). It is the responsibility of the program developer to ensure dissemination activities occur over the next 1–3 years (see also Appendix F for a professional poster design).

Budget

Dissemination activities will require a budget to determine funding needs and costs. Please refer to Table 6.2 for an anticipated budget involving dissemination. The total anticipated cost for dissemination is $8,400.66.

Table 6.2

Anticipated Budget Overview for Dissemination

Primary Audience (OT Practitioners)	
Dissemination Activity	**Expenses**
Airline Travel (To/From Boston to Orlando)	$400 (round-trip)
Hotel Stay	$2,055.38 (4 nights)
Professional Poster Printing Cost	$120
AOTA Memberships (Student)	$75
AOTA Conference Registration (Student)	$280
Miscellaneous Conference Costs (food, drink, products)	$500
Primary Audience (OT Practitioners)	
Dissemination Activity	**Expenses**
C&J Bus (Portsmouth, NH to Logan Airport, Logan Airport to Portsmouth, NH)	$60
Person vehicle (gas at $3.69/gallon, back and forth from Dover to Portsmouth)	$15
Primary Audience Total	**$3,505.38**
Secondary Audience (Equine Professionals & Allied Health Professionals)	
Dissemination Activity	**Cost**
Monthly phone plan at $75.99 for 36 months	$2,735.64
Internet priced monthly at $59.99 for 36 months	$2,159.64
Secondary Audience Total	**4,895.28**
Primary & Secondary Dissemination Expenses	**$8,400.66**

Evaluation

Evaluating the success of this dissemination plan is important to ensure the author's efforts yielded results that meet expectations. The purpose for sharing this information is to inform audiences of the benefits horses can provide in OT, as well as intention to implement the proposed evaluation study design through *Unbridled.* Given that this project is in an early stage and that research has not been completed, it will be important to facilitate an exchange of information to be able to communicate with OTPs that are interested in learning about the developments over the next few years. A sign-up sheet will be available in person as well as via QR code to organize contact data and ensure a follow-up plan can be established and developed overtime with OTPs interested in learning more. There will also be an option to enter a preferred method of contact with options such as email, social media, or text message. Measuring success of dissemination may include the number of participants/sign-ups from the primary audience and the number of printed materials disseminated provided to the primary audience.

Additionally, analytics from social media may also help to evaluate engagement of media posts and communications. Since use of social platforms are free to use, social platforms would likely engage members of both primary and secondary audiences. Social media could be used to post announcements (e.g., providing notice of a recent podcast), advertise future educational events, post information through videos (e.g., interviews), advertisement (e.g., financial sponsors), and/or engage with an audience through questions/answer forums. Measurements of successful outreach may consist of quantifying social media views, post likes, and connections made through social media.

Conclusion

A dissemination plan for *Unbridled* is important for both primary and secondary audiences to increase their knowledge and build an awareness of how horses are used in occupational therapy. Dissemination of program results may also provide audiences with information that help to inform their practices. Dissemination through a variety of methods will help to promote *Unbridled's* visibility, networking opportunities, encourage professional collaboration and participation, and inform future research and practice.

CHAPTER SEVEN – Funding Plan

With the steady rise in pediatric mental health (PMH) needs, there is a growing need for pediatric occupational therapy (OT) services. OT services that incorporate horses can be effective at proving social support to children with post-traumatic stress disorder (PTSD). Horses incorporated into therapy have been found to have several positive effects on pediatric mental health (Norwood et al., 2020). The proposed program, *Unbridled*, will deliver OT services that incorporate horses to five children ages five to ten with PTSD. *Unbridled* will be overseen and operated by a licensed occupational therapist and will take place at a Professional Association of Therapeutic Horsemanship (PATH) accredited barn. The program will run for 10-weeks with the goal of improving children's mental health by promoting wellness, building self-regulation skills, and increasing functional independence through socialization with the horse. *Unbridled* will integrate a combination of horse-child socialization opportunities, horse grooming activities, adaptable sensory experiences, horse-child teaming, and therapeutic activities that promote independence and skill acquisition. In order to operate, *Unbridled* will require a budget for planned operational costs. Planning financial expenditures is an important consideration to help determine the supports needed for successful program implementation.

Available Local Resources

Available resources within the community of Dover, New Hampshire will be considered to help identify a location that is capable of providing this type of service. This includes local barns, therapeutic horses, and volunteers. Within the greater New

Hampshire Seacoast and Southern Maine community, there are a few options where this program could be established:

- Wits End Farm- Eliot, Maine
- Paradise Farm- Dover, NH
- High Knoll Equestrian Center- Rochester, NH
- Maple Stone Therapeutic Riding Center- Acton, Maine (PATH Certified)
- Carlisle Academy Integrative Equine Therapy & Sports- Lyman, Maine (PATH Certified)

Volunteers may be recruited to help offset program expenses and to ease logistical operations. They may be recruited from local schools with high school students who require volunteer hours (e.g., Dover High School, Spaulding High School, Somersworth High School), college occupational therapy programs (e.g., University of New Hampshire (UNH) Occupational Therapy Program), and/or equine programs or barns (e.g., UNH Equine Studies). Volunteers within the program would have roles assisting the OTP.

Needed Resources: Budget

Anticipated fees for *Unbridled* include fees for the OT service provided, horse rental, facility rental, evaluation materials, and staff wages. Other items required to provide the service includes consideration of equipment costs. An exhaustive list of possible program expenditures was developed to organize costs associated with supplies, services, and wages over a two-year period (see Appendix G for an exhaustive list of budgeted expenses). The total cost to run *Unbridled* is $33,197.65.

Potential Funding Sources

Considering a range of funding sources is important for program planning. The goal in obtaining a variety of funding supports would be to include participation fees, medical insurance reimbursement, grants, donations, and sponsorships. Some funding sources may off-set out-of-pocket costs to families. Additionally, as the program continues and expands to serving more children, the participation cost per child may also decrease as many of the initial expenses would not need to be repeated (e.g., evaluation kits or equipment such as a barrel that can be used again).

