Developmental Coordination Disorder/ Dyspraxia

Cortical functioning in children with developmental coordination disorder: a motor overflow study

*Experimental Brain Research*, March 2015

Melissa K. Licari, Jac Billington, Siobhan L. Reid, John P. Wann, Catherine M. Elliott, Anne M. Winsor, Erin Robins, Ashleigh L. Thornton, Randall Jones, Michael Bynevelt

Abstract

This study examined brain activation in children with developmental coordination disorder (DCD) to reveal areas that may contribute to poor movement execution and/or abundant motor overflow. Using functional magnetic resonance imaging, 13 boys with DCD (mean age = 9.6 years ±0.8) and 13 typically developing controls (mean age = 9.3 years ±0.6) were scanned performing two tasks (finger sequencing and hand clenching) with their dominant hand, while a four-finger motion sensor recorded contralateral motor overflow on their non-dominant hand. Despite displaying increased motor overflow on both functional tasks during scanning, there were no obvious activation deficits in the DCD group to explain the abundant motor overflow seen. However, children with DCD were found to display decreased activation in the left superior frontal gyrus on the finger-sequencing task, an area which plays an integral role in executive and spatially oriented processing. Decreased activation was also seen in the left inferior frontal gyrus, an area typically active during the observation and imitation of hand movements. Finally, increased activation in the right postcentral gyrus was seen in children with DCD, which may reflect increased reliance on somatosensory information during the execution of complex fine motor tasks.

Autistic Spectrum Disorder

A comparative study of sensory processing in children with and without Autism Spectrum Disorder in the home and classroom environments,

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Abstract

Sensory processing and higher integrative functions impairments are highly prevalent in children with ASD. Context should be considered in analyzing the sensory profile and higher integrative functions. The main objective of this study is to compare sensory processing, social participation and praxis in a group of 79 children (65 males and 14 females) from 5 to 8 years of age (M=6.09) divided into two groups: ASD Group (n=41) and Comparison Group (n=38). The Sensory Processing Measure (SPM) was used to evaluate the sensory profile of the children: parents reported information about their children’s characteristics in the home environment, and teachers reported information about the same characteristics in the classroom environment. The ASD Group obtained scores that indicate higher levels of dysfunction on all the assessed measures in both
environments, with the greatest differences obtained on the social participation and praxis variables. The most affected sensory modalities in the ASD Group were hearing and touch. Only in the ASD Group were significant differences found between the information reported by parents and what was reported by teachers: specifically, the teachers reported greater dysfunction than the parents in social participation ($p<0.000$), touch ($p<0.003$) and praxis ($p<0.010$). These results suggest that the context-specific qualities found in children with ASD point out the need to receive information from both parents and teachers during the sensory profile assessment process, and use context-specific assessments.

Development of Tests to Evaluate the Sensory Abilities of Children with Autism Spectrum Disorder

Elisabeth Söchtin, Johannes Hartl, Martin Riederer, Christian Schönauer, Hannes Kaufmann, Claus Lamm

ScienceDirect: Available online at: www.sciencedirect.com

Abstract

An emerging line of research attempts to reveal underlying mechanisms of Autism Spectrum Disorder (ASD) by studying differences in sensory processing in individuals with ASD. One sense that has not been studied well yet in this context is proprioception, a sensory system that processes information from muscles and joints about body position and force, and is hypothesized to feed into a body schema that is the foundation for motor planning and purposeful action (praxis). In this paper, we introduce new methods to measure proprioceptive functions of children with ASD. The instruments use force, touch and RGB-D sensors to retrieve data in different test scenarios. Data are transferred to a mobile device or PC and analyzed close to real-time with specifically developed software tools. The instruments were pilot tested with typically developing children to test for functionality and usability of the instruments. They will be used in a larger study with children with ASD.

Clinical differences in children with autism spectrum disorder with and without food selectivity,

Valentina Postorino, Veronica Sanges, Giulia Giovagnoli, Laura Maria Fatta, Lavinia De Peppo, Marco Armando, Stefano Vicari, Luigi Mazzone,

Appetite: Available online 18 May 2015, ISSN 0195-6663, http://dx.doi.org/10.1016/j.appet.2015.05.016.

