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THE INCORPORATION OF HIPPO THERAPY AS
A TREATMENT TOOL IN SPEECH-LANGUAGE
THERAPY SESSIONS FOR ADOLESCENTS
WITH COMMUNICATION DISORDERS

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Structured Abstract

Clinical Question: In adolescents, does incorporating hippotherapy with speech-language intervention improve speech- and language-based outcomes more than traditional therapy alone?

Method: Systematic Review

Study Sources: CINAHL, PubMed, PsycINFO, ERIC, ASHA

Search Terms: communication disorders OR speech therapy OR speech pathology OR speech language pathology OR language disorder OR language impairments OR speech delay OR speech instruction OR speech skills OR language learning OR communication impairment AND hippotherapy OR therapeutic riding OR equine therapy OR equine assisted therapy OR equine assisted activities OR equine OR recreational OR riding

Number of Included Studies: 2

Primary Results:

- Play skills and nonverbal cue comprehension improved with hippotherapy (Hsieh et al., 2017).
- Play and nonverbal messages decreased after withdrawal from hippotherapy (Hsieh et al., 2017).
- Hippotherapy improved speech-language skills and motivation (Macauley & Gutierrez, 2004).
- Parents and participants reported hippotherapy was more effective than traditional speech-language therapy sessions for speech-language skills (Macauley & Gutierrez, 2004).

Conclusions: The research on hippotherapy as a treatment tool is expanding, although much of this lies in fields outside speech-language pathology (i.e., physical or occupational therapy). Of the two studies found that used hippotherapy as a tool to facilitate communication, there is evidence of improved speech-language outcomes for individuals with language-learning disabilities and cerebral palsy (Hsieh et al., 2017; Macauley & Gutierrez, 2004). Recent systematic reviews exploring hippotherapy in children with autism spectrum disorder found that incorporating hippotherapy into speech-language therapy sessions improves social communication skills and reduces maladaptive behaviors (Srinivasan et al., 2018; Trzmiel et al., 2019). Continued research exploring the inclusion of hippotherapy along with evidenced-based speech-language intervention is warranted and seems promising.

The Incorporation of Hippotherapy as a Treatment Tool in Speech-Language Therapy Sessions for Adolescents With Communication Disorders

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Clinical Scenario

Alex is a 19-year-old male with a significant medical history. During his time in the neonatal intensive care unit (NICU) after birth, he was diagnosed with Rubinstein-Taybi syndrome. Thus far, the etiologies for this syndrome include genetic deletion or mutation which account for a little over half of the cases of Rubinstein-Taybi syndrome. It is otherwise unknown (NIH, 2020). Alex's presentation of Rubinstein-Taybi syndrome is similar to that expected in autism spectrum disorder (ASD). His social communication and joint attention skills are severely affected, and he frequently exhibits repetitive movements, such as hand flapping. However, he has never received an ASD diagnosis. Alex's complex medical history includes nasogastric and respiratory difficulties as well as fine motor and speech-language challenges. His health has recently stabilized, and he has not been hospitalized since the age of 13 when he had a cleft larynx repaired. Alex's parents decided to homeschool him throughout middle and high school because of his need for individualized learning and the educational team's placement recommendations.

Alex's significant speech-language deficits lie in both comprehension and use of semantics, morphosyntax, attention, problem-solving, social communication, and speech sound difficulties. Currently, he uses a mixture of oral speech and augmentative alternative communication (AAC) on a dynamic-display, speech-generating device (SGD) with a robust system (Banajee et al., 2003). Over the past 3 years, Alex has been receiving weekly speech-language services, but he has made few gains. Alex's parents believe that traditional speech-language intervention alone has been insufficient to improve his language skills, likely because of his struggles with inattention and eye gaze and his strong need for movement and physical input. Eva, Alex's speech-language pathologist (SLP), has made numerous attempts to create a clinical environment ideally suited for his

attentional difficulties such as decreasing distractions and offering frequent movement or sensory breaks. However, Alex's inattentive and movement-seeking behaviors negatively impact his participation in a clinic-based setting.