As the program expands, the long-term goal would be to increase the number of children served by the program. One way to obtain funding includes applying for local or state level grants, particularly those that do not require the status of the program as 'non-profit' or require a history of tax documentation (see Appendix H for a list of funding sources). Other state and local level funding options for *Unbridled* include donations from local businesses and medical insurance claims. Crowdfunding for this pilot program through Boston University may also help to raise some funds without spending restrictions. A comprehensive list of funding sources has been summarized (see Appendix H) to outline funding sources.

Conclusion

Considering a variety of funding sources is important to maximize financial supports necessary for successful program implementation. Funding options include state and local grant opportunities, participation fees, medical insurance reimbursement, and donations from local businesses. There may also be additional state funds that are

available within the category of grant funding, especially as *Unbridled* becomes more established and can provide an adequate tax history and non-profit status. Covering program expenditures will help to reduce costs for program participation and help promote more equitable access for children and families. Therefore, it is essential to utilize a variety of funding sources.

CHAPTER EIGHT – Conclusion

Throughout this dissertation, pediatric mental health (PMH) and use of equines to promote social interaction as a mental health outcome in occupational therapy (OT) was presented. A need for OT services was identified due to an increased prevalence of children with post-traumatic stress disorder (PTSD) and mental health needs. Children who have PTSD experience significant changes and/or disruption to socialization patterns that occur during various routines, roles, and habits. Changes in socialization leads to decreased occupational engagement and participation across daily activities. Social interventions in OT that incorporate horses can help children with PTSD by functioning as a social support and provide occupation-based engagement to improve social interaction, however occupational therapy practitioners (OTPs) may not realize how horses can help promote social interaction and have a positive impact on PMH. After an extensive literature review, the proposed program evaluation study design through *Unbridled* was presented as a possible solution that will contribute to current knowledge and provider gaps.

Occupational Therapy, Pediatric Post-Traumatic Stress Disorder, and *Unbridled*

OT services that incorporate horses is a growing and yet under researched area of practice that can be a treatment option for children with PTSD. Horses have been found to help improve socialization, confidence, and decrease somatic symptoms for children with trauma and PTSD (Muela et al., 2021). However, current research is unable to explain what mechanisms are involved with horses improving a child's socialization skills and whether the horse connection may be involved with improving a child's mental

health. The aim of this dissertation is to bring attention to the socially oriented therapeutic attributes of the horse and determine whether social interactions have an impact on children with PTSD.

Theoretical Frameworks

Unbridled was developed with two critical theories to help identify mechanisms of social interaction and bonding with the horse. The first theory, Attachment Theory, was developed by John Bowlby in the 1960s and later expanded upon by Mary Ainsworth. Attachment theory helps to explain how primary caregivers and infants develop their relationship or bond following birth. Bowlby explains how to develop healthy attachment and qualities of the primary caregiver. Caregivers that develop strong attachment are responsive and consistent to their infant's cries (Bowlby, 1958). Horses can also function as a source of attachment by providing responsive social interactions that build feelings of trust, safety, and confidence overtime.

A second theory, the Model of Social Interaction (MSI), was developed by Susan E. Doble and Joyce Magee-Evans in the 1990s. The MSI helps to explain the social enactment skills that occur during social interactions that take place during daily activities (Doble & Magill-Evans, 1992). The MSI helps to provide a framework for OTPs to observe, monitor, and break down the motor and process skills associated with socializing. When applying this theory to horses, this theory will help OTPs identify areas of socialization that need support and may also help to identify mechanisms of social interaction that occur between the horse and child.

Program Funding

A funding plan was presented to itemize potential expenses associated with running the program *Unbridled.* There will be several funding sources utilized for program expenditure including a family participation fee, medical insurance reimbursement, and other funding options such as fundraising, grants, and /or donations. The estimated program costs are a conservative estimate and will cover the wages of all staff, including the horse and facility rental fee. As the program continues overtime, *Unbridled* may qualify for grants that require more information such as tax information, program outcomes, and/or proof of a non-profit status.

Dissemination Plan

The proposed program *Unbridled* will utilize a mixed-method approach to collect both quantitative and qualitative data. Data collected will help identify changes in the frequency and quality of the child's social interactions, including interactions between the horse and child. Dissemination of the proposed program evaluation study results will be used to inform practice through publication of a peer-reviewed journal article and/or presentation in an educational context such as a poster or in-service. Aim of the dissemination plan will seek to contribute to known research and provider knowledge gaps. Results of this pilot program will provide information to determine if replication is feasible. If the results suggest strong improvement, a second round of the program will be offered and an implementation manual will be developed for replication for use by OTPs.

Reflection

Unbridled is a program that envisions a world where all children feel safe and empowered to live their best life. This program may help to contribute to provider knowledge and research gaps that help identify mechanisms involved with social interaction, as well as apply theory. *Unbridled* is innovative and may help influence how horses are utilized by OTPs as well as identify whether a child's social interactions with horses can positively impact their ability to engage in meaningful daily tasks and activities. Additionally, once the proposed program evaluation study is completed, *Unbridled* may expand to help more children by developing a manual for intervention that can be used by other OTPs.

In summary, *Unbridled* has the potential to create positive changes in the lives of children who live with PTSD and their families. By helping to restore the social support needed to engage in daily activities, children can begin to heal and grow to promote a healthier quality of life. OTPs may also benefit from learning about how horses function as a social partner in OT and how this can empower a child to cope, express themselves safely, and learn to develop meaningful relationships throughout their lives.

