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DATA NOTE

Occupational therapy and Beery VMI scores of children with autism spectrum disorder, brachial plexus injury, and cerebral palsy [version 1; peer review: 1 approved with reservations]

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Abstract

Data of 107 children (84 males and 23 females) who received occupational therapy services were collected. Data collected included age, gender, prescribed frequency of occupational therapy, number of sessions attended within the six-month timeframe, pre and post Beery Visual Motor Integration scores.

Keywords

Autism Spectrum Disorder, Brachial Plexus Injury, Cerebral Palsy, Occupational Therapy, Beery-Buktenica Developmental Test of Visual Motor Integration

Open Peer Review

Approval Status ?

1

version 1

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?
view

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Any reports and responses or comments on the article can be found at the end of the article.

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Author roles: **Carsone B:** Conceptualization, Data Curation, Formal Analysis, Investigation, Methodology, Project Administration, Resources, Software, Validation, Writing – Original Draft Preparation, Writing – Review & Editing; **Green K:** Project Administration, Supervision, Writing – Review & Editing; **Torrence W:** Methodology, Supervision, Writing – Review & Editing; **Henry B:** Supervision, Writing – Review & Editing

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Introduction

The existing research is at a consensus that autism spectrum disorder (ASD), brachial plexus injury (BPI), and cerebral palsy (CP) affect visual motor integration (VMI) and that VMI may be positively impacted by occupational therapy intervention (Bumin & Kavak, 2008; Cho et al., 2015; Desai & Rege, 2005; Duff & DeMatteo, 2015; Green et al., 2016; Lu et al., 2016; Miller et al., 2014; Wadsworth et al., 2017). However, the research does not adequately address the potential relationship between occupational therapy intervention and the Beery VMI scores of children with ASD, BPI, and CP. This secondary data analysis cohort study addressed the current gap in knowledge by providing data that can be used to investigate the relationship between occupational therapy (prescribed frequency and total sessions attended), age, gender, and pre-Beery VMI scores on post-Beery VMI scores of children with ASD, BPI, and CP.

Methods

Participants

Patients with a formal diagnosis of ASD, BPI, and CP designated in the electronic medical record (EMR) who were between the ages of two years, zero months, and five years 11 months during the initial assessment (occupational therapy evaluation or re-evaluation) were considered for inclusion in the study. Subjects with pre- and post- Beery VMI scores who attended at least one therapy session (excluding the initial assessment and reassessment) were included in the study. Subjects' identifying information was not reported, meeting Human Subject regulations and standards (Breault, 2006). Table 1 below provides the information of each subject included.

The inclusion criteria for the study was designed based on the findings from the literature. Patients with the diagnosis of ASD, BPI, and CP were selected as a focus for this study because these three conditions represent populations commonly affected by VMI deficits (Bonifacci, 2004; Dowd et al., 2011; Englund et al., 2014; Green et al., 2016). The age range accounted for the potential peak in VMI scores, while the six-month intervention period accounted for the confounding variable of maturation (Ercan et al., 2011; Fang et al., 2017; Heiz & Barisnikov, 2016). Limiting the study to one county accounted for the potential effects of location while focusing on one specific clinic increased the feasibility of the study (Cui et al., 2012; Ng et al., 2015; Visser et al., 2017).

Data collection and analysis

Data for both questions were obtained from one pediatric outpatient clinic in South Florida. Subject data were collected from the pediatric outpatient electronic medical record system, RainTree, based on the inclusion and exclusion criteria. The data reviewed spanned from June 1, 2017 to March 13, 2020. Limiters of age (two years zero months to five years 11 months) and diagnoses (ASD, BPI, or CP) were then employed. After the limiters were applied each individual chart was analyzed for pre- and six-month post- Beery VMI scores. Patient charts with pre- and six-month post Beery VMI scores who attended at least one therapy treatment session were included in the study. Prescribed frequency, therapy attendance, and changes in Beery VMI scores were recorded with relevant demographic information (e.g., age and gender). A summary of this process can be seen in Figure 1.

Gender (male = 1, female = 0), age at initial assessment (24 months to 71 months), prescribed frequency (1 time per week = 1, 2 times per week = 0), sessions attended (0 to 52 sessions), pre-Beery VMI raw score (0 to 30 points), post-Beery VMI raw score (0 to 30 points), and change in Beery VMI raw score (0 to 30 points).