Alex's family frequently mentions to Eva how much he enjoyed horseback riding as a child and his desire to try it again. Because Alex continues to struggle in traditional speech-language therapy sessions, Eva and Alex's family have begun contemplating the potential value of hippotherapy for people with complex communication needs. Hippotherapy combines speech-language, occupational, and physical therapy strategies with equine movement manipulation as a therapy tool, in addition to evidence-based practice and clinical reasoning, to engage the participant and achieve clinical outcomes (American Hippotherapy Association, 2020). For Alex, however, the movements of the horse present obvious difficulties for placement and use of his SGD. Eva will need to find a way to use hippotherapy along with his current total communication system.

Eva has completed the American Hippotherapy Association's (AHA) Level I course, and she has 3 years of experience incorporating hippotherapy into her intervention sessions, primarily with children with ASD. Eva's typical therapy sessions incorporating hippotherapy often include literacy activities, structured conversations, as well as games and other engaging activities that are chosen to target articulation, expressive/receptive language, and social communication. For example, if a client displays a need for increased movement, the horse will be led for continuous movement in the arena and strategies may include language modeling, auditory bombardment, or aided language input depending on the client's goals. Although Eva has experience with hippotherapy, she is unsure of its effectiveness as a supplemental speech-language intervention component for Alex because she is not as familiar with the research on hippotherapy's effectiveness for people with diagnoses outside of ASD. As such, both Eva and Alex's family desire

to learn if alternative therapy tools, such as hippotherapy, would increase Alex's complex communication skills more than traditional speech-language intervention alone, given his attention challenges and movement-seeking behaviors.

Background Information

Speech-language disorders, including swallowing, communication, and speech-language problems, affect approximately 16% of the U.S. population (National Institute on Deafness and Other Communication Disorders, 2015). Speech-language intervention services provided to ameliorate these disorders are individualized and may differ on dosage, location, and treatment strategies/tools. Recently, hippotherapy has begun to be included as one treatment tool used to improve speech-language, physical, and occupational therapy outcomes (Koca & Ataseven, 2015). Hippotherapy uses the horse as a dynamic surface to provide rhythmic and repetitive physical input to the rider's body (Koca & Ataseven, 2015). Although many terms exist related to therapy using horses, the term *hippotherapy* refers specifically to speech-language, physical, or occupational therapy sessions that use the tool to facilitate therapy as per the AHA (AHA, 2020). Hippotherapy differs from therapeutic riding (TR) in that TR encompasses equine-assisted activities but excludes physical, occupational, and speech therapy (Professional Association of Therapeutic Horsemanship International, 2020b). TR is different from standard horseback riding because the overarching goal of TR is to improve the cognitive, socioemotional, and physical skills of the individual instead of improving equitation and it is not solely a leisure activity.

SLPs considering the use of hippotherapy must be aware of the limitations of available resources for this therapeutic tool, most notably the availability of a trained horse, equipment, location, financial investment, and training for the therapist. Therapists must complete different levels of training and certification to be qualified to incorporate hippotherapy with integrity. The AHA is one organization that provides such training and resources. Additionally, the Professional Association of Therapeutic Horsemanship International (PATH Intl.) is an organization that establishes the accreditation of facilities and certifies equine professionals and instructors (PATH, 2020a). If an SLP is interested in referring a client to a clinician that incorporates hippotherapy into their practice, the SLP

should consult the AHA and/or PATH Intl. websites to find a therapist and/or member center in their area.

