
Renee R. Taylor; Gary Kielhofner; Caitlin Smith; Sherri Butler; Susan M. Cahill; Monica D. Ciukaj; Melanie Gehman

* University of Illinois at Chicago, Chicago, Illinois


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RENEE R. TAYLOR, GARY KIELHOFNER, CAITLIN SMITH, SHERRI BUTLER, SUSAN M. CAHILL, MONICA D. CIUKAJ, and MELANIE GEHMAN
University of Illinois at Chicago, Chicago, Illinois

Autism is a prevalent developmental disorder that affects numerous aspects of a child’s daily functioning, including but not limited to communication, social interaction, cognitive functioning, motor functioning, and sensation. The many impairments that characterize autism also have the potential to affect a child’s volition, defined by the Model of Human Occupation as a child’s interests, self-efficacy, and motivation to engage in new activities. The objective of this study was to determine the effects of a 16-week hippotherapy program on the volition of three children with autism. Using the Pediatric Volitional Questionnaire, two occupational therapists rated the three participants’ volition at three timepoints—before, during, and after the hippotherapy program. Visual analysis of the data using methods derived from single-subject design research revealed an increase in participants’ volition over time. The study provides preliminary evidence that improved volition may be an important and under-recognized benefit of hippotherapy for children with autism.

KEYWORDS animal assisted therapy, autism, horse, hippotherapy, Model of Human Occupation
Autism is a pervasive developmental disorder characterized by social deficits, difficulties with communication, and odd or stereotypic behaviors that occurs in 6.6 of every 1,000 children and is the second most commonly occurring developmental disability in the United States (Nicolas et al., 2007). Autism causes delays and deviance in the development of cognitive, communicative, and social skills and results in significant impairment of a child's occupational functioning (Crepeau, Cohn, & Schell, 2003). Even with treatment, autism can severely affect a child's ability to interact and participate with their world. These impairments persist across the lifespan and result in many adults with autism experiencing limited independence, persistent behavioral concerns, and low economic status (Evans & Ho, 2007).

Children with autism often exhibit difficulties with motivation, including a limited range of interests and decreased sense of self-efficacy (Restall & Magill-Evans, 1994). When children with autism lack motivation and have decreased interests, their level of engagement is diminished along with their ability to learn about the world (Restall & Magill-Evans, 1994).

The treatment of autism focuses on symptom management and includes pharmacological and non-pharmacological interventions such as behavioral therapy. Current practice emphasizes the importance of early intervention with a multi-disciplinary rehabilitative approach involving occupational, speech, and physical therapy (Twedell, 2008). Therapy services are provided in both school and clinical settings and employ a variety of interventions such as sensory integration and the floor time model (Case-Smith & Arbesman, 2008; Thomas, Morrissey, & McLaurin, 2007; Crepeau et al., 2003). Interventions focus on increasing engagement of a range of occupations, including ADL, IADL, educational, and play-related occupations.

Since no single intervention with autism has been proven completely successful, many families seek out complementary and alternative medical treatments for their children (Umbarger, 2007). Animal-assisted therapies (AAT) are one type of intervention that have been associated with improvements in social interactions and happiness (Nimer & Lundahl, 2007; Sams, Fortney, & Willenbring, 2006). One AAT that is considered an intervention of promising practice is hippotherapy (Umbarger, 2007). Hippotherapy is a therapeutic approach implemented by occupational, speech, and physical therapists, which utilizes a horse as a medium to improve such factors as movement, locomotion, balance, communication, and interaction (Fitzpatrick & Tebay, 1998). A study by Thomas et al. (2007) found that 11% of parents with an autistic child reported using hippotherapy as a social therapy intervention, which was the second most utilized social therapy for children with autism.
Hippotherapy has been found to be an effective intervention for children with different disabilities, including cerebral palsy, traumatic brain injury, Down syndrome, spina bifida, sensory modulation disorder, language disorders, intellectual disabilities, and visual impairments. (Sterba, Rogers, France, & Vokes, 2002; Lehrman & Ross, 2001; Winchester, Kendall, Peters, Sears, & Winklsy, 2002; Candler, 2003; Dismuke, 1984; Biery & Kauffman, 1989; Macauley & Guiterrez, 2004). Although current research regarding hippotherapy with autistic children is limited, the existing studies have found it to help with sensory motor, communication, and overall social interaction skills (Umbarger, 2007; Garrique, Moutiez, & Galland, 1994; Citterio, 1997; English, 1994; Leitao, 2004). A previous study on adults with mental illness found that hippotherapy is effective in increasing people’s self-efficacy and motivation (Bizub, Joy, & Davidson, 2003). Overall, the adults became more engaged in their recovery and life (Bizub, Joy, & Davidson, 2003). Another study completed on children between 9 and 13 years of age with language learning disabilities found that hippotherapy was effective in increasing children’s attention, participation, and motivation (Macauley & Guiterrez, 2004). Despite the promising results of these studies, there is a need for further research that implements a higher quality of research protocol (Umbarger, 2007).

