



# The Effects of Hippotherapy on Repetitive Behaviors and Verbalization in Children with Autism Spectrum Disorder.

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## INTRODUCTION

- Social communication impairments and repetitive/maladaptive behaviors (RMBs) are the diagnostic features of Autism Spectrum Disorder (ASD) (*American Psychiatric Association, 2013*).
- Social communication impairments include complete lack of or delays in verbal and non-verbal communication in a social context (*Eigsti et al., 2011*).
- RMBs in children with ASD range from repetitive sensory exploration of objects, whole-body stereotypies, as well as negative/problem behaviors. (*Leekam et al., 2011, Dominick et al., 2007*).
- There is a growing body of research on sensorimotor comorbidities in children with ASD such as atypical sensory preferences and poor motor coordination and balance (*Bhat et al., 2011; Kaur, Srinivasan, & Bhat, 2017*).
- Standard of care interventions, such as Applied Behavioral Analysis (ABA) utilize principles of reinforcement, modeling and repetition to facilitate communication and behavioral skills of children with ASD. However, ABA does not address the sensory-motor impairments of children with ASD (*Srinivasan & Bhat, 2013; Srinivasan, Cavagnino, Bhat, 2018*).
- Hippotherapy, a treatment tool used by OTs, PTs, and Speech Therapists, is an understudied multisystem intervention, that addresses both the core impairments and sensorimotor comorbidities of children with ASD (*Srinivasan et al., 2018*).
- We conducted a preliminary study evaluating the effects of an 8-week hippotherapy intervention on the repetitive/maladaptive behaviors and communication skills of young children with ASD.
- We hypothesized a reduction in repetitive/maladaptive behaviors following intervention.
- We also hypothesized an increase in communication following intervention.

## METHODS

### Participants

- 12 children with ASD (3 to 14 years; M=5, F=4)
- ASD diagnosis confirmed using medical/school records
- Comorbid diagnoses included Williams Syndrome, ADHD, DS
- Verbalization level – 9 out of 12 children had low communication levels (vocalizations/few words/short phrases) while 3 children had high levels of verbalization.
- Hippotherapy treatment was provided by OTs/co-authors, BG and LJ.
  - Prior hippotherapy treatments had been provided from 3 months to 3 years.
  - Other services received during period of study: ABA 1-5 days/wk, Speech therapy 1-3 days/week, OT 1-2 days/week, PT 1-2 days/week



### Training & Study Protocol:

Parameters	Training Characteristic
Frequency	1 session/week
Duration	8 weeks (with one participant only completing 6 weeks)
Time	45-60 minutes/session