Abstract

Several studies have described the atypical eating behaviors frequently occurring in children with autism spectrum disorder (ASD), and food selectivity is the most frequent of these problems. The everyday management of mealtime behaviors among children with ASD can have a negative impact on family routines and become a significant stressor for families. However, much remains unknown
about why food selectivity is so prevalent among individuals with ASD. The objective of this study was to investigate clinical and behavioral features in individuals with ASD with the aim of identifying distinctive clinical profiles in children with and without food selectivity. A total of 158 children with ASD were enrolled in this study: 79 participants with food selectivity (FS) were age and sex matched with 79 participants without food selectivity (No FS). All participants and their parents completed a battery of psychological tests for a comprehensive evaluation of ASD symptoms, cognitive abilities, adaptive skills, behavioral problems and parental stress level. No statistically significant difference on gastrointestinal symptoms and growth adequacy was found between the FS group and the No FS group. Overall, the FS group showed significantly higher rates of ASD symptoms as compared to the No FS group in the questionnaires completed by parents. Furthermore, parents of the FS group reported significantly higher levels of parental stress and a larger degree of their children’s behavioral problems as compared to the No FS group. Finally, there were no differences between the FS and the No FS group on any adaptive skill domain. Our findings suggest that the identification of distinctive clinical and behavioral patterns in children with ASD and food selectivity is a crucial issue for parents and therapists in the daily management.

**Psychological Correlates of Sensory Processing Patterns in Individuals with Autism Spectrum Disorder: A Systematic Review**

Magdalena Glod, Deborah M. Riby, Emma Honey, Jacqui Rodgers


Abstract

Existing evidence suggests that there is a relationship between sensory processing difficulties and the clinical and non-clinical features of autism spectrum disorder (ASD). The current review aimed to evaluate evidence of the psychological correlates of sensory processing patterns in individuals with ASD. Primary studies investigating sensory processing patterns in children and adolescents with ASD were identified through systematic searches of electronic databases and evaluated for methodological rigor and reporting quality. In 21 studies, associations between sensory processing patterns and psychological correlates were found. Sensory hyporesponsiveness was correlated with core features of ASD. Social awareness difficulties and affective disorders were associated with hyperresponsiveness. Mixed results were found for repetitive behaviours. Further research is needed to confirm, clarify and extend these finding.

**Feasibility of a Sensory-Adapted Dental Environment for Children With Autism**

Sharon A. Cermak; Leah I. Stein Duker; Marian E. Williams; Christianne Joy Lane; Michael E. Dawson; Ann E. Borreson; José C. Polido

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Abstract

OBJECTIVE. To provide an example of an occupational therapy feasibility study and evaluate the implementation of a randomized controlled pilot and feasibility trial examining the impact of a
sensory-adapted dental environment (SADE) to enhance oral care for children with autism spectrum disorder (ASD).

METHOD. Twenty-two children with ASD and 22 typically developing children, ages 6–12 yr, attended a dental clinic in an urban hospital. Participants completed two dental cleanings, 3–4 mo apart, one in a regular environment and one in a SADE. Feasibility outcome measures were recruitment, retention, accrual, dropout, and protocol adherence. Intervention outcome measures were physiological stress, behavioral distress, pain, and cost.

RESULTS. We successfully recruited and retained participants. Parents expressed satisfaction with research study participation. Dentists stated that the intervention could be incorporated in normal practice. Intervention outcome measures favored the SADE condition.

CONCLUSION. Preliminary positive benefit of SADE in children with ASD warrants moving forward with a large-scale clinical trial.

