The Effects of Dance on the Social and Motor Performance of Children with Autism Spectrum Disorder

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INTRODUCTION

- Autism Spectrum Disorder (ASD) is a multi-system neurodevelopmental disorder characterized by social communication impairments and the presence of repetitive behaviors *(American Psychiatric Association, 2013; Srinivasan et. al. 2014)*.
- Additional comorbidities in ASD include motor impairments (e.g., postural instability, poor balance) and behavioral impairments (e.g., non-compliance, running away) *(Bhat et. al. 2011)*.
- The Move2Learn Autism Lab is focused on developing novel interventions for children with ASD tot address their social, motor, and behavioral difficulties.
- Often children with autism receive relatively sedentary behavioral interventions (i.e., Applied Behavioral Analysis). In contrast, alternative interventions using Music & Movement, Yoga, and Creative Movement/Dance could impact multiple developing systems of a child with ASD (social, communication, motor, cognitive, etc.).
- In this project, we examined the effects of socially embedded, dance-based activities integrated with autism approaches/motor learning principles to facilitate social engagement and verbalization skills as well as creativity and praxis in a group of school-age children with ASD.
- Effects on the quantity and quality of the following behaviors were assessed:
  - Training-related changes in repetitive behavior, social smiles, and verbalization rates
  - Training-related changes in tester prompts and creativity scores
  - Praxis on imitation errors during standardized praxis subtests conducted pre- and post-training.

HYPOTHESES

H1: Children with ASD will display fewer repetitive/negative behaviors, greater smiles and verbalization, post-intervention.
H2: Children with ASD will display improved motor performance (reduction in praxis errors during standard actions and prompt frequency during training-related actions), post-intervention.

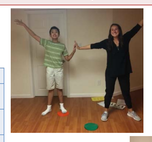
METHODS

- ***Participants***: 13 children with ASD between 6 and 14 years of age participated. ASD diagnosis was confirmed using medical/school records and a social communication delay was confirmed using the Social Communication Questionnaire (SCQ) (score >= 12 was confirmed) and/or ADOS confirmation.

Study Design	
Frequency	2 sessions/week
Duration	8 weeks
Time	~45 minutes/session
Testing Measures	- Praxis subtests of SIPT (pre and posttests) done by a pediatric PT. - Coding of RMBs, smiles, verbalizations, action errors, prompt frequency, and creativity scores for early, mid, late training sessions.

Training Conditions *(Gilbert, A. G. (2015))*	
Hello & Warm Up	Greet and Stretch
Theme	Variety of spatial/temporal concepts of creative movement
Partnering	Social skills, awareness, synchrony
Creating	Spontaneity/creativity
Chance	Motor planning/show and tell – animals, activities, emotions
Goodbye & Reflection	Reflect on the session, bid farewell. Training activities led by a trained dance movement therapist (PhD) or dancers (>15 years of dance training, >3 years experience teaching dance) along with an undergraduate model/buddy to the child.

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	Chewing 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



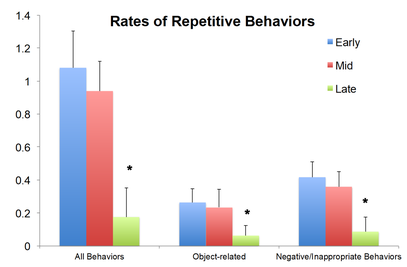
- ***Behavioral Coding Variables***: Training-related actions/sessions (inter-rater reliability >85%)
  - In an early, mid, and late session, **repetitive maladaptive behaviors (RMBs), smiles, or words** produced per minute.
  - **Prompt frequency** (# of verbal/gestural/manual prompts) during standard training-related actions.
  - **Creativity scores** for actions during creating (0=self-initiated action, 1=recalled, 2=suggested, 3=copied, 4=no action)
- Pre/Post-testing using praxis subtests from the Sensory Integration and Praxis Tests (SIPT)
  - **Temporal** (rhythm and pace) and **spatial** (mirroring, modulation, overflow, and reciprocity) errors during coordinated actions/postures *(Ayres, 1988)*.