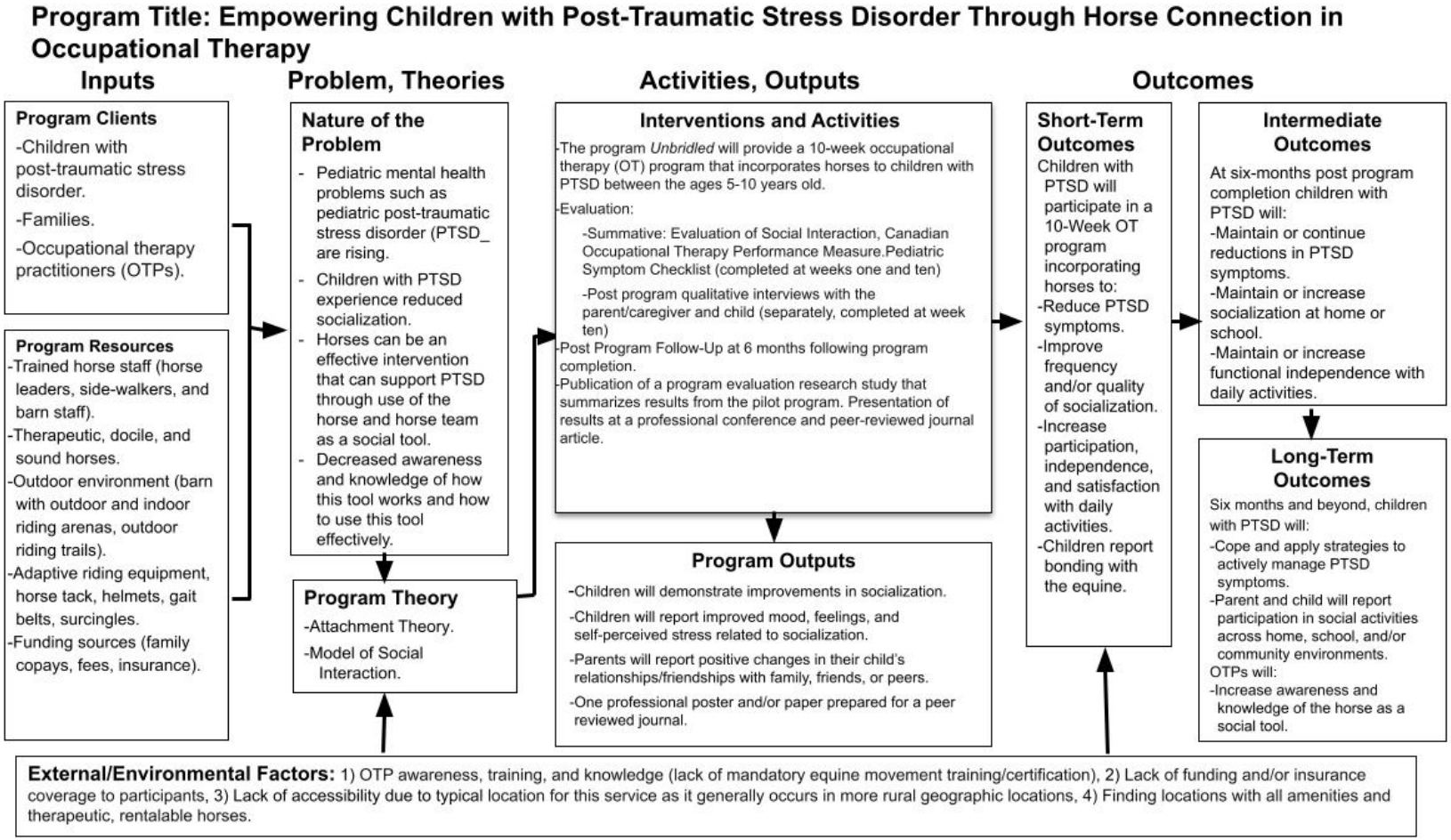
APPENDIX A

Overview of 10-Week Intervention Plan

Week	Social Task	Focus	Activity Description
1	Occupational Therapy Evaluation		
2	Greeting the Horse	Introduction- learning how to be safe around and greet the horse; getting comfortable around horses.	Practice safe greeting with the horse and feeling comfortable around them. Complete brushing activities with support. Introduce the child to the horse's movement.
3	Brushing the Horse	Cause/Effect Relationship- build an awareness and understanding of the child's action and horse's responses.	Continue to promote the horse-child social connection through horse grooming and riding activities while gradually decreasing the level of support. Child may or may not begin to notice and respond to the horse's body language; social prompt cueing may be provided as needed to build this skill throughout.
4	Directing the Horse	Build Communication between the child and horse.	Child begins to direct the horse by asking for change through cues. Child may attempt to direct the horse to walk, stop, and trot as tolerated/preferred. Turning left or right etc.
5	Talking to the Horse	Relationship building that involves the child telling the horse a favorite memory, story, or sharing their day.	Practice verbalizing needs with the horse and getting a response (assisted by the horse team) during the session with activities and while sharing stories.
6	Partnering with the Horse & Body Language	Body language- reading and responding to the horse.	Complete indoor activities and focus on labeling/scanning the horse's body cues during activities completed. Activities may vary.
7	Partnering with the Horse- Interoception	Increase the child's body awareness through movement.	Body scan, relaxation, and grounding exercises that enhance the feeling of movement and body awareness. Describe the sensory experience petting the horse, touching mane etc. This may include positional changes facilitated by the therapist.
8	Child-led activity with the horse	Complete activities with the horse.	Activities may focus on flexibility and taking turns with games between horse and child.
9	Outdoor exploration	Problem solving during activities, interoceptive/sensory experience in outdoor walking area or trail	Obstacle course with ground poles, cones, standards/stations; variation of dynamic surfaces, natural elements, and relaxation.
10	Occupational Therapy Re-evaluation		