The underlying rationale for incorporating hippotherapy is that the movement of the horse while the rider is mounted stimulates neurological activity, sensory system, and other integral systems necessary for speech-language production (Koca & Ataseven, 2015). Recent studies noted in systematic reviews found that hippotherapy can be an effective tool to enhance social communication skills and engagement and to reduce maladaptive behaviors in children with ASD (e.g., Anderson & Meints, 2016; Bass et al., 2009; Borgi et al., 2016; Gabriels et al., 2012, 2015; García-Gómez et al., 2014; Srinivasan et al., 2018; Trzmiel et al., 2019; Wilson et al., 2017). These findings are promising because Alex struggles in these same areas; however, Alex does not have an ASD diagnosis. As such, Eva intends to use this review to explore the efficacy of incorporating hippotherapy into intervention with adolescents with speech-language deficits beyond ASD.

Clinical Question

Eva decided to use the PICO format to formulate her evidence-based question, where "P" stands for the population, "I" represents the intervention, "C" signifies the comparison, and "O" symbolizes the outcome (Centre for Evidence-Based Medicine, 2020; Sackett et al., 2000). Using this framework, her clinical question was: In adolescents (P), is the incorporation of hippotherapy with speech-language intervention (I) more effective than traditional therapy alone (C) in improving speech-language-based outcomes (O)?

Search for the Evidence

Developing the research corpus began with the creation of an inclusion checklist. The studies included were dated between January 1, 1960, and November 31, 2019, and participants presented with communication deficits and were between the ages of 5 years 0 months and 40 years 0 months. Because Alex is quickly approaching his adult life, Eva wanted to include both children and adult participants in the research studies to fully capture the essence of hippotherapy in speech-language therapy sessions. Additionally, Alex is missing foundational and early developing language skills that are typically mastered by 5:0; Eva included articles addressing this younger age range to incorporate evidence on relevant language targets for Alex.

She excluded studies if participants were bilingual language speakers or had an official diagnosis of ASD, pervasive developmental disorder, or Asperger's. Additionally, each study included the incorporation of hippotherapy, equine-assisted activities (EAA), or therapeutic riding (TR). To be included, each study must have reported outcomes for at least one language-based measurement, and the study had to have been a treatment or intervention study. The study may have evaluated one treatment or compared two or more treatments. Additionally, each study needed to employ a quasi-experimental design for evaluating the effectiveness or efficiency of a treatment such as selected quasi-experimental group designs or single-subject experimental designs. Pre-experimental designs such as AB designs or group equivalents were excluded.

Eva searched four major databases to include as many articles as possible. The databases were the Cumulative Index to Nursing and Allied Health Literature (CINAHL), PubMed, Education Resources Information Center (ERIC), and PsycINFO. She also searched the American Speech-Language-Hearing Association's (ASHA) website and ASHA-related websites, including the ASHA Leader and journal articles on December 13, 2019; however, she found no results that matched the search criteria.

The encompassing search term list was used to remain as inclusive as possible within the databases. The initial search yielded a total of 321 articles. Eva analyzed the titles of each study. If any titles explicitly contradicted the inclusion checklist items, those articles were identified and excluded. For example, if the title of a study included the word "autism," the study was excluded. A total of 70 articles included applicable titles that then underwent abstract review. Eva assessed these abstracts to more deeply compare against the inclusion criteria. Many articles passed the title hit step and were then excluded upon abstract analysis. A total of 19 articles passed the abstract analysis. Eva then completed full text reviews of these articles. Many articles appeared promising, although upon further review they contained age ranges that were outside of the inclusion checklist, included participants with ASD, did not include language outcomes or measures, did not include horses, or did not use equine-assisted activities. Two out of the 19 articles met the inclusion checklist's criteria. Of the 17 articles excluded, 10 did not report language outcomes or have sufficient measures, 5 did not employ an experimental study design, 3 included participant ages out of the included age range, and 3 excluded horses or equine-assisted

activities. Many of these articles were excluded for multiple reasons such as missing both an experimental study design and language measures or outcomes. See the summary of the article selection process in Table 1 and the relevant search inclusion process in Figure 1.