RESULTS

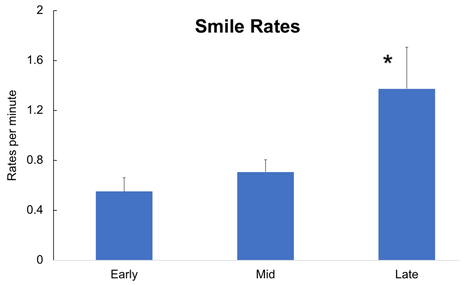
$^{*}p < 0.05$, $^{**}p < 0.001$

Group Average ± Standard Error

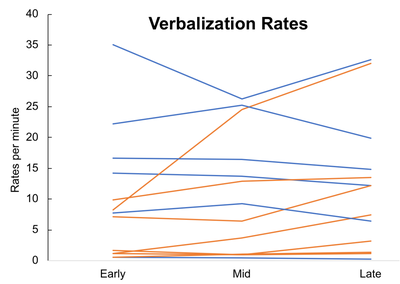
A. Improvements in Behavior, Social, and Verbal Communication



- All, object-related and negative behaviors: ↓ Early - - Late
- 8 out of 13 showed a reduction in RBs

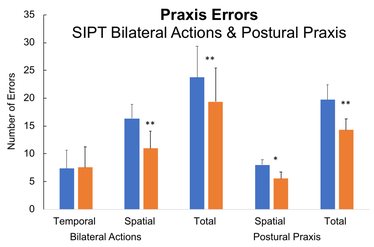


- Smiles: ↑ Early - - Mid - - Late
- 10 out of 13 showed more smiles with training

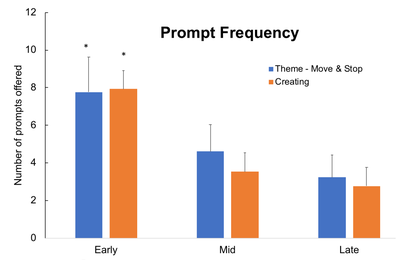


- Words: ↑ Early - - Mid - - Late
- 8 out of 13 increased verbalization

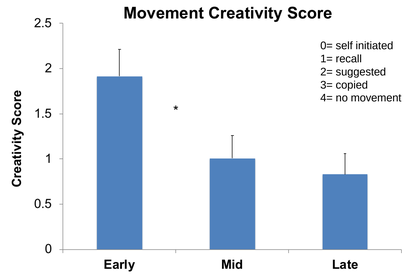
B. Improvements in Motor Performance/Assistance



- Praxis Error: ↓ Early - - Mid - - Late



- Prompts: ↓ Early - - Mid - - Late
- 9 out of 13 needed less prompting to perform actions



- Creativity Score: ↓ Early - - Mid - - Late

Summary of Results

- ❑ Children with ASD produced fewer object-related stereotypies and negative behaviors along with more social smiles and verbalization following intervention.
- ❑ Children with ASD required fewer trainer prompts to complete the movement activities during the "idea" and "creating" conditions.
- ❑ The creativity scores for children with ASD reduced indicating an increase in creativity/self-reliance (vs. using trainer's ideas).
- ❑ Praxis errors in a standardized post-test reduced compared to the pre-test.
- ❑ We are still analyzing data on interpersonal synchrony and pre- and post-testing data using standardized motor measures.

Conclusions

- ❑ Our dance intervention protocol positively impacted the social affect and verbalization skills of children with ASD while reducing repetitive/negative behaviors.
- ❑ Children with ASD became more self-reliant and creative in performing novel actions post-intervention.
- ❑ Testers provided less prompting and children moved more accurately following training.
- ❑ Praxis errors during standard actions were lower in the post-test vs. pre-test.
- ❑ These data provide preliminary support for the use of creative movement in facilitating social, behavioral, and praxis/motor planning skills in children with ASD.

Limitations

- ❑ Lack of a control group.

Future Directions

- ❑ In the future, we will conduct a randomized controlled trial with a larger study sample.

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Acknowledgments

❑ We thank the children and families who participated in this study.
❑ We also thank the UD Leadership Education in Neurodevelopmental and Related Disabilities (LEND) program for supporting AB, MG, and AB's work on this project through a grant from the Maternal & Child Health Bureau (MCHB) of the Health Resources and Service Administration (HRSA) (#T73MC30116, PI: Beth Mineo).
❑ AB thanks the National Institute of General Medical Sciences of NIH for a CTR-ACCEL Pilot, CTR-SHORE (Project PI) & CTR-Orbits (Co-I) through Institutional Development Award (IDeA) funding (Grant #: U54-GM104941, Site PI: Binder-Macleod), and the Dana Foundation for supporting AB's research efforts.