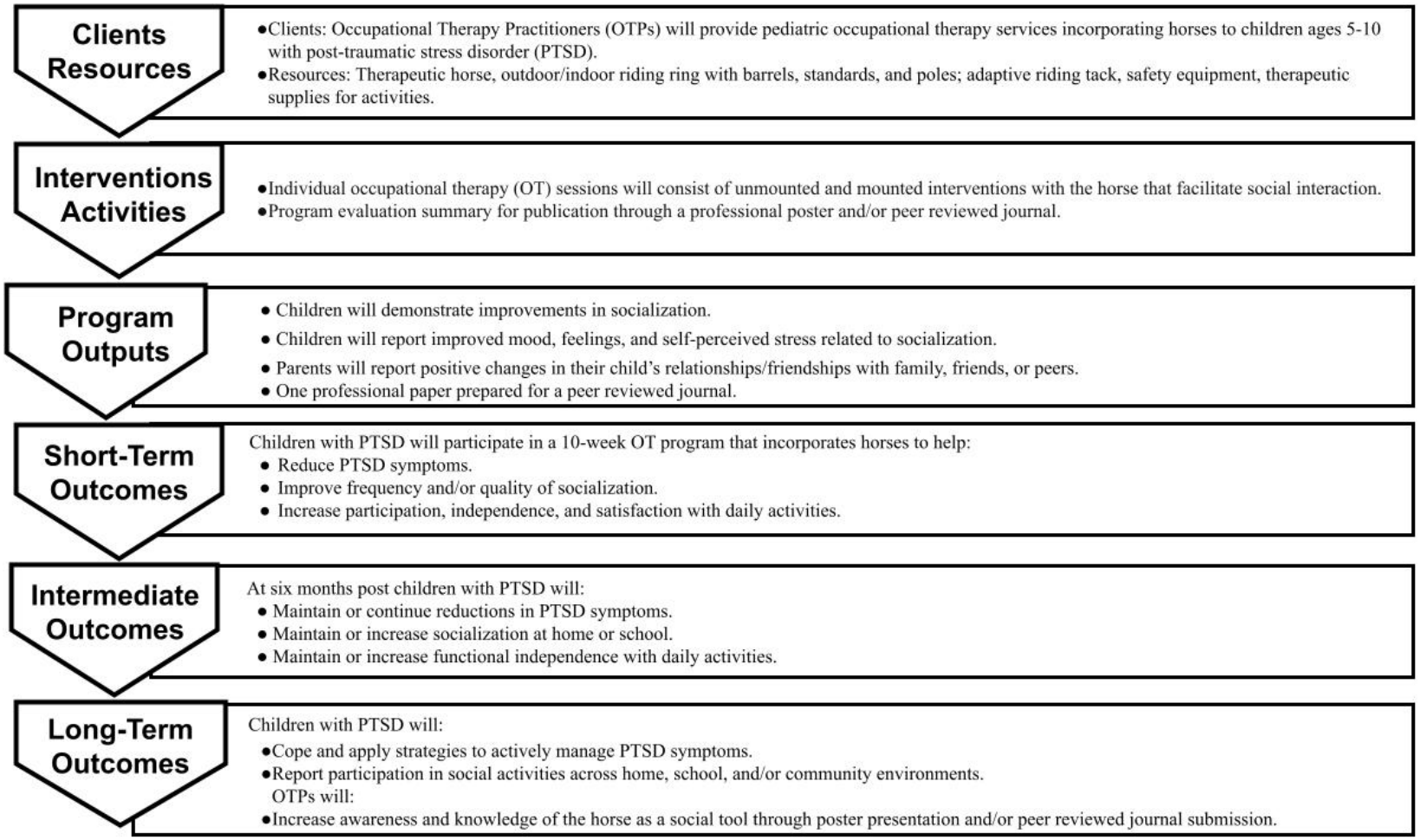
APPENDIX B

Full Logic Model



APPENDIX C

Simplified Logic Model



APPENDIX D

Research Questions for Stakeholders

Stakeholder	**Types of Program Evaluation Research Questions**
Stakeholders involved in providing direct service throughout program: Occupational Therapy Practitioner (OTP)/Author, volunteers, barn staff	***Formative:*** Is there anything that should be changed to improve program content or delivery? What other key issues or problems faced by participants were not addressed in the program? Did participants experience observable changes toward their mental health and/or socialization abilities? Were the interventions and horse interaction opportunities sufficient to establish connection? ***Summative:*** What changes did participants report? Did parents report changes/improvement to their child's mental health? How did the child behave or report their experiences over the course of the program? Did participants gain skills and/or perceived confidence in their ability to utilize coping strategies?
Stakeholders that provide access and resources to participate in the program: Parents/ Guardians of the children	***Summative:*** What changes did you notice from your child throughout the program? Did the program impact your child's social skills in any way? If so, how? Did the program impact relationships at home or other environments? If so, explain the impact. Do you feel the program Unbridled benefitted your child's mental health? If so, how? Did the program meet your expectations? How or how not?
Stakeholder to receive service: Children enrolled in the program	***Summative:*** Did you like working with your horse? What was your favorite memory about working with your horse? How did your horse make you feel? How do you feel about talking others at home or at school? How do you think the horse helped you? Finish the phrase, "I love my horse because:_____."

Stakeholder	**Types of Program Evaluation Research Questions**
Stakeholders providing legal, financial, and/or practical support: IRB, sponsors, liability insurers, and regulating organizations such as the American Occupational Therapy Association and the American Hippotherapy Association	***Formative:*** Is the content of the program and delivery of services sufficient to meet expectations and program implementation? Are children and families confident that the horse was a change agent in supporting their mental health? ***Summative:*** Can the program evaluation data be used to demonstrate desired change in recipients of occupational therapy intervention as the result of the project? Will the program evaluation results identify, demonstrate, or distinguish the importance of the role of occupational therapy (OT) for providing services relevant to the project? What aspects of the program evaluation will contribute to the knowledge needed to close the clinical gaps?
Stakeholder: involved with program development, implementation, and evaluation: Barn staff and volunteers	***Formative:*** Were the resources available sufficient to meet the child and horse's needs? From your perspective, did Unbridled seem suitable for the needs of the child? ***Summative:*** From your perspective, did the child show changes in their level of social skills while working with the horse?

APPENDIX E

Summary of Dissemination Activities

Dissemination Method	Dissemination Activity	Target Audience	Responsibility/Purpose	Estimated Occurrence
Written Information	Professional Poster	Primary Audience	Print a professional poster summarizing this dissertation for the AOTA (American Occupational Therapy Association) conference.	February 2023
Written Information	AOTA Handout	Primary Audience	Provide a project overview brochure and/or factsheet to provide interesting key points.	February 2023
Written Information	Contact Information	Primary Audience	Provide AOTA members with a way to contact this author.	February 2023
Person-to-Person	AOTA Conference Poster Presentation	Primary Audience	Develop quick talking points about the summary of evidence and need for research.	March 2023
Person-to-Person	Meeting	Primary Audience	Meet with Gina Taylor, MS, OTR/L, HPCS.	March 2023
Electronic Media	Podcast	Primary Audience	Podcast interview with Gina Taylor as guest speaker.	Anytime
Person-to-Person	Meeting	Secondary Audience	Board Member(s) of the AHA.	January–June 2023
Hippotherapy Credentialing Exam	Examination	Primary Audience, Secondary Audience	Obtain advanced credentialing in hippotherapy.	February 2023