**Sensory Features as Diagnostic Criteria for Autism: Sensory Features in Autism**

Jordan N. Grapel,* Domenic V. Cicchetti, and Fred R. Volkmar,


Abstract

In this study, we examined the frequency of sensory-related issues as reported by parents in a large sample of school-age adolescents and adults with autism/autism spectrum disorder (ASD) [1] as compared to a group of individuals receiving similar clinical evaluations for developmental/behavioral difficulties but whose final diagnoses were not on the autism spectrum. In no comparison were the features examined predictive of autism or autism spectrum in comparison to the non-ASD sample. Only failure to respond to noises had sensitivity above .75 in the comparison of the broader autism spectrum group, but specificity was poor. While sensory issues are relatively common in autism/ASD, they are also frequent in other disorders. These results question the rationale for including sensory items as a diagnostic criterion for autism.
Effectiveness of sensory integration program in motor skills in children with autism

Amel E. Abdel Karim & Amira H. Mohammed

*Egyptian Journal of Medical Human Genetics (2015)*

Abstract

Background

Autism spectrum disorders (ASDs) represent an extensive category of conditions that had a variety of deficits. Dysfunctions of perceptual and sensory processing as well as interaction and neurological functioning result in various functional behavior limitations.

Aim

The present study aimed to determine the effectiveness of sensory integration program in children with autism.

Methods

Thirty-four children from both sexes suffering from autism spectrum disorders (ASDs) participated in this study. Their age ranged from 40 to 65 months with mean age 53.21 ± 6.87 months. The children were tested pre and post treatment using the Peabody Developmental Motor Scale (PDMS-2) to assess gross and fine motor skills and to identify the effectiveness of sensory integration on the developmental skill levels. Each child received sensory integration program. The sensory integration program was conducted three sessions per week for 6 months.

Results

Comparing the pre and post treatment mean values of the variables measured using PDMS-2, revealed significant improvement in gross and fine motor skills.

Conclusion

The sensory integration therapy was effective in the treatment of autistic children as it helps those children to become more independent and participate in everyday activities.
Early Development

Toward Early Identification of Sensory Over-Responsivity (SOR) A Construct for Predicting Difficulties With Sleep and Feeding in Infants

Simone Thomas, Anita C. Bundy, Deborah Black, Shelly J. Lane,

*OTJR: Occupation, Participation and Health* April 29, 2015

Abstract

Sensory over-responsivity (SOR) is a type of sensory modulation disorder in which heightened sensitivity to non-noxious sensations interrupts daily life. In this preliminary study within a larger investigation, we used infants with sleep/feeding difficulties as a proxy for later development of SOR. We tested evidence for construct validity and internal reliability of pre- and perinatal factors that, together, could predict infant sleep/feeding difficulties. We obtained retrospective data on 360 mother–infant dyads on 38 pre- and perinatal variables and linked the data with infant referral for sleep/feeding difficulties. We analyzed the data with Rasch analysis to examine evidence for a unidimensional construct. Our results show good evidence for a construct comprising 18 of the 38 pre- and perinatal variables examined. This construct may represent a step toward early identification of SOR and provide therapists with evidence to support the use of pre- and perinatal information as predictors of infant sleep/feeding difficulties.

Atypical sensory processing is common in extremely low gestational age children.


Abstract

Aim

Atypical sensory processing is common in children born extremely prematurely. We investigated sensory processing abilities in extremely low gestational age (ELGA) children and analysed associated neonatal risk factors, neuroanatomical findings and neurodevelopmental outcome.

Methods

We carried out a prospective study of 44 ELGA children, including 42 who had undergone brain magnetic resonance imaging (MRI) at term-equivalent age, when they were 2 years of corrected age. Their sensory processing abilities were assessed with the Infant/Toddler Sensory Profile questionnaire and their neurodevelopmental with a structured Hempel neurological examination, Griffiths Mental Developmental Scales and Bayley Scales of Infant and Toddler Development Third Edition.

Results
Sensory profiles were definitely or probably atypical (<−1 SD) in half of the ELGA children, and the most common behavioural pattern was low registration (23%). Sensation seeking was associated with abnormalities in grey and/or white matter in the brain MRI (p < 0.01). Atypical oral sensory processing was associated with surgical closure of the patent ductus arteriosus (p = 0.02, adjusted p < 0.01).

Conclusion

Atypical sensory processing in ELGA children was common, and children with neonatal neuroanatomical lesions tended to present specific behavioural responses to sensory stimuli. Surgical closure of the patent ductus arteriosus may predispose infants to feeding problems due to atypical oral sensory processing.

