

RESEARCH BRIEF

Autism, Service Delays, and Educational Outcomes

PURPOSE OF THE STUDY

The purpose of this exploratory study was to examine the effects delayed starts in early intensive behavior intervention (EIBI) on later educational outcomes for Medicaid-enrolled children who were diagnosed with autism spectrum disorder between the ages 3-5.

BACKGROUND & PURPOSE

Autism spectrum disorder (ASD) is a developmental disability that is estimated to impact 1 in 68 children nationwide (CDC, 2015). Estimates in Minneapolis, Minnesota among 7 to 9 year olds are closer to 1 in 48 children (Hewitt et al., 2013). Children diagnosed with ASD have impairments in communication and social functioning, and engage in repetitive and or restricted behavior (CDC, 2015). Impairments associated with ASD can have deleterious effects on quality of life (e.g., challenging behavior, limited communication, and social skills).

With increased diagnoses of ASD over the past decade, it is imperative that children and families have early access to high quality services (Chasson, Harris, & Neely, 2007). Treatment for ASD is essential, but costly. The long-term cost attributed to the needs of a person with ASD is estimated at \$3.2 million dollars (Ganz, 2007). Research suggests that these costs can be significantly reduced with effective early diagnosis and early intervention services (Jarbrink & Knapp, 2001).

Early Intensive Behavioral Interventions (EIBI) can be effective for remediating ASD symptoms (Lovaas, 1987; Matson, 2007; Matson & Konst, 2013). EIBI is based on applied behavior analysis principles and is usually an intensive home-based program (e.g., one on one services for up to 40 hours per week for 2 years; Reichow, 2011). Research suggests that EIBI is among the top evidence-based behavioral treatments for young children with ASD (Matson & Smith, 2008).

There is a need to investigate the effects of service delay on outcomes for children with ASD due to reported waitlists for both ASD diagnosis and services (Hewitt et al., 2012). This study focused on two research questions:

- 1. Does a delay in early intensive behavioral intervention services for children with ASD (aged 3-5) impact later educational outcomes?**
- 2. Does average delay to start early intensive behavioral intervention differ by region within Minnesota?**



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METHODS

Secondary data analyses of educational records of children enrolled in Medicaid with an ASD diagnosis were conducted. Average delay to start EIBI was calculated and compared by region within Minnesota. Delay to start EIBI was also compared to assess if educational outcomes differed for children with a delay in service of 5 months or more versus those who did not.

Through Minn-LInK, Medical Assistance (MA) records from the Minnesota Department of Human Services (DHS) were used to create a cohort of 3 to 5 year olds who received a diagnosis of ASD between January 1st, 2008 and December 31st, 2010. This cohort was matched with Minnesota Department of Education (MDE) records from the 2013-2014 academic year (AY14; 94.5% match rate). All children ($n=607$) received EIBI services before entering elementary school. (Demographic characteristics are presented in Table 1.)

Delay to EIBI services in months was calculated by subtracting the date of ASD diagnosis (ICD-9 CM 299.0) from the first billing date associated with an EIBI service provider (H2014 UA/HR). The dependent variables included: an educational diagnosis of ASD, the instructional placement (general education, special education resource room, separate classroom, and or a separate school for special education [i.e., a Level 4 restrictive setting]), and Minnesota Comprehensive Assessment-III (MCA-III) scores for reading, math, and science.

Exploratory analyses included relative risk, one-way ANOVA, and logistic regressions to investigate the relationship between delay in months to start EIBI services and educational outcomes at 4-6 years of follow up. Delay was recoded as a binary categorical variable for relative risk estimates based on the 50th percentile estimate (5-months).

FINDINGS

Delays in starting EIBI services were observed for 70% of children. The average delay was approximately nine months and significantly differed by Minnesota region. A delay of five months or more was associated with more restrictive instructional placement settings for some children.

DELAY TO EIBI SERVICE START

Overall, average delay within the cohort of 3-5 year olds who received an ASD diagnosis was 8.9 months (SD=10.7 months, range= 0-45 months) from date of diagnosis to the start of EIBI services. Approximately 30% of the cohort had no delay to EIBI services. Figure 1 displays the distribution of the average delay to start EIBI by Minnesota region. Southwest Minnesota had the smallest delay ($n=5$, $M=4.4$ months, $SD= 4.4$ months) while the Northeast had the largest average delay ($n=33$, $M=10.7$ months, $SD=12.9$ months). There was a statistically significant difference between regions as determined by a one-way Welch's ANOVA for unequal variances ($F(6,45.07) = 15.42, p<.001$).