Our objective was to study the effectiveness of a 16-week individual hippotherapy program on the motivation of three children with autism between 4 and 6 years of age. We utilized the Pediatric Volitional Questionnaire (PVQ), which is an observational assessment tool designed to measure a child’s motivation by evaluating the way he or she interacts with his or her environment (Basu, Kafkes, Schatz, Kiraly, & Kielhofner, 2008; Reid, 2005). The PVQ is based on the Model of Human Occupation (Kielhofner, 2009). A key concept of this model is volition, which refers to a person’s motivation or inner drive to action. Volition is influenced by what one finds important and enjoyable and by one’s sense of efficacy (Kielhofner, 2004). According to the concept of volition, motivation can range from exploration (a very basic drive to interact with the environment reflected in such things as curiosity and willingness to try new things or initiate action) to competence (reflected in pride, sustained attention, and efforts to correct mistakes and fix problems), and, finally, achievement (reflected in willingness to take on challenges and increase performance).

PVQ scores reflect the level of motivation a child demonstrates and the extent of motivational spontaneity a child exhibits. So, for instance, children with the lowest levels of motivation show little curiosity or willingness to try new things without substantial support or stimulation. Children at the highest level of motivation will, of their own accord, seek out new challenges and sustain effort to achieve a goal. We hypothesized that, as a result of hippotherapy, the children would show an increase in their volition.
METHODS

This study involved an analysis of videotaped data of hippotherapy sessions of three children with autism between the ages of 4 and 6.

Subjects

A convenience sample of three children with autism who enrolled for hippotherapy treatment at a riding facility in a suburb outside Chicago, IL, was used. Boys and girls were included if they were between the ages of 4 and 6 and if they were medically approved for participation and had no other medical or psychiatric diagnoses in addition to autism. Consent for participation was obtained from participants’ parents, and the study was approved by the Human Subjects Internal Review Boards of Western Michigan University and the University of Illinois at Chicago.

Design

The study was conducted as a single-subject A-B-B design. Each participant served as his/her own control. Before beginning hippotherapy, each of the three children were observed and videotaped using a standardized play protocol to evaluate their baseline motivation. The children were again observed according to the same standardized play protocol after the first 8 sessions and after the 16 sessions to determine whether any changes in motivation took place over the course of the intervention.

Hippotherapy Procedures

The children received weekly 45-minute hippotherapy sessions under direction of a pediatric physical therapist who also had extensive training and certification in hippotherapy. This 45-minute timeframe included donning of the helmet, preparation to mount, approximately 20–30 minutes on the horse, and time for dismount. The children were all mounted at a portable mounting ramp and dismounted to the ground. Parents were present in the arena during all hippotherapy sessions in a viewing area. The same horse, a 12-year-old American Quarter Horse carefully evaluated and trained for hippotherapy work, was utilized for all riders and all sessions. This particular horse was selected for gait and temperament and because of the way in which the horse translated rotary movement to the rider.

Each child received the same therapy procedures. Each rider was accompanied by one trained horse leader (responsible for leading and directing the horse), two trained sidewalkers (responsible for monitoring the seat and safety of the client), and one therapist (responsible for directing all therapeutic activities). The same leaders, sidewalkers, and therapist were
maintained throughout the course of the project. A surcingle (a wide belt-like device that wraps around the heart girth of the horse) with a single handle (attached to the belt-like device and located just behind the mane and withers) were used for the rider to hold while riding. A gel pad and a surcingle pad were also used to provide padding and shock absorption for both the horse and rider. No reins were used; the horse was led by halter and lead rope. Our goal for selecting this tack was to transfer significant movement to the rider, to provide as much unrestricted contact with the horse as possible, and to provide stability for the rider with the handle.