Mary, a second SLP, assisted in the research to determine inter-rater reliability. Mary was blinded to Eva's scoring and was randomly assigned five (i.e., 25%) of the 19 articles that underwent full-text reviews. A random number generator from random.org was used to randomize the articles chosen for Mary's blind inter-rater scoring. Once the scoring was completed, Mary was given access to Eva's scoring to conduct inter-rater reliability analyses. Overall article inclusion reliability was determined to be 100%. Further item-by-item inter-rater reliability was calculated based on each inclusionary criterion for the five articles. Reliability calculated through item-by-item coding was rated as 94% agreement. Because of the binary nature of the inclusion criteria, Cohen's kappa and phi coefficient were also calculated to estimate inter-rater reliability. Cohen's kappa was 0.81 and phi coefficient was 0.82. After reliability measures were calculated, consensus building was conducted to ensure agreement on future coding.

Evaluating the Evidence

Many articles that Eva found initially were excluded because they focused on hippotherapy with physical and occupational therapy, reported mental/emotional health therapy targets rather than speech or language targets, or solely included participants with ASD diagnoses. Eva considered the remaining available studies that met the search criteria and were most relevant to Alex's case. She used the Certainty of Evidence Framework adapted from Simeonsson and Bailey (1991) to determine the generalizability of evidence and findings from each study. This framework rates studies as *conclusive*, *preponderant*, *suggestive*, or *inconclusive* based on three qualifying aspects: study design, interobserver agreement (IOA), and treatment integrity (TI; Simeonsson & Bailey, 1991). During the full-text review, the studies were evaluated based on their qualifying aspects. Studies that she determined to have sound research designs were those that provided sufficient detail for replication, applied an experimentally appropriate approach to address the intended research question, and may have used randomization in designating groups. Weak designs lack quantitative data that would make them

repeatable, generalizable, valid, and reliable. A sufficient IOA is 80% at minimum, and a reliable TI is taken between 20% and 40% of the intervention. If an IOA is below 80% and TI is taken less than 20% of the intervention, the study is considered flawed. Studies with sufficient IOA and reliable TI are conclusive and indicate that the outcomes are undoubtedly the result of the intervention. Preponderant studies either have a strong design and minor flaws in the IOA or TI, or vice versa, and suggest that the outcomes are likely the result of the intervention. Studies ranking as suggestive have minor flaws in the study design and either absent or flawed IOA or TI, and outcomes are possibly the result of the intervention. Inconclusive studies are the least reliable and generalizable to the studied population because they have a poor study design or have absent IOA and TI. Both studies that Eva included were rated as suggestive (Hsieh et al., 2017; Macauley & Gutierrez, 2004).

Hsieh and colleagues (2017) used an experimental, single-blinded clinical trial with an ABA design. The authors reported an IOA of greater than 0.80 on administration of international classification of functioning, disability and health: children and youth version (ICF-CY) categories. However, this study did not report any TI, limiting its quality appraisal ranking. The participants in this study included 14 children, with an equal number of males and females, recruited from early intervention centers in Taiwan. They were between the ages of 3 and 8 years old. All participants had a diagnosis of cerebral palsy with varying severities and types.

Hsieh and colleagues' (2017) study design included a 12-week baseline, intervention, and withdrawal phase, totaling 36 weeks. Hippotherapy sessions were implemented by a physical therapist and included a dosage of twelve, 30-minute weekly sessions. Outcome measures were taken with the ICF-CY body functions and activities and participation categories before baseline, at week 12, week 24, and week 36 following the withdrawal phase. Hsieh et al. (2017) reported significantly positive trends after intervention for play and comprehension of nonverbal communication skills. After the withdrawal phase, ICF-CY ratings for producing nonverbal messages and play returned to baseline scores. Although the study does not describe what play skills were evaluated or improved, foundational communication skills that Alex requires additional support in, such as joint attention and gesture use, may be supported through symbolic play (Quinn & Kidd, 2019). Based on the quality appraisal ranking for Hsieh and colleagues (2017),

it is plausible that the incorporation of hippotherapy along with symbolic play may increase Alex's comprehension of nonverbal communication.