Ethical considerations

This data set is part of a publicly defended dissertation and the study was approved by Concordia University Chicago's IRB (study number 1698245-1). The study was exempt from review as it was determined to be a secondary data analysis. The research involves only information collection and analysis involving the investigator's use of identifiable health information when that use is regulated under 45 CFR parts 160 and 164, subparts A and E, for the purposes of "health care operations" or "research" as those terms are defined at 45 CFR 164.501 or for "public health activities and purposes" as described under 45 CFR 164.512(b). Consent from participants was therefore not required.

Dataset description

Overwhelmingly, 97% of subjects were diagnosed with ASD while 1% were diagnosed with BPI and 2% were diagnosed with CP. The majority of subjects were male (N = 84, 78.5%; female N = 23, 21.5%). The subjects' mean age was 49.21 months or approximately 4 years of age. Table 2 below provides an overview of the descriptive statistics.

Table 1. Subject information (underlying data).

Gender	Diagnosis	Age at assessment (months)	Pre-Beery	Post-Beery	Sessions attended	Prescribed frequency
M	ASD	36	1	4	40	2
F	ASD	44	9	13	18	2
M	ASD	45	0	9	42	2
M	ASD	40	9	13	37	2
M	ASD	32	0	0	28	1
M	ASD	37	5	8	17	1
M	ASD	37	1	7	17	2
M	ASD	57	10	8	17	2
M	ASD	38	2	2	20	2
M	ASD	68	12	15	40	2
F	ASD	67	9	14	15	1
M	ASD	49	1	5	27	2
M	ASD	60	7	9	15	2
M	ASD	56	13	13	15	1
M	ASD	43	4	3	29	2
M	ASD	46	3	0	21	2
M	ASD	52	0	0	4	2
M	ASD	48	10	11	13	2
F	ASD	34	4	6	14	2
M	ASD	39	4	5	27	2
M	ASD	47	5	6	17	2
F	ASD	31	2	2	24	2
M	ASD	61	11	15	0	2
M	ASD	50	1	3	37	2
M	ASD	38	0	0	26	2
M	ASD	64	9	10	28	2
M	ASD	63	11	15	28	2
M	ASD	41	2	3	16	2
M	ASD	43	9	9	9	1
M	ASD	42	3	3	10	2
F	ASD	42	9	12	6	1
F	ASD	43	6	6	8	2
M	ASD	48	6	8	12	1
M	ASD	58	4	13	37	2
M	ASD	67	9	14	22	2
F	ASD	61	1	6	22	2
M	ASD	31	1	2	32	2
F	ASD	45	6	6	3	2
M	ASD	70	14	20	12	1
M	ASD	30	0	4	35	2
M	ASD	58	6	2	18	1
M	ASD	34	3	9	36	2

Table 1. *Continued*

Gender	Diagnosis	Age at assessment (months)	Pre-Beery	Post-Beery	Sessions attended	Prescribed frequency
M	ASD	55	3	0	26	2
M	CP	69	15	15	22	1
M	ASD	58	0	0	36	2
M	ASD	45	0	9	16	2
F	ASD	46	9	10	21	1
M	ASD	39	0	1	31	2
M	ASD	59	0	0	25	2
M	ASD	49	0	1	44	2
M	ASD	55	15	16	26	2
M	ASD	26	2	2	26	2
M	ASD	34	4	9	15	2
M	ASD	59	6	7	35	2
M	ASD	36	0	1	17	2
M	ASD	65	4	4	43	2
M	ASD	50	1	1	39	2
M	ASD	55	10	15	12	1
M	ASD	47	9	10	39	2
F	ASD	50	1	13	21	2
M	ASD	45	5	6	18	2
M	ASD	35	7	4	30	2
M	ASD	44	3	4	26	2
F	ASD	69	14	15	39	2
M	ASD	62	7	9	36	2
M	ASD	67	13	15	35	2
M	ASD	57	7	9	44	2
F	ASD	61	15	14	8	2
F	ASD	61	10	11	24	1
M	ASD	37	10	9	9	2
M	ASD	66	14	17	10	1
F	ASD	68	16	19	42	2
M	ASD	36	9	8	40	2
M	ASD	52	1	2	28	2
M	ASD	53	9	12	23	2
M	ASD	54	8	10	15	2
F	ASD	35	4	6	25	2
M	ASD	39	7	9	14	2
F	ASD	46	2	2	16	2
F	ASD	50	10	12	45	2
M	ASD	32	3	4	38	2
F	ASD	65	12	14	35	2
M	ASD	42	2	3	21	2
M	ASD	42	9	13	40	2

