Identifying an Association Between Sensory Processing and Food Sensitivities

Taylor Tonks OTD, OTR/L
taylor.tonks@pillerchilddevelopment.com

Aimee Piller PhD, OTR/L, BCP, FAOTA
aimee.piller@pillerchilddevelopment.com

The relationship between sensory processing and feeding difficulties in children has been previously researched. However, most of the existing research focuses on children diagnosed with Autism Spectrum Disorder. The purpose of the present study was to identify the association between sensory processing and food sensitivities in children of varying diagnoses using retrospective data. 47 children who presented to an outpatient pediatric clinic for a feeding evaluation were included in the study. Correlational statistics were conducted using SPSS to determine the correlations between scores on the Sensory Processing Measure (SPM) or Sensory Processing Measure-Preschool (SPM-P), the Brief Assessment of Mealtime Behaviors in Children (BAMBIC), and a Food Preference Checklist. Results found weak correlations between scores on the SPM/SPM-P and scores on the BAMBIC and Food Preference Checklist. Moderate correlations were found between specific test items on the BAMBIC related to food selectivity and the Body Awareness subtest of the SPM/SPM-P. One test item also had a moderate correlation with the Total Sensory Score of the SPM/SPM-P. The results indicate the importance of identifying and addressing body awareness (proprioception) and oral motor skills in children presenting with feeding difficulties.

Introduction

- Up to 50% of children may have some difficulties with feeding with higher prevalence among children with disabilities (Andrew & Sullivan, 2010; Taylor et al., 2015)
- Feeding challenges can include food selectivity and food refusal
- There are a multitude of poor health outcomes associated with feeding difficulties including: nutritional status, obesity, and GI symptoms
- Previous studies have identified some links between sensory processing and feeding in children with majority of research focused on children diagnosed with ASD
- Sensory processing difficulties that impact feeding include tactile sensitivities (Cermak et al., 2010; Yi et al., 2015), sensory aversions (Chistol et al., 2018)
- Oral motor skills and oral praxis plays an important role in feeding
- Sensory processing can impact oral motor skills and oral motor praxis (Voniati et al., 2021)

Methods

- Retrospective de-identified data
- Outcome measures: Sensory Processing Measure (SPM) or Sensory Processing Measure-Preschool (SPM-P), Brief Assessment of Mealtime Behaviors in Children (BAMBIC), & Food Preference Checklist
- Used 2 tailed Spearman bivariate correlational statistics via SPSS (2018)

Participants

- 47 participants who received a feeding evaluation at an outpatient pediatric clinic
- 35 male, 12 female
- Ages 2 years and older
- Completed all 3 outcome measures

Results/Discussion

- The study found weak correlations between sensory processing and food difficulties. However, correlations were found between body awareness based on the SPM/SPM-P and food selectivity questions of the BAMBIC
- Results indicate the importance of identifying and addressing body awareness, proprioception, and oral motor planning in children with feeding challenges
- Proprioception impacts motor planning (oral praxis) affecting oral motor skills and a child's abilities to safely and effectively engage in oral feeding
- Interventions can include sensorimotor techniques

Conclusion

- Overall, sensory processing did not have strong correlations with feeding.
- Body awareness had some correlations with feeding difficulties
- Results have implications for occupational therapy practice and tailoring feeding interventions for children of varying diagnoses

Table 1

Demographics

Factor		Frequency	Percent
Gender			
	Male	35	74.5%
	Female	12	25.5%
SPM-P & SPM			
	SPM-P	22	46.8%
	SPM	25	53.2%

Table 2

Results: BAMBIC and SPM/SPM-P

SPM/SPM-P SubTest	Correlation Coefficient	Relationship Strength
Social Participation	0.213	Weak
Vision	0.060	Very Weak
Hearing	0.125	Weak
Touch	0.127	Weak
Body Awareness	-0.064	Very Weak
Balance and Motion	0.054	Very Weak
Planning and Ideas	0.088	Very Weak
Total Sensory Score	0.077	Very Weak