Macauley and Gutierrez (2004) conducted a pilot study with a repeated measures design with three English-speaking participants. It did not report measures of TI. Inter-rater reliability ranged from 0.95–0.99 (Adams & Bigler, 1999). The participants were all males with diagnoses of attention deficits and language learning disabilities, ages 9–12 years (Macauley & Gutierrez, 2004). Language measures were assessed before the intervention with the Clinical Evaluation of Language Fundamentals (3rd ed.; CELF–3; Semel et al., 1995). The participants had composite scores of greater than –1.5 standard deviations below the mean, which is similar to Alex (Macauley & Gutierrez, 2004). The authors began with hour-long speech-language therapy sessions in a clinic, twice per week, for one semester (Macauley & Gutierrez, 2004). After a brief break, hour-long sessions incorporating hippotherapy began twice per week for 6 weeks. The clients and their parents each completed questionnaires following the end of both the traditional sessions and the sessions with hippotherapy, 12 in total. These questionnaire results were used to evaluate the effectiveness of hippotherapy on language outcomes.

Participant feedback included elevated interest in coming to hippotherapy sessions and increased communication with peers about hippotherapy. The participants reported that their expressive and receptive language skills did not generalize to their day-to-day life and that hippotherapy activities did not generalize to the academic environment. Parents noted in their feedback that their children demonstrated increased interest in participating in hippotherapy and improved speech-language abilities following hippotherapy. These participants have demographics and language abilities that more closely mirror Alex than in the Hsieh and colleagues (2017) study. The findings in this study are plausibly the result of the intervention and may be generalizable to Alex.

The Evidence-Based Decision

Previous systematic reviews have attempted to identify the efficacy of including hippotherapy in speech-language therapy sessions in the pediatric population (e.g., Charry-Sánchez et al., 2018; Llambias et al., 2016; Ward et al., 2013; Wuang et al., 2010). Crucial discrepancies in the literature searches of these systematic reviews were

corroborated by the findings in this literature search, specifically with poor or inconsistently used quality-control measures, small sample sizes, lack of long-term effects, lack of clear language-based outcomes and measures, the exclusive participant demographics, and the absence of live horses in the studies. The lack of quality appraisal elements enhanced the difficulty for determining the effectiveness of incorporating hippotherapy into interventions for speech-language deficits.

To make the clinical decision, Eva considered the qualitative and quantitative evidence as well as the family's values and her own clinical expertise (ASHA, n.d.). Because the quality and quantity of available evidence provide limited rationales for inclusion with participants who have diagnoses other than ASD, her clinical expertise and Alex's family values more heavily supported the clinical decision. Based on the findings from the systematic reviews on the inclusion of hippotherapy in children with ASD, Eva determined that the incorporation of hippotherapy into Alex's speech-language intervention had the potential to improve his social communication skills and reduce his maladaptive behaviors (Anderson & Meints, 2016; Bass et al., 2009; Borgi et al., 2016; Gabriels et al., 2012, 2015; García-Gómez et al., 2014; Srinivasan et al., 2018; Trzmiel et al., 2019; Wilson et al., 2017). Furthermore, using the articles she discovered in her own systematic review that focused on children with speech and language deficits (Hsieh et al., 2017; Macauley & Gutierrez, 2004), Eva also found evidence that the incorporation of hippotherapy could lead to improvements in nonverbal communication skills, motivation, and participation, which are also areas of concern for Alex. Alex's family was willing to try alternative treatment tools and learn about hippotherapy to improve his language skills. They were excited for the possibility of including additional movement in his sessions and interacting with novel communication partners. Alex's interest in horseback riding and his family's support of this approach are all factors that may increase the likelihood of improved speech and language outcomes with the inclusion of hippotherapy as a treatment tool for Alex.

