Development of Verbal Behavior in Early, Intensive Behavioral Therapy for Autism Spectrum Disorder

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Introduction

Autism (ASD) is a neurodevelopmental disorder characterized by deficits in social communication and behavioral flexibility, with current incidence in the US of 1/44 children.[1] The spectrum encompasses a broad range of conditions including difficulties in social skills, speech, nonverbal interactions and repetitive behaviors.[2]

Most therapeutic approaches focus on developing skills to remedy core behavioral deficits. According to the National Research Council, applied behavior analysis therapy through early intensive behavioral intervention (EIBI) is recommended.[3,4] However, the heterogeneity of clinical and behavioral features seen in children on the spectrum means that individual plans of treatment are crucial.

The Verbal Behavior Milestone Assessment and Placement Program (VB-MAPP) is used for both assessment and curriculum development for language acquisition.[4] Behavioral analysis in VB-MAPP separates language by function, and one of the earliest functions of language to emerge is the MAND, a request for something wanted or needed.

Children with ASD often do not have the echoic repertoire necessary for instruction and guidance in developing vocal language for MAND.[5] Research suggests that a series of rapid motor imitations (MI), the ability to reproduce movements after observing another person performing the action, before a vocal model could facilitate vocal speech. Yet little is known about how MI skills may longitudinally influence functional language development. This retrospective cohort study with MI skill level subgroups (*low*, *medium* and *high*) will explore whether the development of MI skills correlates with greater MAND progress in pediatric patients with ASD.

AIMS

- To compare the baseline scores of MAND and MOTOR IMITATION skills in young ASD patients.
- To explore the rate/pattern of acquisition of MAND and MOTOR IMITATION skills with 2 to 7-year old ASD patients in 12-month increments.
- To examine whether baseline MOTOR IMITATION scores can act as a predictor of MAND acquisition skill developing in 2 to 7- year old ASD patients.

Methods

Patient data from 2010 to 2019 was accessed through the Beaumont Children's TLF HOPE Center database. The date range was specifically chosen to maximize the sample size.

All children included in the study had a confirmed diagnosis of ASD through standardized assessments including:

- **Autistic Diagnostic Observation Schedule**
- **Clinical Interview**
- **Cognitive Assessment**
- **Adaptive Living Assessment**

Children received 15-30 hours per week of one-on-one applied behavior analysis (ABA) treatment which includes individual instruction as well as group learning and social play training.

VB-MAPP assessment scores of pediatric ASD patients from the Ted Lindsay Foundation HOPE Center (TLF HOPE) at Beaumont Children's were reviewed to explore the interrelationships between MI and MAND.

The motor imitation subgroups are stratified as listed below.

- **LOW**: 0-3 Milestones Achieved.
- **MEDIUM**: 4-6 Milestones Achieved.
- **HIGH**: 7-10 Milestones Achieved.

Analysis

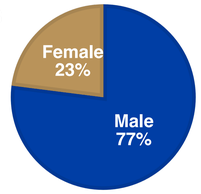
The data set was subjected to statistical analysis using SPSS. Using the subgroups listed above:

1. Baseline scores were compared using *r* to determine the correlation between initial MAND and MI scores.
2. Univariate/unadjusted mixed effect linear regressions were fit for MAND and MI Milestones as a function of time of measurement and MI baseline to explore the rate/pattern of MAND and MI.
3. Examined whether baseline MI score were predictors of MAND acquisition through linear regressions.

Correlations over continuous data were identified within the data, and these data points were adjusted for age.

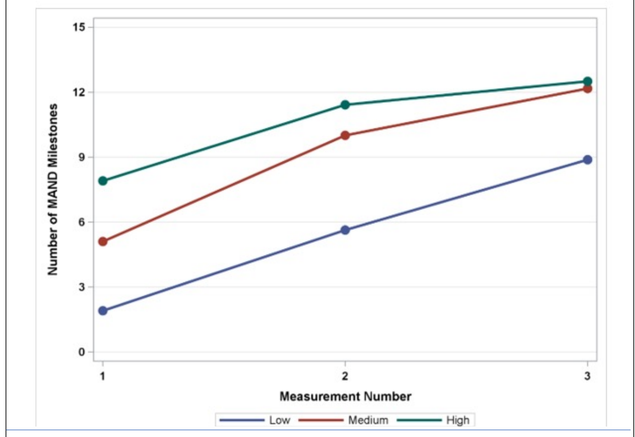
Results

Descriptive Statistics:
Participants (n = 94) had a mean age of 48.95 months (SD = 11.87, range 22 - 74 months).

