Rocking Studies on Autism, ASD, & related therapies

Compiled by John Huff • 641 472 6651 • Floating Bed Co • www.floatingbed.com
Essential findings are in **bold**. (Earlier studies, especially circa 1970-80, use different/less correct language to describe the children and the conditions.)

Background, and general information about Vestibular Motion Therapy:

The vestibular system is the sensory system that responds to the position of the head in relation to vestibular motion, specifically, gravity and accelerated or decelerated motion. The vestibular system is found in the cerebellar area of the brain and influences righting reactions, muscle tone, standing balance, ocular orientation, visual perception, general arousal/attention, and neck and head orientation. Brain damage to individuals may interfere with the organization of the central nervous system, and, in particular, the vestibular system.
Vestibular damage is found in a number of disorders, including, but not limited to, **autism**, developmental delay of unknown origin, cerebral palsy, traumatic brain injury, attention deficit disorder, stroke, blindness, and hearing impairment.

Research has shown many benefits from vestibular motion therapy for Autism and other disorders including decreased self stimulation, decreased hypersensitivity, increased postural security, increased concentration & attentiveness, increased balance, body awareness, calming effects, reduction of abnormal muscle tone at slow speeds & increased alertness at high speeds.
A few such studies are referenced below.

Background, and/or general information about SIT (Sensory Integration Therapy):

Sensory Integrative Dysfunction (SID) - SID is a disorder in which sensory input is not integrated or organized appropriately in the brain. Main symptoms of SID look like symptoms of other disabilities that include Fragile X, ADHD, ADD, Autism, Pervasive Development Disorder (PDD), and Tourette Syndrome.

Sensory Integration Therapy (SIT) - SIT is a theory used by occupational therapists. It is one approach used by therapists as part of a comprehensive & individualized intervention program. Its principles have been recommended for & applied to autism, learning disabilities, attention problems, and developmental problems like Fragile X. Rocking in a rocking chair is one of the calming activities recommended. Sensory integration intervention is based on a neurophysiological view of autism.

The late A. Jean Ayres, Ph.D. of the US, developed the theory and practice of sensory integration. She believed every autistic child should have a rocker in his room.

Vestibular Stimulation: Effects on Visual and Auditory Alertness in Children with Multiple Disabilities

Journal Journal of Developmental and Physical Disabilities
Publisher Springer Netherlands
ISSN 1056-263X (Print) 1573-3580 (Online)
Issue Volume 13, Number 4 / December, 2001
DOI 10.1023/A:1012229327941
Pages 333-341
Subject Collection Behavioral Science
SpringerLink Date Monday, November 01, 2004

Allen G. Sandler1 Contact Information and Karen Voogt1
(1) Child Study Center, Old Dominion University, Norfolk, Virginia

Abstract: Although vestibular stimulation has been related to increased alertness in both preterm infants and healthy full-term infants, empirical data indicating the effect of vestibular stimulation on alertness in children with multiple disabilities are lacking. In this study we investigated the effect of a brief period of rocking on visual and auditory alertness in children with severe multiple disabilities.
The children's performance on one of the five tasks assessed (tracking a noise-making toy) was significantly better following a 3 min session of rocking in an adaptive swing. This finding is discussed relative to the need for additional research on the effects of vestibular stimulation.

alertness - multiple disabilities - vestibular stimulation
Contact Information Allen G. Sandler
Email: asandler@odu.edu

Vestibular swinging increases the postural stability of autistic children.

https://www.ncbi.nlm.nih.gov/pubmed/25374155

Phys Occup Ther Pediatr. 2015;35(4):365-80. doi: 10.3109/01942638.2014.975313. Epub 2014 Nov 6.

Using Posturography to Examine the Immediate Effects of Vestibular Therapy for Children with Autism Spectrum Disorders: A Feasibility Study.

Smoot Reinert S[1], Jackson K[2], Bigelow K[1].
Author information

Abstract
AIMS:
The primary objective of this study was to determine the feasibility of using posturography to monitor acute changes in postural control induced by a Sensory Integration (SI) therapy intervention. A secondary objective was to identify which posturography outcome parameters, tests conditions and data analysis methods might be most useful in identifying post-intervention changes.

METHODS:
Five children with Autism Spectrum Disorder (ASD) and five children with typical development (TD) participated in a 10 min vestibular swing activity and had their postural stability evaluated pre- and post-

intervention under four different sensory testing conditions. Sway ranges, mean sway velocity, sway root mean square (RMS), and sample entropy were calculated from center of pressure (COP) data.