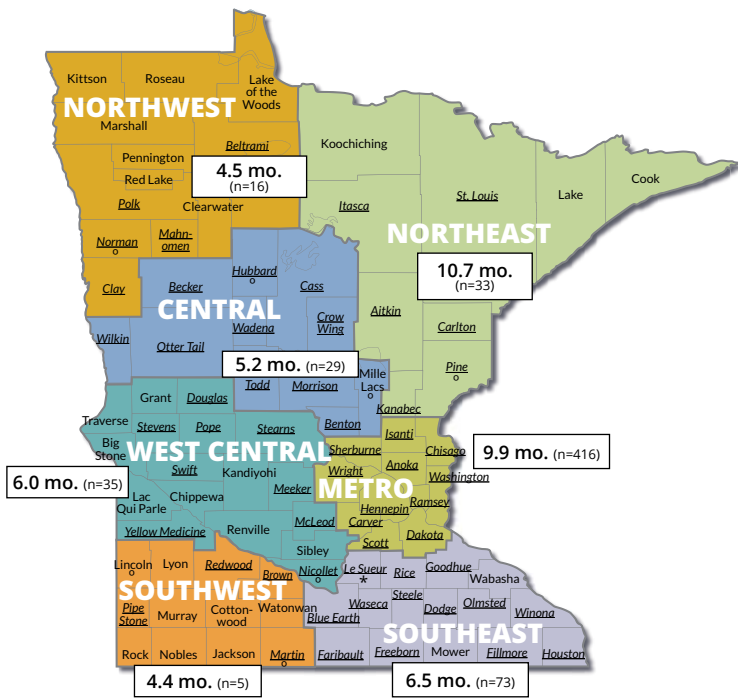
EDUCATIONAL OUTCOMES

Using education data from AY14 allowed for four to six years of follow up from the age of ASD diagnosis. At that time, 94% of the cohort was eligible or received special education services. For those children, the average total number of special education service

Table 1. Demographic Characteristics (n=607)

Demographics	% of sample or mean (sd)
Gender	
Female	17.6%
Male	82.4%
Race/ethnicity	
American Indian	2.6%
Asian	4.6%
Hispanic	5.9%
Black	14.0%
White	72.8%
Age at ASD diagnosis	
3- years old	38.6%
4 -years old	35.3%
5 -years old	26.2%
Free/Reduced Price Lunch	54.5%
Homeless/Highly Mobile	1.8%
Limited English Proficient	4.1%
Comorbid Disability	
Language disorder	38.1%
Developmental delay	15.3%
Mild intellectual disability (IQ 50-70)	8.1%
Moderate intellectual disability (IQ 35-49)	6.1%
Severe intellectual disability (IQ 20-34)	3.3%
Profound intellectual disability (IQ <20)	0.8%
Unspecified Intellectual disability	20.6%
Average hours of EIBI per week	19.4 (14.2)
Received Speech and Language Therapy	50.4%
Received Occupational Therapy	42.7%
Received Physical Therapy	12.4%

Figure 1. Average Delay (in Months) to Start EIBI Services by Region



NOTES: *Italicized underlined counties indicate that the sample included this county, ° indicates no delay of service within the county, * indicates the county with the largest delay in the sample.*

Table 2. Logistic Regression Results

Variable	B	SE	Odds ratio	p
General Education				
Gender	-.16	.23	.85	.48
Intellectual Disability	1.27	.20	3.55	<.001***
Delay in months	-.03	.01	.97	<.001***
Constant	-.63	.20	.53	.001***
Special Education				
Gender	-.32	.42	.73	.46
Intellectual Disability	1.47	.61	2.23	.02*
Delay in months	.05	.03	1.06	.04*
Constant	3.69	.62	39.94	<.001***
MCA-III Reading/Math participation				
Gender	.06	.28	1.07	.82
Intellectual Disability	1.18	.22	3.24	<.001***
Delay in months	-.02	.01	.98	.03*
Constant	-.44	.23	.65	.05*
MCA-III Science participation				
Gender	-.44	.54	.64	.42
Intellectual Disability	1.22	.42	3.39	.004**
Delay in months	-.01	.02	.99	.56
Constant	-.36	.45	.70	.42

hours received was 117.98 hours (range= 0-2,017 hours; $SD=290.84$ hours). Approximately 70% of the cohort retained a primary educational diagnosis of ASD at follow up. Of the students that were in grades 3 through 6, 53% took MCA-III reading and math assessments. Similarly, 53% of 5th graders from the cohort took the MCA-III science assessment. Overall, 40.4% met or exceeded the passing standards for the reading section of the MCA-III. For the math MCA-III, only 30.8% of the cohort that took it met or exceeded the standards. Finally, of the 5th graders in the cohort, 35.1% MCA met or exceeded the standards in science.