Dissemination Method	Dissemination Activity	Target Audience	Responsibility/Purpose	Estimated Occurrence
Written Work	Article for AOTA magazine	Primary Audience	Summarize key points of the dissertation and benefits of the horse-child connection.	August 2025
Written Work	Publication in a peer reviewed journal	Primary Audience, Secondary Audience	Summarize pilot program results.	August 2026
Electronic Media	Media posts	Primary Audience, Secondary Audience	Share progress, updates, and developments through professional social media sources.	Ongoing
Person-to-Person	Meeting	Primary Audience	Meet with Donna Latella, OTR/L.	June 2023
Person-to-Person	Meeting	Primary Audience	Meet with Cindy Burke, BS, MBA, Path Intl CTRI, ATRI, Mentor, Lead Site Visitor, Path Intl ESMHL.	June 2023

APPENDIX F

Professional Poster for Dissemination

BOSTON UNIVERSITY

Empowering Children with Post-Traumatic Stress Disorder Through Horse Connection in Occupational Therapy

Natalie Saccoccia, MS, OTR/L

BOSTON UNIVERSITY

INTRODUCTION

Children are experiencing higher incidences of trauma. More than two-thirds of children reported at least one traumatic event by age 16 (Substance Abuse and Mental Health Services Administration, 2023) . Of the children with at least one reportable trauma, an estimated 16% become diagnosed with post-traumatic stress disorder (PTSD) (McLaughlin et al., 2023). The consequences of undiagnosed and/or untreated trauma or PTSD have long-term implications through adulthood including risk of depression, anxiety, substance abuse, high-risk sexual behavior, chronic diseases, and even suicide (Tsehay et al., 2020).

Heightened levels of stress associated with PTSD can inhibit a child's ability and willingness to socialize, process social information, and develop relational skills toward others while performing daily tasks, routines, roles, and/or other occupation-based activities (Moscholouri & Chandolias, 2021).

PROBLEM

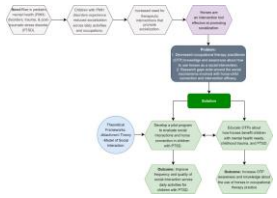
Children with PTSD experience reduced interest, motivation, and independence to socialize in daily occupations. Social situations can stimulate triggering feelings or sensations that cause nervous system dysregulation (Allen et al., 2021). Triggering experiences or fear of experiencing a triggering event in social environments can lead to stigmatization and further compound feelings of loneliness, detachment, anxiety, and hypervigilance. Fears associated with socialization can lead children to avoid and isolate from others and activities they enjoy (Allen et al., 2021; Harandi et al., 2017).

AIM

To investigat e what evidence-based research exists for:

- Children with PTSD who work with horses
- Mental health benefits provided by horses
- Theoretical frameworks

VISUAL MODEL



The interactional sensory exchange that takes place during socialization opportunities between a horse and child occur naturally without prompt or bias, suggesting that responsiveness is a key element in providing the child with immediate and direct feedback. When children are provided with direct feedback and experience natural consequences, they become more aware of how their actions yield a response from the horse and start to build trust and confidence (Hojgaard-Boytler & Argentzell, 2023; Moscholouri & Chandolias, 2021).

Figure 1
A child lying forward on a horse with open arms.

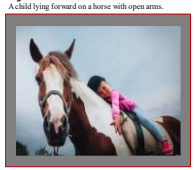
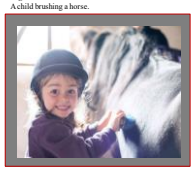


Figure 2
A child's hand touching a horse's face.

Figure 3
A child brushing a horse.



CONCLUSION

The horse's movement helps improve a child's ability to function and develop the physical skills needed to support confident social interactions.

Occupational therapy practitioners can use horses in therapy to promote improved mental health, socialization, and quality of life for children with PTSD.

Ongoing research is needed to develop protocols, theoretical frameworks, and to identify mechanisms of interaction between the horse and child.

USE OF HORSES IN OT

Horses can be incorporated into occupational therapy (OT) practice as an occupation-based intervention that provides individuals across the age span with a variety of physical and psychological benefits. Interventions involving horses vary from person to person and generally include:

- Mounted and/or unmounted therapeutic activities or exercises that may consist of horse movement (hippotherapy)
- Horse care (e.g., brushing the horse)
- Interactions with the horse
- Outdoor stimulation that provides health benefits associated with sunlight exposure, fresh air, and visual sight of green spaces (Fisher, 2021)

Horses can be effective at promoting socialization during OT sessions. A horse's instinctive mentality helps them detect subtle changes in their environment, including non-verbal cues, and social interactions with children. Horses are attentive to changes in communication through:

- Touch/pressure
- Facial expressions
- Vocal intonation, volume, and frequency

For children with PTSD who may be unaware, unable, or unwilling to communicate their feelings, wants, and needs, horses have a unique ability to see, feel, and respond to them differently than humans. Children who work with horses in therapy report feeling supported and less alone throughout the therapeutic experience (Hojgaard-Boytler & Argentzell, 2023). In addition, the horse's responsive nature and presence facilitates emotional attachment and creates feelings of partnership (Harvey et al., 2020; Moscholouri & Chandolias, 2021). This combination of qualities is invaluable and cannot be replicated in traditional clinical settings.

REFERENCES

ACKNOWLEDGEMENTS

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Lindsay Callaghan (Reviewer)
Pauline Westcott, OTD, OTR/L (BU Peer Mentor)
Sean Manning (Reviewer)
Sigal Vox, Ph.D., MSc. OT (BU Academic Mentor)
Tia Madaffari Hackett, MS, LMFT (Advisor & Reviewer)

APPENDIX G

Overview of Program Expenses

Item	Justification	Cost	Year 1 Cost	Year 2 Cost	Total
Salaries/Consultant Fees					
OT Salary	Fee associated with the cost of a 10-week program for private occupational therapy services for 5 children.	$150 evaluation	$750.00	$750.00	$1,500.00
		$100/hr Session x9 Sessions (excludes initial evaluation)	$4,500.00	$4,500.00	$9,000.00
		$50/hr for planning, documentation, paperwork, communications (based on two hours a week)	$500.00	$500.00	$1,000.00
OT Liability Insurance	Fee associated with malpractice and liability insurance for one therapist	$120/yr	$120.00	$140.00	$260.00
Program Dissemination	Fee associated with sharing information about the program.	$8,400.66	$4,200.33	$4,200.33	$8,400.66
Barn Manager Consultant	Fee covers barn manager	$50/hr, 2 hours per	$800.00	$840.00	$1,640.00