RESULTS:
All five children with ASD demonstrated decreased mean sway velocity in the eyes open/flat plate condition post-intervention with an average decrease of 5.87 ± 2.69 mm/s. Four of the five children with ASD demonstrated an increase in RMS and a decrease in anterior/posterior sample entropy post-intervention in the eyes closed, foam pad condition and eyes open, flat plate condition respectively.

CONCLUSION:
Posturography may be useful for assessing acute physiologic responses to an SI therapy intervention and warrants further investigation.

KEYWORDS:

Autism spectrum disorder; postural stability; posturography; sensory integration therapy; vestibular swing

PMID: 25374155 DOI: 10.3109/01942638.2014.975313

Magrun, M., Ottenbacher, K., McCue, S., & Keefe, R. (1981). **Effects of vestibular stimulation on spontaneous use of verbal language in developmentally delayed children.** *American Journal of Occupational Therapy*, 2, 101-104.
Subjects: 5 mentally retarded preschoolers with severe language delay (age 3—6), 5 trainable mentally retarded (ages 6-10)
Design/Treatment:: Single subject ABAB design. Each treatment (Phase B) consisted of 10 minutes per day for 5 days of vestibular stimulation activities (3 activities from which subject chose).
Outcome Measures: Verbal responses recorded each day during a 5 minute free play situation (following treatment).
Results: Eight of 10 participants showed an increase in frequency of verbal response from baseline 1 to treatment 1. Nine of ten participants showed increase from baseline 2 to treatment 2. Decrease in verbal responses seen in treatment withdrawal phase.

(Book related to study above) –
Vestibular Processing Dysfunction in Children
By Kenneth J. Ottenbacher, Margaret

Clinical Pediatrics, Vol. 23, No. 8, 428-433 (1984)
DOI: 10.1177/000992288402300802
The Efficacy of Vestibular Stimulation as a Form of Specific Sensory Enrichment
Quantitative Review of the Literature
Kenneth J. Ottenbacher, PhD

2120 Medical Science Center, 1300 University Avenue, Madison, WI 53706
Paul Petersen, PhD

The application of recently developed, quantitative literature reviewing methods (**meta-analysis**), detailed in the companion article in this issue,1 is illustrated by examining the results of studies that explored the effectiveness of vestibular stimulation as a form of sensory stimulation.

Sixty- seven studies were located that employed some form of vestibular stimulation as the independent variable. Fourteen of these studies met criteria consistent with traditionally accepted standards of empirical inquiry in the behavioral and biomedical sciences and were included in the review. The 14 studies contained 31 hypothesis tests that evaluated the efficacy of vestibular stimulation as a form of sensory enrichment designed to facilitate various developmental parameters.

An analysis of the results of these tests, using quantitative reviewing methods, revealed that subjects receiving vestibular stimulation performed significantly better than members of control or comparison groups who did not receive such stimulation.

We can begin to answer questions of efficacy using research reports which currently exist when that research is properly synthesized by the quantitative review method. The use of quantitative reviewing procedures is recommended to help establish a consensus when synthesizing conflicting research literature in the behavioral and biomedical sciences.

William E. MacLean Jr.1 and Alfred A. Baumeister1
(1) Vanderbilt University, USA
Revised: 29 September 1981
Abstract Four developmentally delayed babies were given semicircular canal stimulation (**motion**) in an effort to facilitate their motor and reflex development. Each of the children also exhibited abnormal stereotyped movements. The theory was advanced that these movements are related to motor development and that significant improvements in motor abilities will produce changes in the intensity and/or form of stereotypic responding. Semicircular canal stimulation was provided by rotating the children in a motor-driven chair at a velocity of about 17 rpm for 10 minutes daily over a period of 2 weeks. Standard motor and reflex measures were taken before, during, and after the rotation treatment period. Daily observations were made of the children"s stereotyped movements.

Over the course of the study all of the children showed motor and/or reflex changes that were attributable to the vestibular stimulation. In addition, some evidence was obtained linking changes in stereotypic responding to the vestibular stimulation.
This work was supported by PHS Grant Nos.HD15051 and HD13344.

Science 10 June 1977:
Vol. 196. no. 4295, pp. 1228 – 1229 DOI: 10.1126/science.300899
Science, Vol 196, Issue 4295, 1228-1229

Vestibular stimulation influence on motor development in infants
DL Clark, Kreutzberg JR, and FK Chee

Preambulatory, normal human infants were exposed to sessions of mild semicircular canal stimulation on 2 days per week for 4 weeks. The gross motor ability of each child was assessed before and after the 4-week period.
The vestibular stimulation effected a significant improvement in gross motor skills.