Eva currently works with a caseload of clients with significant communication needs and diverse diagnoses. Many of her clients use various forms of AAC, including SGDs. She has been successful at incorporating the SGDs of other multimodal communicators into sessions with hippotherapy, facilitating the device user's access to communication throughout the whole session and using her

own modeling iPad®. She is interested in further exploration of protocols for SGD use during speech-language sessions with hippotherapy. Her sessions are highly differentiated and individualized. Eva hopes that her previous experience with hippotherapy will increase Alex's buy-in to participate in intervention because of the motivating nature of the setting.

Considering the Hsieh and colleagues (2017) and the Macauley and Gutierrez (2004) studies, her clinical expertise and knowledge of the use of hippotherapy, and the client/parent perspective and values, Eva decided to incorporate hippotherapy into weekly treatment sessions along with other evidence-based strategies to assist in providing Alex with the most individualized and beneficial speech-language therapy sessions possible. Because of the limited research with specific guidance on how best to incorporate hippotherapy for a client like Alex, Eva decided that she would reassess progress incrementally every 6 weeks, as was completed by Macauley and Gutierrez (2004), to determine whether hippotherapy is an effective approach for Alex.

Authors' Note

Anna Mitchell-Cannone is a practicing speech-language pathologist with an AHA Level 1 certification working with people across the lifespan and communication abilities in the outpatient, school, and medical settings.

Dr. Allison Gladfelter is an assistant professor at Northern Illinois University and a certified speech-language pathologist who specializes in child language disorders.

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Table 1. Database Search and Inclusion Chart

Databases	Total hits	Title hits	Duplicates	Abstract hits	Full-text reviews
CINAHL	18	10	2	4	1
PubMed	83	27	13	6	1
PsycINFO	178	28	22	2	0
ERIC	42	5	1	7	0
ASHA	0	0	0	0	0
Total	321	70	38	19	2

Table 2. Article Summary Chart

Study	Participants (n, age)	Diagnoses	Design	Results	Appraisal
Hsieh et al., (2017)	Group A (n = 6) Group B (n = 8) Nine of the 14 were between ages 3 and 6. Five of the 14 were between ages 7 and 8.	Cerebral palsy (CP)	Single-blinded clinical trial with ABA design (12 weeks baseline, 12 weeks intervention, 12 weeks withdrawal)	Children with higher functioning CP (GMFCS Levels I–III) demonstrated significant positive results from hippotherapy and less regression after the withdrawal period. Regression after withdrawal increased more for body function scores as compared to activities and participation scores per the ICF-CY categories across all participants. Gains were more consistent during intervention in the activities and participation scores as compared to the body functions scores of the ICF-CY categories. Comprehending nonverbal communication and play skills significantly improved at intervention as compared to baseline in group B. Worse trends were found with use of nonverbal communication and play skills in the withdrawal phase as compared to group B’s baseline. In group A, play skills significantly improved at intervention phase when compared to baseline.	Suggestive TI: NA Design: ABA IOA: > 0.80 on administration of ICF-CY categories
Macauley & Gutierrez (2004)	Three males, ages 9, 10, and 12	Language learning disability; 1 with ADHD	Pilot study; repeated measure design	Parents reported that overall progress and generalization of communication skills to the home environment increased more during sessions with hippotherapy than during traditional sessions. The participants observed decreased generalizations from hippotherapy-included sessions to academic environments. Participants showed increased motivation to participate in and attend hippotherapy sessions. Parents reported the participants increased their communication with peers, specifically regarding their sessions with hippotherapy.	Suggestive TI: NA Design: Repeated measure IOA: 0.95–0.99

Note. GMFCS = Gross Motor Function Classification System; ADHD = attention-deficit/hyperactivity disorder; ICF-CY = International Classification of Functioning, Disability and Health: Children and Youth version; TI = treatment integrity; IOA = intra-observer agreement.

Figure 1. Relevant Search Inclusion Process Flow Chart