Item	Justification	Cost	Year 1 Cost	Year 2 Cost	Total
	oversight, assistance with equine logistics, and covering staffed positions	week for 8 weeks; year 2 increase to $52.50/hr			
Horse Staff (e.g., horse leader and/or side-walker if unable to recruit volunteers)	Fee covers 6hrs/week with a half-hour before and after sessions to prep and a half-hour to cool out the horse.	$15/hr for 8 weeks; year 2 increase for returning staff to $15.75/hr	2 Positions @ $15/hr: $1,440.00	2 Positions @ $15.75/hr: $1,512.00	$2,952.00
Horse Rental Fee	Fee covers the rental cost of the therapeutic horse and associated equipment (halter, lead rope, surcingle, saddle pad, brushes etc.)	$50/hr for 5 hrs per week for 8 weeks; year 2 increase to $55/hr.	$2,000.00	$2,200.00	$4,200.00
			Year 1 Total: $14,310.33	**Year 2 Total:** $14,642.33	**Program Total:** $28,952.66

Supplies					
Item	**Justification**	**Cost**	**Year 1 Cost**	**Year 2 Cost**	**Total**
Computer Paper	Paper needed for correspondence and therapy visuals	$10	$10	$10	$20
Printer	Printing appliance for therapy corre-spondence and materials	$200	$200	0	$200
Ink	Ink cartridges (black and color) for handouts, paperwork, therapy visuals	$50	$50	$50	$100
Computer	Computer and protection plan* (*Author will provide)	$700 value	$700 value	0	$700
Basketball Hoop Goal	Therapeutic activities	$105	$130	0	$130 +shipping
Docu-mentation System (Clinic Source)	Secure and digital based record keeping for evaluations and notes (based on one year)	$75/month	$900	$900	$1,800
Equine Helmets	Protective equipment	$70 per helmet (small, medium, large, extra large)	$280	0	$280
Gait Belts	Protective equipment	$20	$40	0	$40
Wool saddle pad	Required riding tack	$108	$108	0	$108

Item	Justification	Cost	Year 1 Cost	Year 2 Cost	Total
Vaulting Surcingle (single handle)	Required riding tack	$49.99	$49.99	0	$49.99
Vaulting Surcingle (double handle)	Required riding tack	$170	$170	0	$170
Horse grooming tools (brushes)	Required horse tools	$50	$50	0	$50
Brush box	Required horse tools	$57	$57	0	$57
Barrel	Used to hold therapeutic materials (2)	$100	$200	0	$200
Standard Pole	Used as a visual target (1 set of 2 poles)	$200	$200	0	$200
Rings, cones, balls	Therapy activities	$20	$20	0	$20
Adjustable Field Easel for Floor with Adjustable Height Ranges	Therapy activities	$120	$120	0	$120
			Year 1 Total: $3,284.99	**Year 2 Total**: $960.00	**Program Total:** $4,244.99
Total Estimated Costs	**Year 1 Total:** $17,595.32 **Year 2 Total:** $15,602.33 **Total Program Cost (2 years):** $33,197.65				

APPENDIX H

Funding Sources

Name of Organization	Website	Funding Details
National		
The Max and Victoria Dreyfus Foundation	https://www.mvdreyfusfoundation.org/application-guidelines	Max and Victoria Dreyfus Foundation Grant provides recipients with a median reward of $8,471 and has a history of three million awarded to past recipients across 42 states. Awards can range from $1k–$20k. This organization focuses on providing funds that will make a big difference in individuals (The Max and Victoria Dreyfus Foundation, n.d.). They consider non-profit community organizations in the United States. Previous award recipients and amounts are not provided on the website.
United States Equestrian Federation	https://www.usef.org/about-us/diversity-inclusion/opportunity-fund	The USEF has grant opportunities that support their mission "to increase access to horses, horse sports, and equine-based learning opportunities among under-represented and/or under-served communities" USEF, 2023, para.1). Funds are not restricted and can be used for organizational costs. No previous award history information is listed. https://www.usef.org/forms-pubs/wz9wVCe6wms/2023-usef-opportunity-fund-grant

Name of Organization	Website	Funding Details
National		
Grants in Action: Horse Therapy MJ Murdock Charitable Trust	https://murdocktrust.org/2019/03/grants-in-action-horse-therapy/	This organization has funded more than $1.3 billion to non-profit organizations. 152 national grants were provided in 2023. A previous award for "Dogs For Better Lives" was funded in 2023 to assist with hiring new staff for $336,500. "Young Life" was a new program that was funded in 2023 for the amount of $250,000. The website provides an exhaustive list of recipients and award amounts. https://murdocktrust.org/grants-awarded/
State		
New Hampshire Charitable Foundation	https://www.nhcf.org/	Founded in 1962, NHCF has helped numerous New Hampshire communities and organizations. Money is acquired through donation, grants, and scholarships. NHCF funds, "Programs and operations of qualified nonprofits working in the areas of health and well-being, civic engagement, education, economic development, environmental protection and arts and culture." (NHCF, 2023) Some grant restrictions noted to exclude Strafford County. Community grants given awards up to twenty thousand. Deadline is early September. Unbridled would be eligible for this grant: The Greater Rochester Community Health Foundation (10k max, one year only). Please click on the link for the 2022 grant recipient list: https://www.nhcf.org/what-were-up-to/charitable-foundation-awards-3-8-million-in-operating-support-to-nonprofits/

Local		
Annie's Angels	https://www.anniesangels.org/fund-guidelines00af4079	Since 2007, this local non-profit has raised approximately 5 million dollars to families in need, or to businesses who support family needs. This non-profit has been in business for 6,019 consecutive days and has never refused to provide support to a family (Annie's Angels Memorial Fund, 2023). Support ranges with service animals, teddy bear drive, arts programming, and/or monetary assistance to help with a variety of needs including yet not limited to adaptive devices, specialty home equipment, and/or cost of medical care or services. Donations for 2023 to date are $534,393. Monetary support provided to families to date is $338,951.00. Individual award amounts was not listed on the website.
Business Grants from Local Companies/ Sponsorships	Saccoccia Electric	A family-owned business would be able to contribute $1,000.00.
Crowdfunding through Boston University	https://crowdfunding.bu.edu/pages/home-13	Awards raised range from $100–$21,500. Boston University uses an online platform to assist with fundraising for innovative ideas for Boston University programs and students.