< THIS ARTICLE HAS BEEN CITED BY these following ARTICLES:

Feeling the Beat: Movement Influences Infant Rhythm Perception.
J. Phillips-Silver and L. J. Trainor (2005)
Science 308, 1430
| Abstract » | Full Text » | PDF »

The Role of Motor Stimulation in Parental Ethnotheories: The Case of Cameroonian Nso and German Women.
H. Keller, R. D. Yovsi, and S. Voelker (2002)
Journal of Cross-Cultural Psychology 33, 398-414
| Abstract » | PDF »

The Developmental Niche: A Conceptualization at the Interface of Child and Culture.
C. M. Super and S. Harkness (1986)
International Journal of Behavioral Development 9, 545-569
| Abstract » | PDF »

The Efficacy of Vestibular Stimulation as a Form of Specific Sensory Enrichment: Quantitative Review of the Literature.
K. J. Ottenbacher and P. Petersen (1984)
Clinical Pediatrics 23, 428-433
| Abstract » | PDF »

Wells, M.E., & Smith, D.W. (1983). **Reduction of self-injurious behavior of mentally retarded persons using sensory integrative techniques**. *American Journal of Mental Deficiency*, p2, 664—666.
Subjects: 4 profoundly retarded multiply handicapped institutionalized adults.
Design/Treatment:: Single case experimental AB design. 4 weeks baseline observation
treatment. Five 30 minute SI sessions per week.
Outcome Measures: Frequency of self-injurious behavior (head slapping, hitting and biting hands, etc.).
Results: Frequency of self injurious behavior, as documented by direct—care staff members throughout the day, decreased significantly for all subjects.

LEARNING DISABILITIES

Ayres, A.J. (1972) . Improving academic scores through sensory integration. *Journal of Learning Disabilities*, 24-28.
Subjects: 148 LD Ss from which the following groups were formed: 30 Experimental and 30 Control Ss with generalized exclusively auditory language problems. (Average age of groups — 8 years)
Design/Treatment:: Experimental design. Experimental group received SI for25-40 minutes per day, 5 days a week for 5-6 months.
Outcome Measures: Academic: Wide Range Achievement Tests Slosson Oral Reading Test; Language: Illinois Test of Psycholinguistic Abilities; Other: SCSIT

Results: Both Experimental groups show improvement in academic and language variables. Some measures show trend, some reach significance.

Ayres, A.J. (1977).
Effect of sensory integrative therapy on the coordination of children with chore-athetoid movements. *American Journal of Occupational Therapy*, 31, 291-293.
Subjects: Sample of 54 LD Ss with a mild choreoathetosis (from Ayres 1978 study).
Ss divided into 2 groups - 31 Ss in Experimental group, 23 Ss in Control group. Mean age 8 years.
Design/Treatment:: Children in Experimental group seen individually or in pairs for SI therapy 1/2 hour per day, 5 times a week for 6 months. Control Ss stay in classroom.
Outcome Measures: Eye—hand coordination (MAC)
Results: Therapy group shows greater improvement than classroom control (p<.06)

Ayres, A.J. (1978).
Learning disabilities and the vestibular system. *Journal of Learning Disabilities*, 11, 30 -41.
Subjects: 128 LD Ss ages 6-10 from which 2 groups were drawn:
46 Experimental, 46 Control (Mean age — 8 years)
Design/Treatment:: Experimental group received SI for 1/2 hour per day, 5 days a week for 5 months. Control Ss stay in classroom.
Outcome Measures: Academic: Wide Range Achievement Tests, Slosson Oral Reading Test; Auditory Language: Flowers Costello Test of Central Auditory Abilities; Other: MAC and DC of SCSIT, SCPNT
Results: Hyporeactivity to rotation (PRN duration) predictive of academic success (WRAT scores)

Kenneth Leslie and Robert Ogilvie
Vestibular Dreams: The Effect of Rocking on Dream Mentation
Dreaming: Journal of the Association for the Study of Dreams. Vol 6(1) 1-16, Mar 1996.
A rocking by time interaction was found: rocking increased lucid mentation during

early morning REM periods… These results suggest that vestibular activation during REM sleep can influence dream mentation, specifically, dream self-reflectiveness and vestibular imagery.

Motor Development after Vestibular Deprivation in Rats
Hildegard C. Geisler* and Albert Gramsbergen
Medical Physiology, Developmental Neurology, Bloemsingel 10, 9712 KZ Groningen, The Netherlands Available online 13 July 1998.
Abstract
GEISLER, H.C. AND A. GRAMSBERGEN. Motor development after vestibular deprivation in rats. NEUROSCI BIOBEHAV REV 22(4) 565–569, 1998.—This review summarizes the postural development in the rat and the influences of vestibular deprivation from the 5th postnatal day on this development.