Table 3
Results: BAMBIC Items & SPM/SPM-P

BAMBIC Item	SPM/SPM-P SubTest	Correlation Coefficient	Relationship Strength
"My child is willing to try new foods"			
	Social Participation	-0.142	Weak
	Vision	-0.212	Weak
	Hearing	-0.186	Weak
	Touch	-0.222	Weak
	Body Awareness	-0.377**	Moderate
	Balance and Motion	-0.289	Weak
	Planning and Ideas	-0.239	Weak
	Total Sensory Score	-0.301*	Moderate
"My child dislikes certain foods and won't eat them"			
	Social Participation	-0.159	Weak
	Vision	-0.169	Weak
	Hearing	0.007	Very Weak
	Touch	-0.287	Weak
	Body Awareness	-0.464**	Moderate
	Balance and Motion	-0.142	Weak
	Planning and Ideas	-0.069	Very Weak
	Total Sensory Score	-0.258	Weak
"My child prefers the same foods at each meal"			
	Social Participation	-0.012	Very Weak

	Vision	-0.112	Weak
	Hearing	-0.090	Very Weak
	Touch	-0.150	Weak
	Body Awareness	-0.164	Weak
	Balance and Motion	-0.152	Weak
	Planning and Ideas	-0.060	Very Weak
	Total Sensory Score	-0.169	Weak
"My child accepts or prefers a variety of foods"			
	Social Participation	-0.139	Weak
	Vision	-0.078	Very Weak
	Hearing	-0.060	Very Weak
	Touch	-0.284	Weak
	Body Awareness	-0.370*	Moderate
	Balance and Motion	-0.230	Weak
	Planning and Ideas	-0.156	Weak
	Total Sensory Score	-0.230	Weak

*Correlation is significant at the 0.05 level (2-tailed)
** Correlation is significant at the 0.01 level (2-tailed)

Table 4
Results: Food Preference Checklist and SPM/SPM-P

SPM/SPM-P SubTest	Correlation Coefficient	Relationship Strength
Social Participation	-0.147	Weak
Vision	0.103	Weak
Hearing	0.014	Very Weak

Touch	-0.003	Very Weak
Body Awareness	0.161	Weak
Balance and Motion	0.137	Weak
Planning and Ideas	-0.062	Very Weak
Total Sensory Score	0.155	Weak

References

Al-Khuffash, S. (2013). A comparison of eating problems among children with autism, mental retardation and children with normal development. *Higher Education of Social Science, 4*(3), 40-45.

American Occupational Therapy Association (AOTA). (2008). *Frequently asked questions about ayres sensory integration.* https://www.aota.org/-/media/Corporate/Files/Practice/Children/Resources/FAQs/SI%20Fact%20Sheet%202.pdf

Andrew, M. J., & Sullivan, P. B. (2010). Feeding difficulties in disabled children [Review Article]. *Paediatrics and Child Health*, *20*(7), 321-326. https://doi.org/10.1016/j.paed.2010.02.005

Anil, M. A., Shabnam, S., & Narayanan, S. (2019). Feeding and swallowing difficulties in children with Down syndrome. *Journal of Intellectual Disability Research*, *63*(8), 992–1014. https://doi.org/10.1111/jir.12617

Ayres, A. J., & Western Psychological Services (Firm). (1989). *Sensory integration and praxis tests (SIPT): Manual*. Los Angeles, Calif: Western Psychological Services.