Effect of infant and maternal sensory processing on infant fussing, crying and sleep

Kate McGeorge, Lisa Milne, Louise Cotton and Tom Whelan


Abstract

This study investigated the effects of infant and maternal sensory processing on sleep, fussing, and crying in a sample of 55 firstborn, 4- to 7-month-old infants and their mothers. Mothers completed self-report questionnaires to assess maternal and infant sensory processing styles and a 4-day diary of infant behavior, including sleep, fussing, and crying. Higher levels of infant Sensation Avoiding were associated with less sleep, more fussing, and more crying whereas higher levels of Sensory Sensitivity were associated with less sleep and more fussing. The positive association between infant Sensation Avoiding and crying was strengthened by lower levels of Low Registration in mothers. The effect of infant Sensory Sensitivity on reducing total sleep also was strengthened by lower levels of maternal Low Registration. Assessment of infant sensory processing as well as the moderating effect of maternal sensory processing on the relationship between infant sensory processing and infant regulatory capacities need to be considered when assessing and designing interventions for families in which infant regulation is problematic.

Sensory Processing Disorder in Children Ages Birth–3 Years Born Prematurely: A Systematic Review

Anita Witt Mitchell; Elizabeth M. Moore; Emily J. Roberts; Kristen W. Hachtel; Melissa S. Brow

*AJOT*, 69 2014

This systematic review of multidisciplinary literature synthesizes evidence of the prevalence and patterns of sensory processing disorder (SPD) in children ages birth–3 yr born preterm. Forty-five articles including physiological, behavioral, temperament, and SPD research met the inclusion criteria and provided 295 findings related to SPD—130 (44%) positive (evidence of SPD) and 165 (56%) negative (no evidence of SPD). The majority of findings related to sensory modulation disorder (SMD;
43% positive). The most prevalent subcategory of SMD was sensory overresponsivity (82% of findings positive). Evidence of sensory underresponsivity and sensory-seeking SMD, sensory discrimination disorder, and sensory-based motor disorder was limited. This study supports the education of neonatologists, pediatricians, and caregivers about the symptoms and potential consequences of SPD and helps justify the need for follow-up screening for SPD in children ages birth–3 yr born preterm. Research using measures based on sensory processing theory is needed.

**Neuroscience**

**Smell and Taste Dysfunction as Early Markers for Neurodegenerative and Neuropsychiatric Diseases**

Tiffany Field

*J Alzheimers Dis Parkinsonism* 2015, 5:1

**Abstract**

During the last few decades a significant literature has evolved, suggesting that sensory dysfunction, particularly smell and taste dysfunction, can be early markers for neurodegenerative diseases such as Parkinson’s and Alzheimer’s and neuropsychiatric diseases including ADHD and Schizophrenia, all diseases that involve dopaminergic pathology. Smell loss and taste dysfunction appear in clinical versus non-clinical groups, and in longitudinal studies these symptoms have been noted years earlier than motor signs in the first degree relatives of individuals who already have the diseases. This paper is a review of the recent literature on empirical studies and reviews that have documented the results of sensory screenings of several groups with neurodegenerative and neuropsychiatric diseases and those first-degree relatives at risk for those diseases. Although early biomarkers could be useful in identifying those needing preventive intervention, the treatment literature is very limited.

**Effects of Deep Pressure Stimulation on Physiological Arousal**

Stacey Reynolds; Shelly J. Lane; Brian Mullen

*American Journal of Occupational Therapy*, April 2015, Vol. 69,

**Abstract**

Deep pressure stimulation has been used in therapeutic practice because of the assumption that it changes physiological arousal. The purpose of this study was to test the effects of deep pressure stimulation, applied with a Vayu Vest (Therapeutic Systems), on both autonomic arousal and performance in a normative adult sample. A repeated-measures, repeated-baseline design was used with participants completing a performance test before and after deep pressure application. A convenience sample of 50 adults participated in the study. Results showed that wearing the Vayu Vest for even short periods of time reduced sympathetic arousal and non–stimulus-driven electrical occurrences. Concomitant increases in parasympathetic arousal were found. Performance
improvements were noted after wearing the Vayu Vest, potentially because of changes in arousal. We conclude that deep pressure stimulation is capable of eliciting changes in autonomic arousal and may be a useful modality in diagnostic groups seen by occupational therapy practitioners.