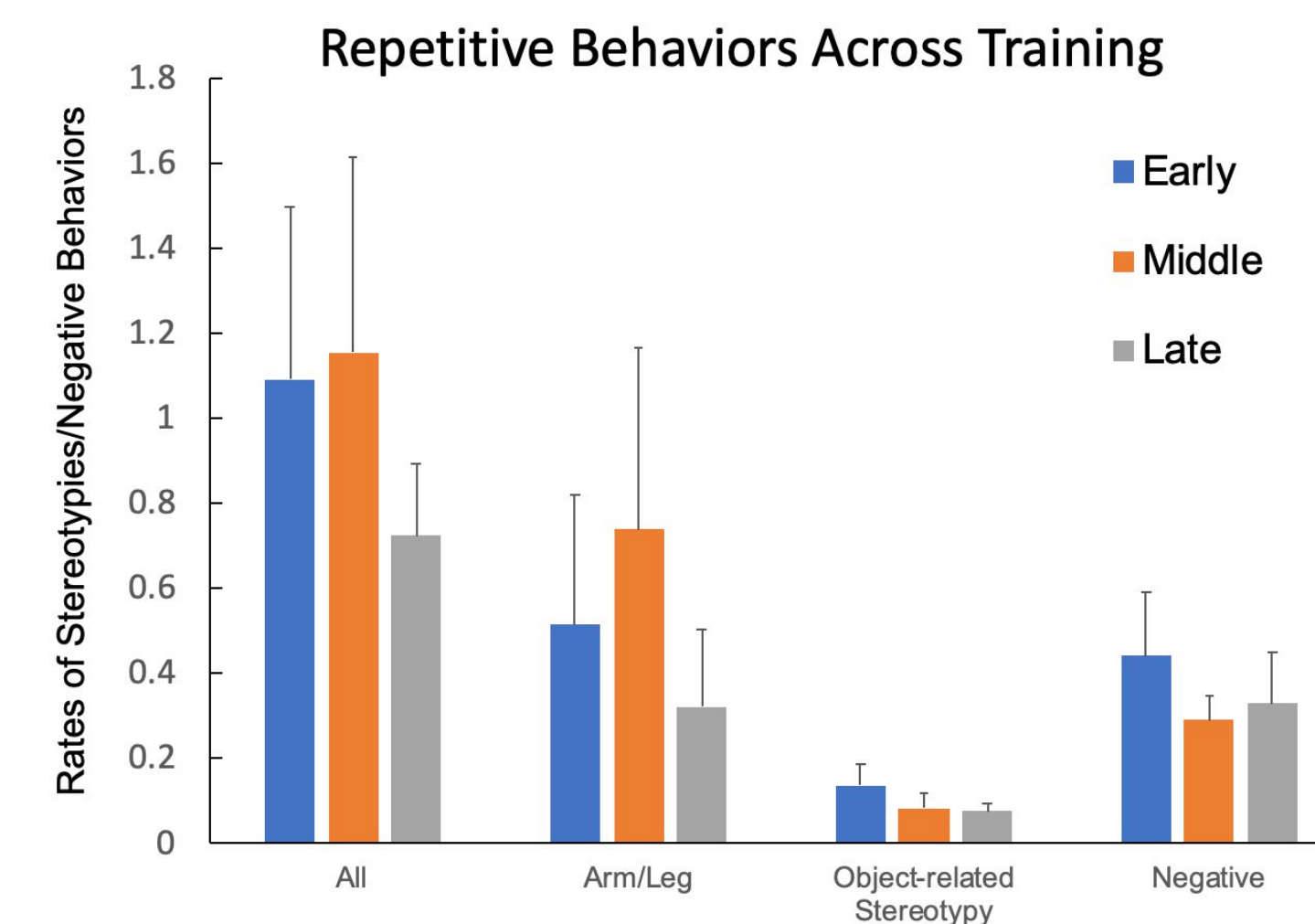
Condition	Description
Play	Reciprocal ball activity with 5 repetitions
Transfer on	Donning helmet and transfer on horse
Trail	Equine movement warm up on trail; starts with verbalization or ASL sign for "go"
Forward	Forward sitting astride, moving forward; then abrupt stops and starts of movement
Backward	Sitting astride backwards
Sideways	Sitting side ways on barrel to right and left on a Figure 8
Activity on Horse	Occupation-based balance, fine or visual motor activity
Transferoff/Feed	Transfer off horse, preparation and feeding horse treat