APPENDIX I

Executive Summary

There is an increased number of children experiencing post–traumatic stress disorder (PTSD). In 2019, 1,840 children died of abuse or neglect, and it is estimated that one in seven children this year will have experienced either abuse or neglect (Substance Abuse and Mental Health Services Administration, 2023). Greater than two thirds of children report at least one traumatic episode by age 16 (Substance Abuse and Mental Health Services Administration, 2023, para. 2 & 3). Children with PTSD may experience mental health symptoms such as anxiety, depression, and/or suicidal ideation. These symptoms result in reduced social engagement because of social isolation, excessive worry or fear, lack of sleep, low energy, low motivation, and somatic complaints (e.g., headaches, stomach pain etc.).

Incorporating horses into occupational therapy intervention can be a helpful treatment option that uses the healing power of the horse. Horses fulfill a therapeutic role with people across the globe due to their intuitive and gentle nature. They possess many qualities that help to encourage healing across the age span. When children learn how to interact and care for a horse, they also learn how to build an emotional connection and be successful. Some studies report that equine assisted therapy (EAT) can positively influence mental health and socialization. For example, a pilot study of adolescents reported horses helped to reduce trauma symptoms, such as reductions in self–harm and suicidal behavior (Muela, 2021). Children who participate in 10-12–week equine programs also experience reduced anxiety and improved motor coordination, which helps

promote socialization (Beetz et al., 2012; Grockienė et al., 2018, Harvey et al., 2020, Hoagwood et al., 2017; Moscholouri & Chandolias, 2021).

Current research in this area of practice lacks statistical confidence and strong study designs. Many studies consist of low population samples, poor clarity among synonymous terms and interventions, and varied philosophical approaches, which can impact research efficacy and ability to reproduce results with other populations. Studies also lack standardization in assessments. Implementing a pilot program that aims to improve pediatric socialization through incorporation of the horse may help to inform occupational therapy practice and provider knowledge.

Project Overview

The proposed pilot program, *Unbridled*, was designed to provide occupational therapy (OT) services that incorporate horses and serve children from ages 5-10 with PTSD that are experiencing socialization difficulties. The program will run for 10–weeks with the goal of improving the frequency and quality of social interactions. The program will seek to achieve this by providing therapeutic unmounted grooming activities, therapist facilitated horse–child interactions, and hippotherapy with an occupational therapist, horse, and horse team (horse leader and side walkers). The *Unbridled* program will cost approximately $14,840.95 to implement for the initial year.

Throughout the 10–week program, information will be collected from children and their caregivers. To start, the occupational therapy practitioner (OTP) will evaluate the child with three evaluation tools. The first evaluation measure that will be utilized is the Evaluation of Social Interaction (ESI), which is an observation–based, standardized

assessment of social interaction skills. This assessment consists of a trained OTP observing two natural social exchanges between the child and someone whom they need or want to interact with. Results will help to provide information about the child's occupational performance skills involving socialization and the areas needing improvement. The second evaluation measure is the Canadian Occupational Performance Measure (COPM) which is a standardized client centered outcome measure which will be used to identify challenges the child experiences in daily life, rate their perceptions of their occupational performance, and determine areas of priority necessary for goal setting. The third evaluation measure is the Pediatric Symptom Checklist (PSC) that will help to monitor for changes in health symptoms.

Qualitative information will also be collected on the final week of the program from children and their caregivers through separate semi–structured interviews. Children will be asked open ended questions about the child's relationship with the horse, their feelings, and moods while with the horse, their comfort socializing, and how they feel the horse helped them. Parents will be asked questions about their perception of their child's growth/changes in social behavior, symptoms, independence in daily tasks/activities, horse–child relationship, and whether there were changes in their child's level of confidence and motivation. The results will be reviewed through a thematic analysis to further understand changes in the child's occupational performance and engagement with activities outside of therapy and whether the horse–child bond was perceived to influence the child's mental health and/or behavior.

Program monitoring and evaluation will take place to ensure successful outcomes and efficacy of *Unbridled*. Monitoring outcomes through detailed data collection and follow up with caregivers will help to inform future research, interventions, and resources such as financial stakeholders. Staff and volunteers involved in the program will also provide feedback and ongoing training to ensure conduct and program guidelines are met.

Theoretical Background

Unbridled was developed with two theoretical references to help frame how social interactions and attachment develops between children and horses. The Model of Social Interaction is an OT based theory that views socialization as a complex occupational behavior that must be broken down into smaller units (Cho, 2023; Doble & Magill–Evans, 1992). This information can help to inform an OT about the quality of interactions and areas of performance skills that require additional support during interactions. Attachment Theory is a psychological theory that explains how attachment and relationships are formed between infants and primary caregivers (Bowlby, 1958). Since the horse can exhibit qualities of a responsive caregiver, this theory helps to explain how horses can also promote increased social behavior and social connection with others. Together these theories promote a comprehensive understanding of socialization through explanation of attachment and mechanisms involved with social interaction.

Model of Social Interaction

Socialization in a child's life plays an important role in their mental health. A study reports that children who receive social support from family, peers, teachers, and providers are less likely to develop PTSD than children without social support

(McLaughlin, 2023). Social interactions vary across cultures and contexts. The Model of Social Interaction, a guiding theory for *Unbridled*, explains that social exchanges between humans and animals consist of a process of intake, processing, output, and feedback (Cho, 2023; Doble & Magill–Evans, 1992). Analyzing interactions with this framework will help providers understand the small units of interaction that occur between social exchanges of the horse and child. Assessing interactions is necessary to determine whether interventions are effective at facilitating social interaction.

Attachment Theory

Another guiding theory for this program is John Bowlby's theory of Attachment. Bowlby defines attachment as, "A behavior that results in a person attaining or maintaining proximity to some other clearly identified individual who is conceived as better able to cope with the world" (Bowlby, 1988, p. 27). His theory explains that attachment with a responsive caregiver leads to infants with improved regulation that allows for healthy development. Interactional exchanges between the horse and child are authentic and occur naturally without prompting or bias, suggesting that responsiveness is a key element in providing the child with immediate and direct feedback that helps a child meet their immediate needs. When children are provided with that direct feedback and experience natural consequences, they can become more aware of how their actions yield a response from the horse and begin to form attachment (Moscholouri & Chandolias, 2021).