Each session began by leading the horse in a counter-clockwise and clockwise motion around the perimeter of arena—first at a walk and then at a trot. Obstacles were laid in the same place for each session, and horse and rider were walked over poles and weaved through cones. Posters were placed on the walls of the arena to encourage visual scanning and to offer opportunities for language. The therapist would refer to these pictures and encourage the rider to respond with language while riding.

Evaluation Procedures

The children’s motivation was assessed using the Pediatric Volitional Questionnaire (PVQ) to assess volition at the three timepoints. The Pediatric Volitional Questionnaire (PVQ) (Geist, Kielhofner, Basu, & Kafkes, 2002) is an observational rating scale that consists of 14 items reflecting motivation (e.g., shows curiosity, tries new things, tries to solve problems). The PVQ is designed to observe motivation in both naturally occurring and therapeutic activities. Following observation of the child, the items are rated using a 4-point scale (passive, hesitant, involved, and spontaneous) that reflects the degree of motivational spontaneity.

Andersen, Kielhofner, and Lai (2005) studied the PVQ and concluded that the scale’s items work well to capture the construct of volition and reflect the volitional continuum of exploration, competency, and achievement. They also found that the PVQ was a reliable and sensitive measure of volition. Reid (2005) also found evidence of concurrent validity of the PVQ. Harris and Reid (2005) and Reid (2005) concluded that the PVQ can be used to meaningfully assess volition in children.

The PVQ was administered at baseline (prior to the beginning of hippotherapy), time 2 (8th week, mid-program) and time 3 (after completion of program). Each administration took place during a standardized play activity in order to provide all participants with the same structured play activities so that aspects of their volition could be observed and measured as freely of bias as possible. The structured play activity was designed to evoke natural interactions and included playing with a wind-up toy, blowing up a balloon, popping bubbles, playing peek-a-boo with a cloth, feeding and brushing the hair of a doll, exploring other toys, looking through books, and stacking
rings and cups. An occupational therapist administered the standardized play session.

All the play sessions were videotaped so that controlled ratings of each participant’s volition could be made at a later time using the PVQ. The videotapes from each timepoint were reviewed and rated by two trained observers (occupational therapy graduate students) who were blinded to the evaluation timepoint. Ratings were compared between the two scorers, and adequate inter-rater reliability rating was achieved at pre-test ($r = 0.85$), mid-course ($r = 0.76$), and final ($r = 0.76$) evaluation timepoints. When there was a discrepancy between the two raters at any timepoint, the average of the two ratings was utilized for data analysis.

Data Analysis

As recommended by Deitz (2006), data were analyzed by plotting each subject’s PVQ scores across time. Visual inspection of the scores across time was used to identify patterns of change in each participant.

RESULTS

Each of the participants PVQ scores for each of the three timepoints is shown in Figure 1. Visual analysis of the data shows that all three participants demonstrated increased volition from baseline to the time 3 observation. The pattern of change was unique for each participant. Participant A showed relatively stable volition from baseline until the second observation but improved from the second to the third observation. Participant B improved in volition across both timespans. Participant C improved from the baseline to second observation and then remained stable.

![FIGURE 1 Participants (a,b,c) PVQ scores at baseline, midpoint, and end of the hippotherapy program.](image-url)
DISCUSSION

This study examined the effects of 16 sessions of hippotherapy on the volition of three children with autism. Visual analysis of the data indicates that all three children showed an improvement in their motivation to engage in everyday activities as measured by the PVQ. Notably, these improvements were observed in a standardized play activity outside the hippotherapy sessions.

The study findings do indicate that it may be possible to detect motivational change in children with autism who received hippotherapy. Anecdotal data suggest that one of the most obvious effects of hippotherapy is on motivation, while most studies of hippotherapy focus on other outcomes. This study provided preliminary evidence that, in one specific group (children with autism), motivation does appear to change in association with hippotherapy. It also provided evidence that the PVQ may be a particularly effective instrument for detecting change in motivation.

A next logical step would be to replicate the procedures of this study in more rigorous studies. These might include additional single-subject designs with multiple baselines as well as experimental studies with a control group and larger sample size.

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