Sensory Integration/Processing and Mental Health

Study of Relationship between Behavioral and Emotional Aspects of Working Memory and Symptoms of Sensory Processing Disorder, Behavioral Disorders and Social Skills

Zohreh Sadat Moeeni, Farnaz Keshavarzi Arshadi, Parvaneh Behrouzmanesh


Abstract

The aim of this study is to examine the relationship between behavioral and emotional aspects of working memory and symptoms of sensory processing disorder, behavioral problems and social skills. This study is descriptive (correlational) in terms of data collection and applied in terms of its objectives. The population consisted of all third to sixth grade female students studying in Tehran primary schools in school year 2012-13. The sample size, which was determined by Morgan Table, comprised of about 200 subjects who were selected through random multistage cluster sampling. Data collection instruments included questionnaires of working memory related behaviors by "Dunn", Sensory Processing Disorder (SPD), behavioral disorders of "Achenbach" and social skills. The results showed that social skills were not related to working memory related behaviors and sensory processing disorder. The relationship between different types of behavior disorder and working memory was significant at the level of 0.01 with the lowest correlation belonging to physical problems and anxiety and the highest correlation belonging to attention deficit hyperactivity disorder and emotional problems. The relationship between sensory processing disorder and working memory related behaviors was significant at the level of 0.01. Sensory processing disorder and self-regulation explained 30% and 35% of variations in working memory behavior. Also, there was no significant difference between age and educational grade of studied students in terms of scores of working memory behaviors and sensory processing disorder.

Predicting fears of intimacy among individuals with post-traumatic stress symptoms by their sensory profile
Abstract

Introduction

The purpose of the research was: (1) to compare fears of intimacy between people with post-traumatic stress symptoms and healthy controls; (2) to examine the relationships between sensory processing patterns and fears of intimacy among people with post-traumatic stress symptoms; (3) to examine the ability of post-traumatic stress symptoms and sensory processing patterns to predict fears of intimacy.

Method

The study consisted of 60 people between 24 and 62 years old. Thirty of the participants had post-traumatic stress symptoms and the other 30 were healthy controls. All participants were involved in an intimate relationship. Participants completed the Post-traumatic Stress Disorder Symptom Scale, the Adolescent/Adult Sensory Profile, and the Fear of Close Personal Relationship Questionnaire.

Findings

Higher prevalence of extreme sensory sensitivity, avoidance, and low registration was found among the study group. These patterns significantly correlated with impaired emotional responses associated with intimacy. Low registration and group membership predicted fears of intimacy.

Conclusion

Sensory processing difficulties may contribute to the impaired intimate relationships of people with post-traumatic stress symptoms. Occupational therapists may help people with post-traumatic stress symptoms to be aware of their sensory processing difficulties and their impact on social/intimate relationships. This awareness may contribute to the person’s ability to cope with post-traumatic stress symptoms, enable better emotional performance, and elevate quality of life.
Abstract

Introduction

Growing evidence suggests that an individual's style of processing sensory information plays a role in affective disorders. However, most of this work focuses on the relationship between sensory hypersensitivity and factors related to internalizing disorders. This study explores the association between sensory processing styles and impulsivity, a fundamental feature of externalizing disorders, in healthy adults.

Method

Two hundred and twenty-six healthy individuals aged 18–60 years completed the adolescent/adult sensory profile, Barratt impulsiveness scale, and a computerized response inhibition task (go/no-go task).

Findings

Low registration sensory processing scores were positively correlated with Barratt impulsivity scores. In addition, individuals high in low registration were more likely to meet criteria for high impulsivity. Individuals higher in sensory sensitivity made more impulsive errors on the response inhibition task.

Conclusion

The findings suggest that individuals with low registration are more impulsive. When helping clients manage impulsivity, occupational therapists should consider their sensory processing patterns and utilize interventions that address sensory needs. Future studies should examine these associations in clinical populations characterized by high rates of impulsive behavior.

The relationship between children’s sensory processing patterns and their leisure preferences and participation patterns

Noor T. Ismael, Lisa A. Mische Lawson, and Jane A. Cox

Abstract

Background.

Sensory processing patterns may be associated with children’s preferences for different activities; however, knowledge about how different sensory processing patterns may relate to children’s participation in leisure activities is scarce.