Relative risk estimates (RR) were calculated to evaluate the likelihood of being placed in restrictive instructional settings and of receiving a primary educational diagnosis of ASD based on delay of EIBI services (five or more months of a delay vs four months or less). Statistically significant findings were evident across restrictive instructional placements with the exception of placement in a resource room (RR= 1.12; 95% CI [0.81,1.55]). Children who had a delay in EIBI of five or more months were 1.27 times more likely to be in a separate special education classroom (95% CI [1.04,1.57]); and 2.59 times more likely to be in a separate (more restrictive) school (95% CI [1.23,5.44]) compared to children whose delay to EIBI was four months

or less. Children with a greater delay also were 1.18 times more likely to retain a diagnosis of ASD (95% CI [1.06, 1.32]).

Logistic regressions were performed to assess if gender, intellectual disability (ID) status (binary), and delay to EIBI significantly predicted whether or not children were placed in general education (i.e., least restrictive environment), received special education, and if they participated in the MCA-III for math, reading, or science at follow up (see Table 2). All models were statistically significant and explained, at most, 15% of variance. Results revealed that children with ID were 3.6 times more likely to be placed in general education. Greater delay to EIBI was associated with a reduction in the likelihood of being placed in general education. Prediction of special education receipt showed that for each 1-month delay, the odds of receiving special education increased by 1.06 times. Children with ID were also more likely to receive special education. MCA-III participation for both reading/math (3rd-5th grade, n=429) and science (5th graders only, n=107) indicated that a shorter delay in EIBI was associated with an increased likelihood of MCA-III participation. Only science MCA participation did not yield statistically significant results.

Conclusion

EIBI has the potential to remediate areas of deficit associated with ASD for some children (Lovaas, 1987; Matson, 2007; Matson & Smith, 2008). However, it is imperative that children diagnosed with ASD receive services during critical times of early development (i.e., when the brain is still developing). Recent implementation of Minnesota's early intensive developmental and behavioral benefit (EIDBI; DHS, 2016) requires Medical Assistance to cover EIBI, yet stakeholders describe waitlists and delays in accessing needed services. The long term effects of waitlists and delay of services for individuals with ASD are not well understood.

This study was developed to investigate if a delay in EIBI services affected later educational outcomes for Medicaid-enrolled children with a diagnosis of ASD. Overall, approximately 70% of children in this study experienced a delay to EIBI services, with an average delay of nine months. Delays to EIBI varied throughout regions of the state, perhaps driven by lack of service providers in regions of Minnesota outside the metro area. In addition, findings of this study reveal that delays of five months or more are significantly associated with more restrictive instructional placement settings for children in the public education system. In sum, although some children received EIBI services before a diagnosis of ASD was given, there are waitlists and delays to services around the state which may be detrimental to children's educational experiences and outcomes in the K-12 setting.

While more research is needed to assess how delays to EIBI affect outcomes over time, current delays may be limited by alternative service delivery strategies. For example, a telehealth (internet based video-conferencing) model of service could potentially bridge the gap in service delivery time after diagnosis. Implications of this type of research include more efficient allocation of services for families and children with ASD throughout Minnesota.

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LIMITATIONS

A limitation of this preliminary study is that the educational outcomes were limited to those available in administrative data (i.e., MCA-III scores and placement information). Other indicators for academic achievement were not available, such as the individualized education plans for the students receiving special education services. Another limitation is that only one school year was examined and so inferences regarding change over time with educational outcomes are limited.

The Center for Advanced Studies in Child Welfare (CASCW) is a resource for child welfare professionals, students, faculty, policy-makers, and other key stakeholders concerned about child welfare in Minnesota. **Minn-LInK** is a unique collaborative, university-based research environment with the express purpose of studying child and family well being in Minnesota using state administrative data from multiple agencies.

For more information, contact **Kristine Piescher (Editor)** at **612-625-8169** or email at kpiesche@umn.edu