Bandini, L., Curtin, C., Phillips, S., Anderson, S., Maslin, M., & Must, A. (2017). Changes in Food Selectivity in Children with Autism Spectrum Disorder. *Journal of Autism & Developmental Disorders*, *47*(2), 439-446. https://doi.org/10.1007/s10803-016-2963-6

Barton, C., Bickell, M., & Fucile, S. (2018). Pediatric Oral Motor Feeding Assessments: A Systematic Review. *Physical & Occupational Therapy in Pediatrics*, *38*(2), 190–209. https://doi.org/10.1080/01942638.2017.1290734

Beighley, J. S., Matson, J. L., Rieske, R. D., & Adams, H. L. (2013). Food selectivity in children with and without an autism spectrum disorder: Investigation of diagnosis and age [Article]. *Research in Developmental Disabilities*, *34*(10), 3497-3503. https://doi.org/10.1016/j.ridd.2013.07.026

Bruns, D. A., & Thompson, S. D. (2010). Feeding Challenges in Young Children: Toward a Best Practices Model. *Infants and Young Children*, *23*(2), 93-102.

Bundy, A. C., & Lane, S. J. (2020). *Sensory integration: Theory and practice, third edition.* F. A. Davis Company.

Cermak, S. A., Curtin, C., & Bandini, L. G. (2010). Food Selectivity and Sensory Sensitivity in Children with Autism Spectrum Disorders [Article]. *Journal of the American Dietetic Association*, *110*(2), 238-246. https://doi.org/10.1016/j.jada.2009.10.032

Chaware, S. H., Dubey, S. G., Kakatkar, V., Jankar, A., Pustake, S., & Darekar, A. (2021). The Systematic Review and Meta-analysis of Oral Sensory Challenges in Children and Adolescents with Autism Spectrum Disorder. *Journal of International Society of Preventive & Community Dentistry*, *11*(5), 469–480. https://doi.org/10.4103/jispcd.JISPCD_135_21

Chistol, L. T., Bandini, L. G., Must, A., Phillips, S., Cermak, S. A., & Curtin, C. (2018). Sensory Sensitivity and Food Selectivity in Children with Autism Spectrum Disorder [Article]. *Journal of Autism & Developmental Disorders*, *48*(2), 583-591. https://doi.org/10.1007/s10803-017-3340-9

Davis, A. M., Bruce, A. S., Khasawneh, R., Schulz, T., Fox, C., Dunn, W., . . . Dunn, W. (2013). Sensory processing issues in young children presenting to an outpatient feeding clinic.

Journal of Pediatric Gastroenterology & Nutrition, *56*(2), 156-160. https://doi.org/10.1097/MPG.0b013e3182736e19

DeMand, A., Johnson, C., & Foldes, E. (2015). Psychometric Properties of the Brief Autism Mealtime Behaviors Inventory. *Journal of Autism & Developmental Disorders*, *45*(9), 2667-2673. https://doi.org/10.1007/s10803-015-2435-4

El Nagar, R., AL-Nemr, A., & Abdelazeim, F. (2021). Effect of oromotor exercises on feeding in children with cerebral palsy: systematic review. *Bulletin of Faculty of Physical Therapy*, *26*(1). https://doi.org/10.1186/s43161-021-00054-8

Gisel, E. G., Alphonce, E., & Ramsay, M. (2000). Assessment of Ingestive and Oral Praxis Skills: Children with Cerebral Palsy vs. Controls. *Dysphagia: An International Multidisciplinary Journal Devoted to Swallowing and Its Disorders*, *15*(4), 236–244. https://doi.org/10.1007/s004550000033

Glennon, T. J., Kuhaneck, H. M., & Herzberg, D. (2011). The sensory processing measure–preschool (SPM-P)—Part one: Description of the tool and its use in the preschool environment. *Journal of Occupational Therapy, Schools, & Early Intervention*, *4*(1), 42-52, DOI:10.1080/19411243.2011.573245

Johnson, C., Turner, K., Stewart, P., Schmidt, B., Shui, A., Macklin, E., Reynolds, A., James, J., Johnson, S., Manning Courtney, P., & Hyman, S. (2014). Relationship between feeding problems, behavioral characteristics and nutritional quality in children with ASD. *Journal of autism and developmental disorders, 44*(9), 2175-2184. https://doi.org/10.1007/s10803-014-2095-9

Kollia, B., Tsiamtsiouris, J., & Korik, P. (2019). Oral motor treatment: Effects of therapeutic feeding on articulatory skills. *Journal of Prevention & Intervention in the Community*, *47*(1), 14–24. https://doi.org/10.1080/10852352.2018.1547305