Purpose.
This study investigated in what leisure activities children with extreme sensory processing patterns participate and if relationships exist between children’s sensory processing patterns and their leisure preferences and participation patterns.

Method.

This correlational study analyzed data from children’s Sensory Profiles and reported play and leisure preferences. All 91 children in the sample completed the Children’s Assessment for Participation and Enjoyment (CAPE) and the Preferences for Activities of Children (PAC). Parents of children ages 6 to 10 years completed the Sensory Profile, and children ages 11 to 14 years completed the Adolescent/Adult Sensory Profile.

Findings.

Children with different sensory processing patterns preferred both similar and distinct leisure activities. Low-registration quadrant summary z scores negatively correlated with CAPE overall diversity scores ($r_s = -0.23, p < 0.03$), sensitivity quadrant summary z scores negatively correlated with preferences for social activities ($r_s = -0.23, p < 0.03$) and preferences for skill-based activities ($r_s = -0.22, p < 0.04$), and avoiding quadrant summary z scores negatively correlated with preferences for social activities ($r_s = -0.26, p < 0.01$).

Implications.

Children’s sensory preferences are related to leisure preferences and participation.

**Intervention**

**Observation of Classroom Performance Using Therapy Balls as a Substitute for Chairs in Elementary School Children**

Molly E Burgoyne, Caroline J Ketcham,


**Abstract**

Many classrooms are beginning to substitute standard chairs with therapy balls, which help to improve students’ focus and classroom performance, according to teacher and student reports. Researchers conducted an observational study in a classroom at a local elementary school that implemented therapy balls. For each hour-long observation, three independent researchers marked seated behaviors of students ($N=19$). The first observation was conducted when students were using standard chairs, and two more were conducted when students used therapy balls during classroom activities. Researchers observed the behaviors of students on the given seating device, including academic task (on/off task), effort level, attitude, interactions, seated behaviour (bouncing/rocking/stationary/other), and intensity level of participation in classroom activities. Analysis of the collected data demonstrates that 50% of observations when students were seated on standard chairs indicated on task behavior, while 85% of observations when students were seated on
therapy balls were recorded as on task behavior. In addition, movement while seated increased on the therapy balls (35% of observations indicated stationary seated behavior) compared to the standard chairs (47% observations indicated stationary seated behavior). The increased rocking and bouncing seated behavior on the therapy balls suggests that the seating device helps to engage the vestibular system. In addition, stationary behavior on therapy balls was often classified as proprioceptive. The results from the observational study will allow researchers to further investigate whether or not engaging the vestibular system can help to improve performance on functional school skills.

Optimising occupational performance through sensory modulation interventions: Case reports of two young adults diagnosed with juvenile Huntington's disease

Anahita Brown, Caroline Fisher

*British Journal of Occupational Therapy* May 13, 2015

Abstract

Statement of context People with juvenile Huntington’s disease often experience difficulty engaging in occupations due to neuropsychiatric sequelae, such as impulse control difficulties, agitation and aggression. Occupational therapy using sensory modulation intervention strategies may be utilised to assuage behavioural symptoms in this population. Critical reflection on practice Through case reports, this practice analysis explores changes in occupational performance for two young adults diagnosed with juvenile Huntington’s disease who received sensory modulation treatment Implications for practice These inspiring reports could encourage occupational therapists to consider sensory modulation intervention to decrease psychiatric disturbance, thus optimising performance capacity among this rare population.

Evaluation in everyday occupational therapy practice: Should we be thinking about treatment fidelity?

*British Journal of Occupational Therapy* May 2015 vol. 78 no. 5 331-333

Jenna Breckenridge, Derek Jones

Abstract

Evaluation is a core component of the occupational therapy process. To draw meaningful conclusions about the effectiveness of occupational therapy practice, it is essential that therapists consider not only what outcomes are achieved, but also reflect on how interventions are delivered. We suggest that incorporating the concept of ‘treatment fidelity’ into clinical practice offers therapists a means of differentiating between interventions and demonstrating clearer links between occupational therapy practice and successful client outcomes. In so doing, practitioners can highlight more explicitly the unique contribution of occupational therapy interventions.