Table 1. *Continued*

Gender	Diagnosis	Age at assessment (months)	Pre-Beery	Post-Beery	Sessions attended	Prescribed frequency
M	ASD	51	5	5	23	2
F	ASD	42	0	7	9	1
F	ASD	43	6	8	41	2
F	ASD	66	11	13	10	2
M	ASD	42	7	13	18	1
M	ASD	71	5	4	44	2
M	ASD	39	4	11	25	2
M	ASD	43	8	12	20	1
M	ASD	49	2	7	22	2
F	BPI	66	13	13	3	2
M	ASD	64	15	20	15	2
M	ASD	65	10	13	4	2
M	ASD	69	15	18	7	1
M	ASD	45	1	5	12	2
M	ASD	32	1	1	15	2
M	ASD	25	1	2	39	2
M	ASD	61	3	3	35	2
M	ASD	32	4	5	17	1
M	ASD	64	0	1	19	2
F	CP	51	9	12	46	2
M	ASD	38	3	4	26	2
M	ASD	48	7	13	45	2
M	ASD	42	0	0	14	2
M	ASD	68	13	15	17	2

Note. "M" and "F" represent "male" and "female" respectively. "ASD", "BPI", and "CP" represent "autism spectrum disorder", "brachial plexus injury", and "cerebral palsy" respectively.

Figure 1. Data collection procedures.

Table 2. Research question descriptive statistics.

Variable	Mean	Standard deviation
Post Beery	7.89	5.317
Gender	1.79	0.413
Age (Months)	49.21	11.983
Pre-Beery	5.89	4.645
Prescribed frequency	1.82	0.384
Sessions attended	24.07	11.588

Data availability

Underlying data

All data underlying the results are available as part of the article (Table 1) and no additional source data are required.

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Open Peer Review

Current Peer Review Status: ?

Version 1

Reviewer Report 28 October 2022

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This is an interesting data note which explores VMI scores pre and post for children who attended occupational therapy. The VMI is a commonly used tool in children's occupational therapy and publication of this dataset may assist in collaboration and production of high quality research. There is however, some more context required in order to ensure that the data set is used to its maximum potential.

Introduction:

The term 'autism spectrum disorder (ASD)' is not preferred by the autistic community. Consider saying 'autism spectrum disorder', hereafter 'autism' rather than ASD.

Methods: Participants:

Beery VMI- this data note may be improved by providing more information about the VMI- you mentioned 'peak scores'. It's not clear what this is if the reader does not have the context of the VMI. You should offer more context about where the score came from. Was it from the whole VMI assessment (including visual perception and motor coordination) or just the main VMI test?

Dataset description:

You should include actual numbers of participants here. How many in total, how many had autism, CP, BPI etc.

The data is presented clearly. I see that majority of the children are autistic. There's only 1 child with BPI and 2 children with CP. It may appear that these children are outliers. It would not be possible for any researcher to use this data to 'determine a relationship' between OT attendance, VMI scores based on these low numbers. I suggest that these outliers are excluded from the

dataset unless you can present a more firm justification for why they should be left in there.

It is not clear whether any of these children had any co-occurring diagnoses (in particular global developmental delay or intellectual disability). These may impact a child's participation in occupational therapy and their VMI scores. Consider including this information or stating if/why it is absent.

Context is needed around what the children worked on in therapy. Were they focused on visual motor integration/visual perception/hand skills in therapy sessions? If a researcher were to use this data to determine a relationship between OT attendance and VMI scores, they would need to context around what type of OT. With a dataset like this, this could be achieved through a process of categorisation, where therapy activities are grouped into categories (fine motor, play etc.). If this data is not available- you should provide a justification as to why.

Table 2:

Don't use Mean and SD for nominal variables like Gender- use number and percentage of total. You could also offer some more descriptive information such as score range (min-max).

Is the rationale for creating the dataset(s) clearly described?

Yes

Are the protocols appropriate and is the work technically sound?

Yes

Are sufficient details of methods and materials provided to allow replication by others?

Partly

Are the datasets clearly presented in a useable and accessible format?

Partly

Competing Interests: No competing interests were disclosed.

Reviewer Expertise: Children's occupational therapy, autism

I confirm that I have read this submission and believe that I have an appropriate level of expertise to confirm that it is of an acceptable scientific standard, however I have significant reservations, as outlined above.

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