Conclusion

The increased prevalence of childhood trauma is a growing national concern. Continued research and evidence is necessary to support the efficacy of horse intervention in occupational therapy and distinguish how horses can help children with PTSD. The proposed program *Unbridled* is designed to help improve the social interactions of children with PTSD. Gathering information from children and their caregivers about social interactions while working with horses will help to inform OTPs and OT practice as well as make recommendations for future research. Furthermore, gathering evidence about the positive changes in socialization is necessary to help the growing mental health needs of children.

APPENDIX J

Fact Sheet

BOSTON UNIVERSITY

Empowering Children with Post-Traumatic Stress Disorder Through Horse Connection in Occupational Therapy

Natalie Saccoccia, MS, OT/L
OTD Candidate

Introduction to the Problem:

Figure 1. A child holding a 'help' sign over their face. Retrieved from https://www.revivetherapy.com/blog/single/how-to-spot-ptsd-in-your-child

Children are experiencing higher incidences of traumatic experiences. The consequences of undiagnosed trauma or those diagnosed with post-traumatic stress disorder (PTSD) are significant due to the known long term negative health implications through adulthood.

Children with PTSD experience reduced interest, motivation, and independence to socialize in daily occupations. High or heightened levels of stress can inhibit a child's willingness to socialize, process social information, and develop the relational skills they need to be successful in when performing daily tasks and activities (Moscholouri & Chandolias, 2021). For some children, social situations can stimulate triggering feelings or sensations that cause nervous system dysregulation (Allen et al., 2021). Triggering experiences or fear of experiencing a triggering event in social environments can lead to stigmatization and further compound feelings of loneliness, detachment, anxiety, and hypervigilance. Fears associated with socialization can lead children to avoid and isolate from others and activities they enjoy (Allen et al., 2021; Harandi et al., 2017).

Socialization and social supports have been found to have a positive impact on children. Children who perceive to be socially supported make healthier decisions and are more likely to experience an improved quality of life (CDC, 2023; Norwood et al., 2022). Incorporating horses as an occupation-based intervention in occupational therapy (OT) provides a social supported therapy experience and promotes positive health outcomes for children (Cahill et al., 2020).

The Proposed Solution:

A pilot program, *Unbridled,* will provide occupational therapy services incorporating horses to children with PTSD. This ten-week pilot program will serve children ages 5-10 years. The program will seek to promote improved social interactions through building the child's attachment with the horse. Therapeutic activities will consist of:

- Unmounted grooming activities involving care taking of the horse.
- Mounted therapeutic activities such as hippotherapy.
- Other exercises and activities that facilitate interactions with the horse.

The goal of *Unbridled* is to improve the frequency and quality of social interactions. As part of the program evaluation, all children will undergo evaluation at the beginning and end of the program to measure changes in socialization as a mental health outcome:

- Each child will complete additional assessments upon start and completion of the program consisting of:
  - A standardized assessment with the Evaluation of Social Interaction (ESI) to assess the quality of social interactions.
  - The Canadian Occupational Performance Measure (COPM) to determine changes in parent and child perception of functional activities they need and want to do.
  - Pediatric Symptom Checklist to monitor mental health symptoms that also influence socialization.

Figure 2. A child looks at a horse with their hand positioned over the horse's face. Note. From Young blonde girl stroking a brown horse. [Online Image]. Pavlovski, 2024. Adobe Stock, Trustees of Boston University Education License. (© Pavlovski-stock.adobe.com)

Figure 3. A child is seated on the horse, forward facing and simultaneously reaching across their body midline to reach for a bean bag, while also being supported by the horse team. Retrieved from https://otcentral.wordpress.com/2020/06/13/hippotherapy/

Why horses? Horses offer an unparalleled multifaceted, outdoor, and therapeutic experience consisting of movement, sensory inputs, and socialization opportunities for children who are unaware, unable, or unwilling to communicate their feelings, wants, and needs.

Theoretical Basis Guiding Socialization and the Horse-Child Connection:

Model of Social Interaction. The Model of Social Interaction is an occupational theory that guides the vision for *Unbridled*, explains that social exchanges between humans and animals consist of a process of intake, processing, output, and feedback (Cho, 2023; Doble & Magill-Evans, 1992).

Attachment Theory. Interactional exchanges between the horse and child are authentic and occur naturally without prompting or bias. Attachment Theory helps to explain how children form attachment with a horse and develop meaningful connection (Moscholouri & Chandolias, 2021).

Implications for OT Practice:

- Occupational therapy practitioners can use horses as a tool to promote improved mental health for children with PTSD.
- The horse's movement offers a variety of benefits, including improvement of a child's ability to regulate and develop the physical skills needs to support confident participate in social interactions.
- Ongoing research is needed within this area of practice, including exploration of the horse-child relationship in relation to pediatric mental health benefits.

Benefits of incorporating horses:

- Children experience improvements to their social skills including the areas of social functioning, social cognition, and social communication (Ajzenman et al., 2013; Bass et al., 2009; Bernstein et al., 2000; Hoagwood et al., 2017; Pendry et al., 2014).
- Children improve their motor coordination and strength, such as maintaining upright posture, that help's children to communicate confidence in social situations and engage in tasks more successfully (Ajzenman et al., 2013; Moscholouri & Chandolias, 2021).
- The horse's adaptable and rhythmical movement can help reduce anxiety and improve motor coordination by providing calming and predictable sensory experience that naturally promotes socialization, interaction, and motivation (Beetz et al., 2012; Grockiene et al., 2018, Harvey et al., 2020, Hoagwood et al., 2017; Moscholouri & Chandolias, 2021).
- Children who work with horses experience reductions to their trauma symptoms such as reductions in self-harm and suicidal behavior (Muela et al., 2021). Researchers explain that because horses provide an opportunity for healthy, attentive, and responsive interactions, children can develop attachment which leads to feelings of safety, trust, and reductions in stress (Hoagwood et al., 2017).

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