Kuhaneck, H. M., & Henry, D. A.. (2009). The sensory processing measure (SPM): Meeting the needs of school-based practitioners part one: Description and background. *Journal of Occupational Therapy, Schools, & Early Intervention*, *2*(1), 51-57, DOI: 10.1080/19411240902720247

Manno, C. J., Fox, C., Eicher, P. S., & Kerwin, M. E. (2005). Early Oral-Motor Interventions for Pediatric Feeding Problems: What, When and How. *Journal of Early and Intensive Behavior Intervention*, *2*(3), 145–159.

Nadon, G., Feldman, D. E., Dunn, W., & Gisel, E. (2011). Association of Sensory Processing and Eating Problems in Children with Autism Spectrum Disorders [Article]. *Autism Research & Treatment*, 1-8. https://doi.org/10.1155/2011/541926

Narayanan, S., Vijayan, K., Vastare Guruprasad, M., Prabhu P, P., & Barman, A. (2022). Oral and Verbal Praxis in Impaired Language Learners. *Perceptual & Motor Skills*, *129*(1), 33–46.

Parham, L.D., Ecker, C.L., Kuhaneck, H., Henry, D.A., & Glennon, T.J. (2021). *SPM-2: Sensory Processing Measure, Second Edition* [Manual]. WPS.

Schreck, K. A., Williams, K., & Smith, A. F. (2004). A comparison of eating behaviors between children with and without autism. *Journal of Autism & Developmental Disorders*, *34*(4), 433-438. https://doi.org/10.1023/b:jadd.0000037419.78531.86

Schreck, K. A., & Williams, K. (2006). Food preferences and factors influencing food selectivity for children with autism spectrum disorders [Article]. *Research in Developmental Disabilities*, *27*(4), 353-363. https://doi.org/10.1016/j.ridd.2005.03.005

Shmaya, Y., Eilat-Adar, S., Leitner, Y., Gabis, L. V., & Reif, S. (2017). Meal time behavior difficulties but not nutritional deficiencies correlate with sensory processing in children with autism spectrum disorder. *Research in Developmental Disabilities, 66,* 27-33.

Smith Roley, S., Mailloux, Z., Miller-Kuhaneck, H. & Glennon T. (2007). Understanding Ayres' Sensory Integration. *OT Practice, 12*(7).

Snider, L., Majnemer, A., & Darsaklis, V. (2011). Feeding Interventions for Children With Cerebral Palsy: A Review of the Evidence. *Physical & Occupational Therapy in Pediatrics*, *31*(1), 58–77.

Taylor, C. M., Wernimont, S. M., Northstone, K., & Emmett, P. M. (2015). Picky/fussy eating in children: Review of definitions, assessment, prevalence and dietary intakes [Review Article]. *Appetite*, *95*, 349-359. https://doi.org/10.1016/j.appet.2015.07.026

Vissoker, R. E., Latzer, Y., & Gal, E. (2015). Eating and feeding problems and gastrointestinal dysfunction in Autism Spectrum Disorders [Review Article]. *Research in Autism Spectrum Disorders*, *12*, 10-21. https://doi.org/10.1016/j.rasd.2014.12.010

Voniati, L., Papaleontiou, A., Georgiou, R., & Tafiadis, D. (2021). The Effectiveness of Oral Sensorimotor Intervention in Children with Feeding Disorders. *Current Developmental Disorders Reports*, *8*(4), 201–211. https://doi.org/10.1007/s40474-021-00236-y

Yi, S.-H., Joung, Y.-S., Choe, Y. H., Kim, E.-H., & Kwon, J.-Y. (2015). Sensory Processing Difficulties in Toddlers With Nonorganic Failure-to-Thrive and Feeding Problems. *Journal of pediatric gastroenterology and nutrition*, *60*(6), 819-824. https://doi.org/10.1097/MPG.0000000000000707