### Dependent Variables:

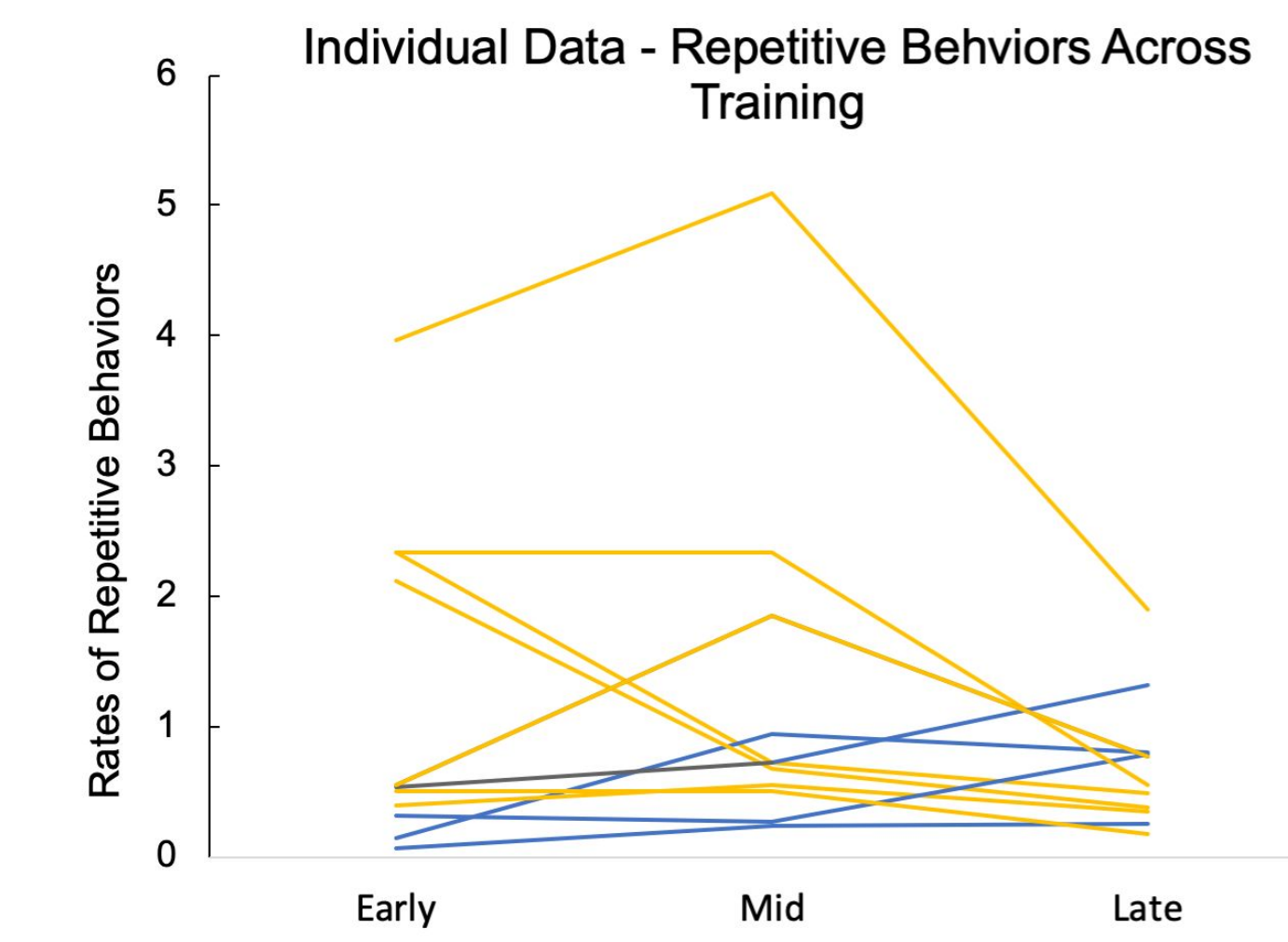
- RMB Rates: Frequency of RMBs per minute
- Communication: Quantity/# Vocalizations/Verbalizations per minute and quality/complexity (type 1: spontaneous or responsive; type 2: jargon, stereotypical, responsive, functional).

Category	Definition	Examples
All Movements	Movements that include whole body, head, hands, arms, feet and leg movements	Rocking, swaying, jumping, flapping arms, kicking legs
Arms/Legs	Movements isolated to the arms, hands, legs and feet	Flapping arms, hands to mouth, kicking legs
Object-Related	Behaviors related to any toys, personal objects, riding materials, or treats throughout the session	Cheating on object, playing with helmet, putting treat in mouth
Negative Behaviors	Self-injurious, aggressive, and inappropriate behaviors	Scratching, hitting, biting, throwing, not listening to direction, crying, tantrums