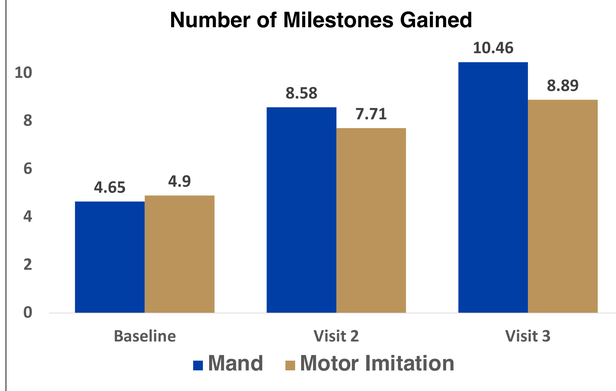


AIM I

Results: MAND Milestones



AIM II



AIM III

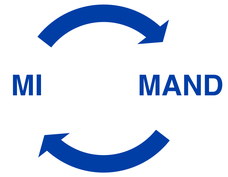
Change in MAND Milestones by Baseline MI Categories:

There was not enough evidence to conclude an interaction between baseline MI subgroups and trend in MAND milestones attained over the course of EIBI treatment.

Conclusions

First and foremost, the positive rate of increase seen in all levels over time indicates the importance of EIBI helping combat ASD deficits. VB-MAPP is unique in that it personalizes EIBI to each child. Thus, the positive rate reveals how children are benefiting from EIBI regardless of their initial diverse presentations. There is a higher increase in the medium group vs. the low group. This result suggests that those children that start treatment with some motor imitation skills gain manding skills at a higher rate than those with low and high motor imitation skills during the first 12 months of EIBI, but that the rate of acquisition evens out for all groups after 24 months of treatment.

However, it is possible that if a more robust assessment tool was used that assessed for higher skillsets in both the motor and manding domains, rate of acquisition may have looked different longitudinally. ,



While the medium group's trend in the first year supports the proposed model of motor imitation being a pivotal skill in mand acquisition, it is difficult to conclude without further analysis. Detailed explorations of the learning rates for these crucial developmental skills may help guide interventionists in developing even more effective programming. Future studies could expand on this study by looking specifically at the topography of the mand, comparing children that request using spoken vocal language, sign language, Picture Exchange Communication System (PECS), or an assistive augmentative communication (AAC) device

There is consistent evidence suggesting that children with ASD have significant impairment in motor abilities.[10] These results show how it could be beneficial for behavioral therapists to target imitation in early intervention programs for verbal development, further personalizing EIBI.

References

1. Kaur, M., M. Srinivasan, S., & N. Bhat, A. (2018). Comparing motor performance, praxis, coordination, and interpersonal synchrony between children with and without Autism Spectrum Disorder (ASD). *Research in Developmental Disabilities*, *72*, 79–95. https://doi.org/10.1016/j.ridd.2017.10.025
2. Ross, D. E., & Greer, R. D. (2003). Generalized imitation and the mand: inducing first instances of speech in young children with autism. *Research in Developmental Disabilities*, *24*(1), 58–74. https://doi.org/10.1016/S0891-4222(02)00167-1
3. Anan, R. M., Warner, L. J., McGillivary, J. E., Chong, I. M., & Hines, S. J. (2008). Group Intensive Family Training (GIFT) for preschoolers with autism spectrum disorders. *Behavioral Interventions*, *23*(3), 165–180. https://doi.org/10.1002/bin.262
4. Barnes, C. S., Mellor, J. R., & Rehfeldt, R. A. (2014). Implementing the Verbal Behavior Milestones Assessment and Placement Program (VB-MAPP): Teaching Assessment Techniques. *The Analysis of Verbal Behavior*, *30*(1), 36–47. https://doi.org/10.1007/s40616-013-0004-5
5. Dadgar, H., Alaghband Rad, J., Soleymani, Z., Khorammi, A., McCleery, J., & Maroufizadeh, S. (2017). The Relationship between Motor, Imitation, and Early Social Communication Skills in Children with Autism. *Iranian Journal of Psychiatry*, *12*(4), 236–240. Retrieved from http://www.ncbi.nlm.nih.gov/pubmed/29472949
6. Field, T. (2017). Imitation enhances social behavior of children with autism spectrum disorder: A review. *Behavioral Development Bulletin*, *22*(1), 86–93. https://doi.org/10.1037/bdb0000042

Acknowledgements

Dr. Lesly Hendershot, Dr. Lori Warner & Dr. James Grogan