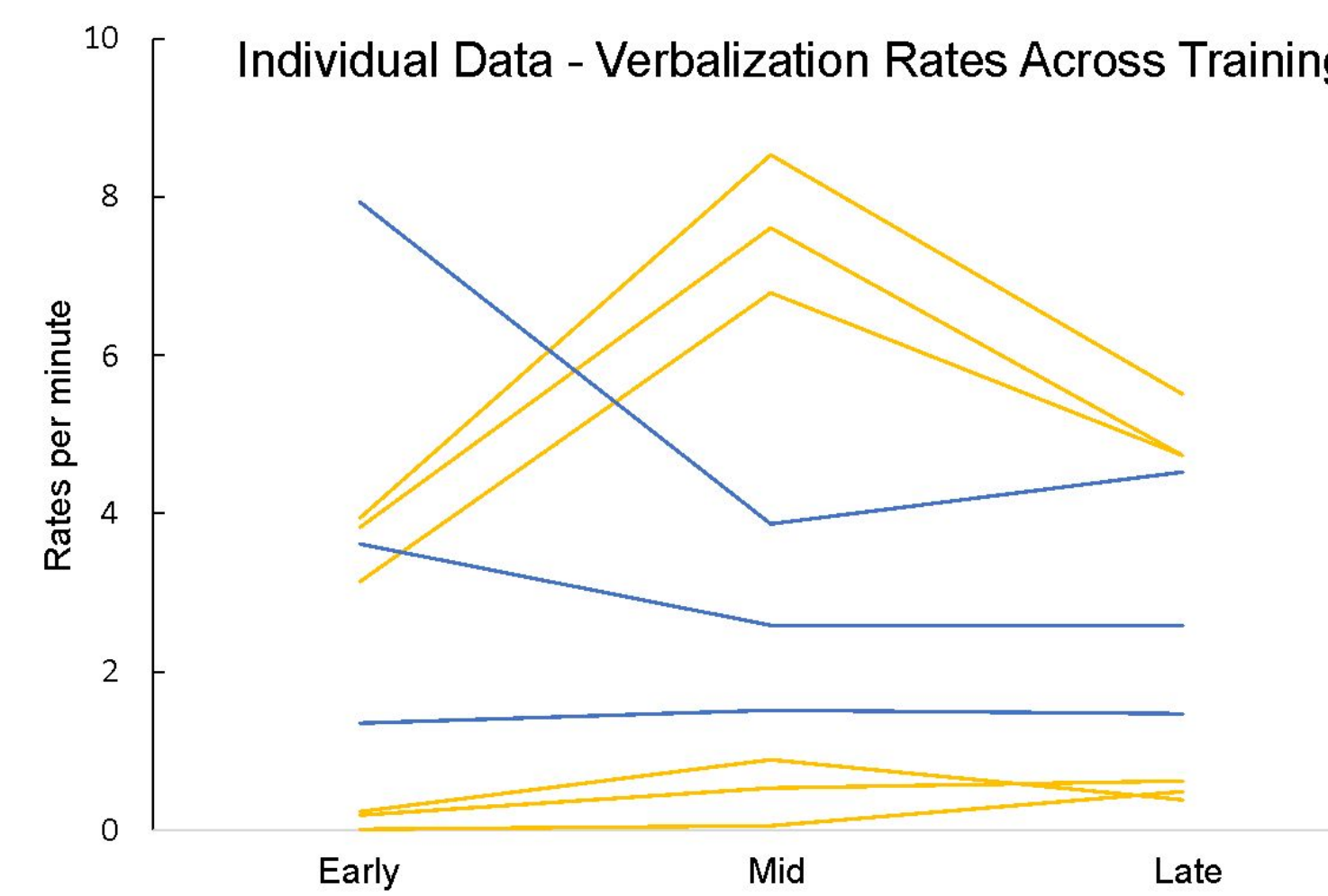
## RESULTS



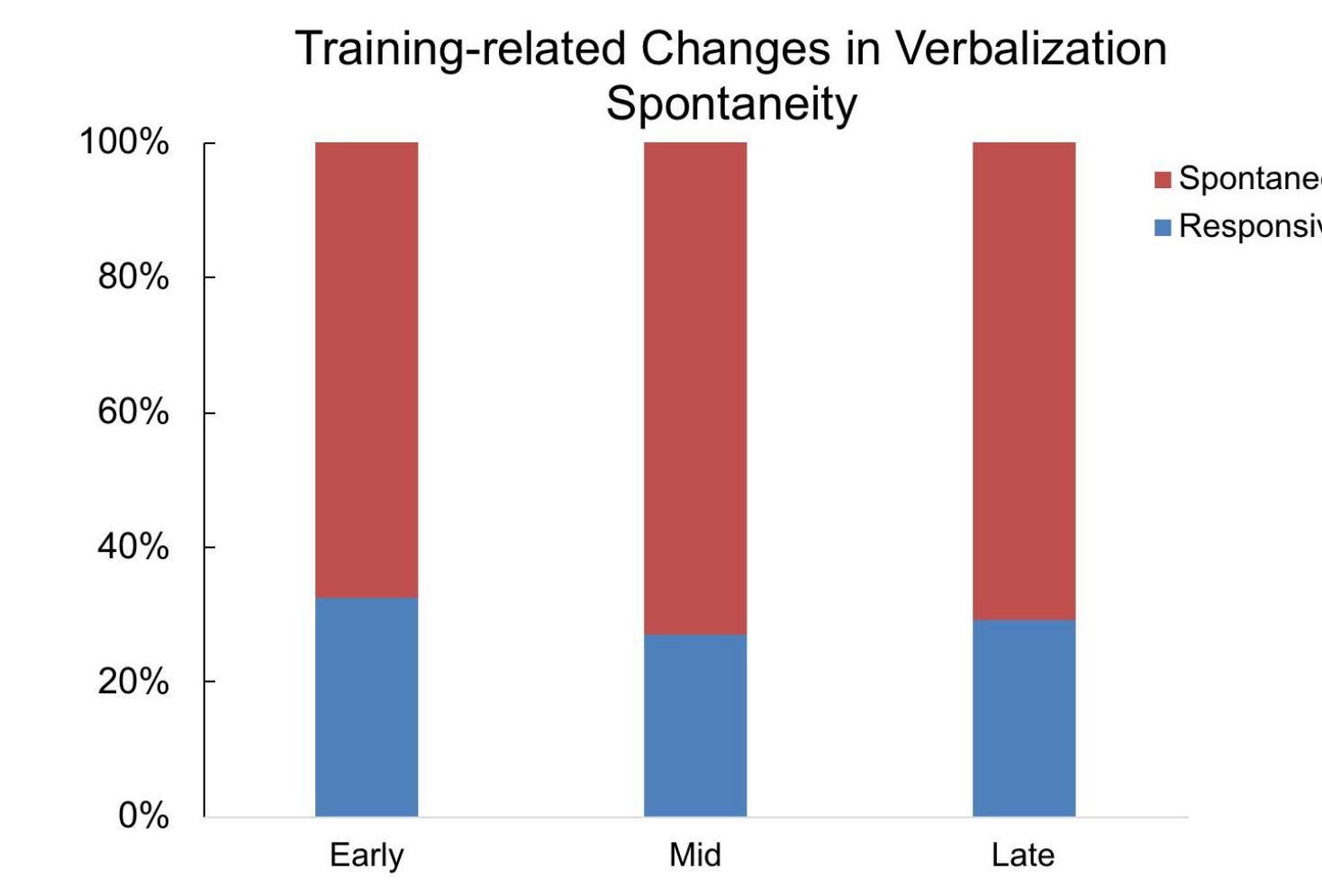
• RMB Rates: ↓ Early -- Mid -- Late



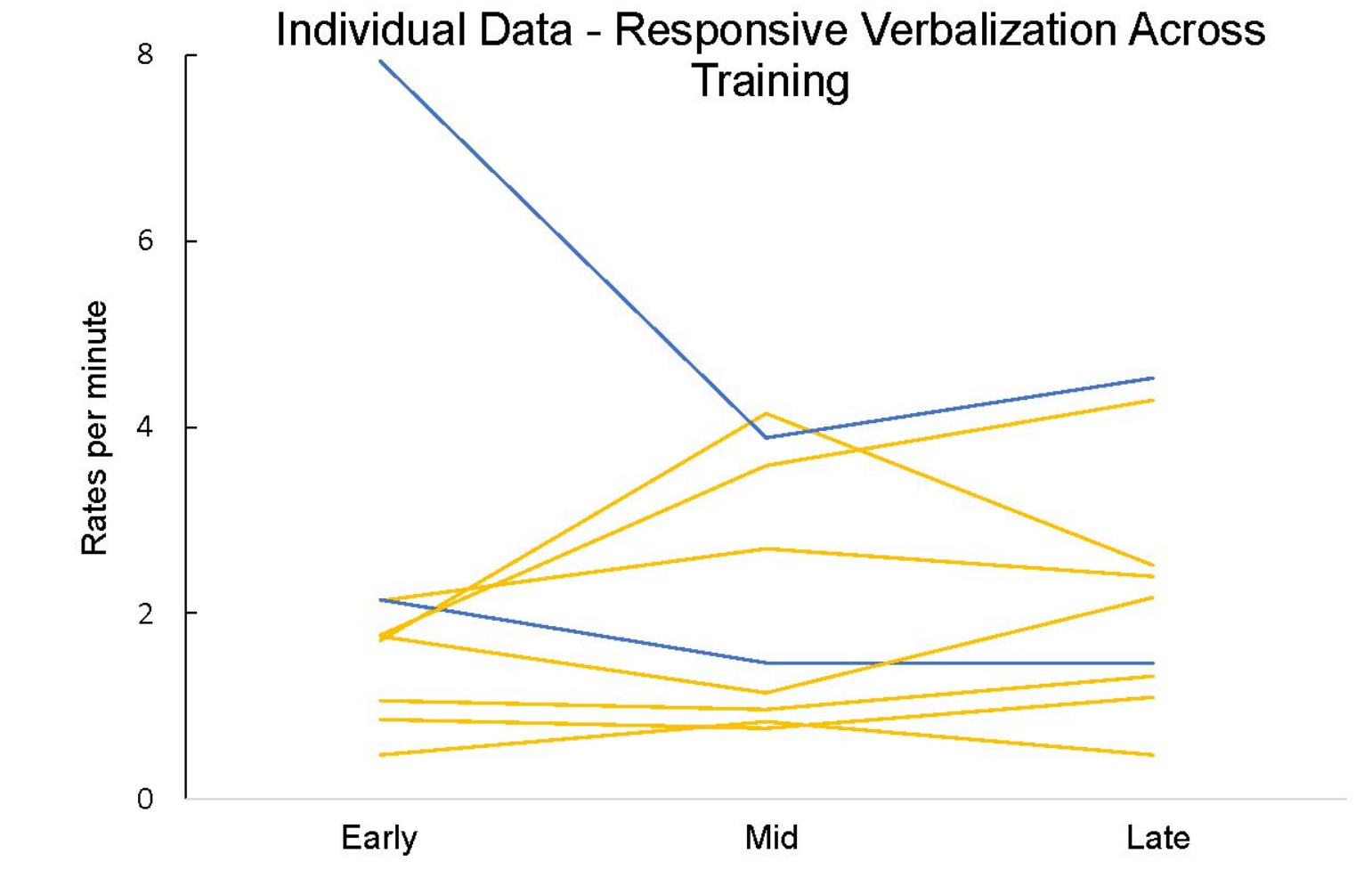
• Negative behavior rates: ↓ in 7 out of 12 children



• Verbalization bouts: ↑ Early -- Mid -- Late  
• In 6 out 9 children



• % Spontaneous communication: ↑ Early -- Mid -- Late



• Rates of responsive communication: ↑ Early -- Mid -- Late  
• In 7 out of 9 children

## SUMMARY OF RESULTS

- RMB rates decreased from early to late sessions in 7 out of 12 children with ASD.
- Negative and inappropriate behaviors decreased from pretest to posttest after completing the hippotherapy sessions.
- Verbalization quantity increased from early to mid and was somewhat retained in the late sessions in 6 out of 9 children.
- The majority of the vocalizations/verbalizations were spontaneous and not responsive.
- We found an increase in rates of responsive communication in the mid and late sessions compared to the early training sessions.
- No training-related changes were seen in the rates of spontaneous communication.

## DISCUSSION

- In our study, we found small improvements in RMBs and communication from early to late training sessions.
- We found some decreases in arm/leg movements, object-related movements, and negative behaviors across training.
- Verbal communication improved in a subgroup of children following the intervention.
- Specifically, there was more responsive communication in the children with ASD following training.

## CLINICAL IMPLICATIONS

- OT utilizing hippotherapy somewhat reduced RMBs/negative behaviors of young children with ASD while improving their communication skills with others.

## LIMITATIONS

- This preliminary study was conducted over a short time period with few participants.
- Future studies must consider adding appropriate control groups, larger sample sizes, prolonged treatments as well as other clinical disciplines (PTs and Speech Therapists).

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