Vestibular deprivation leads to a delay in motor development.
Most probably this delay is caused by a delay in the development of postural control, which is characterized by a retarded EMG development in postural muscles. **Our results indicate that the developing nervous system cannot compensate for a vestibular deficit during the early phase of ontogeny.**

(End of studies)

The following pages are NOT all necessarily studies, but have useful, related information, gleaned from web sites, articles, therapists' experiences, or other sources.

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Research indicates that approximately 56% of developmentally delayed individuals present with sleep-related issues (e.g., difficulty falling asleep at night, early waking). It has also been demonstrated that children with autism do not tend to "grow out" of their sleeping difficulties.

Attempt to determine what is "causing" or maintaining your child's sleep difficulties (e.g., attention seeking, anxiety, medical issues). This will help you decide which strategies to use.

Attempt to establish a consistent bedtime routine. The child's activity level should be gradually reduced over the course of the evening. It is also helpful to include "calming" activities such as warm baths, towel rub downs, and lotion applications in the routine. **Deep pressure and gentle rocking can also have a calming effect on children with autism.**

Parent Skill Building ; Treatment suggestions for sleeping difficulties
by Kim Ward, Psychologist

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http://www.bbbautism.com/sensory_integration.htm
Clinics often have swings For proprioceptive problems:
Swinging (clinics often use a big therapy swing that lets the person swing in a prone position).

Dr. Lucy Jane Miller, director of the Knowledge in Development Foundation, KID
(- she seems to be a possible additional information resource.)

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http://www.nytimes.com/2008/04/08/health/08patt.html

Patterns: Heavy Burden for Infants Who Lack Sleep
By NICHOLAS BAKALAR Published: April 8, 2008

Infants who do not get enough sleep may have an increased risk for being overweight in childhood, a new study suggests.

Researchers recorded the sleep habits of 915 children at ages 6 months, 1 year and 2 years, using questionnaires and in-person interviews. At each visit, they recorded the infants' length and weight and had parents report on the number of hours their children watched television or videos.

The study, published on Monday in The Archives of Pediatrics and Adolescent Medicine, found that the more sleep infants got, the less likely they were to be overweight at age 3. Infants who slept less than 12 hours a day had double the risk of being overweight compared with children who slept more. The effect was especially apparent in children who also watched more than two hours of tv a day.

The relationship held after adjusting for birth weight, mother's age & body mass, breast feeding duration and other variables. The authors say this is the first study to report an association between infant sleep time & children's being overweight.

What's a parent to do? "Most important is to practice good sleep hygiene techniques," said Dr. Elsie M. Taveras, the lead author and an assistant professor of pediatrics at Harvard, who is herself the mother of an infant and a toddler. "No TV in the bedroom, no caffeinated drinks and so on. Getting a good night's sleep is not just to be at our best the next day; it's really to assure good health."

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(from Napshell web site)

Numerous studies from famous institutions have proven the effectiveness of power-napping. Marc Rosenkind conducted a study for NASA that proved reaction time can improve by up to 16% & loss of concentration can be reduced by up to 34%.
The creativity-boosting nap counteracts the biorhythmic midday-low and significantly increases efficiency.
In the lower Saxon city of Vechta, the city administration has introduced power-napping with considerable success: its 100 employees are healthier, which means statistically they are less absent due to sickness and work more effectively.
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Article:
http://www.thestamfordtimes.com/stamford_templates/stamford_story/312620555476306.php
McKay's 13-year-old son has Asperger Syndrome, a type of high-functioning autism. It was because of his son that he purchased the $200,000 machine from its developer, Mary Bolles of the Sensory Learning Center in Boulder, Colo. Joey Lombardi is a patient at Darien's Sensory Training Institute, which is managed by Stamford resident Steven Freedman. The therapy places patients on a gently moving bed. The motion, which is circular, is intended to relax the patient. While the bed moves, the patient watches colored lights moving above the bed and listens to music, played at different frequencies through headphones.

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Autism (see Sensorial)

The ARI (Autism Research Institute), always evaluating all forms of therapy, in recent years has seen an increase in interest of SIT for autistic adults and children.
In treatment evaluation questionnaires that were administered, parents give sensory integration a very high percentage of 69% approval, with the highest of 47 therapies being Behavior Modification at 83%.

Lorna Jean King (OTR, FAOTA) is one of the pioneers of Sensory Integration Therapy, lectures internationally, and is the Founder and Director of the Center for Neurodevelopmental Studies, Inc. in Phoenix, Arizona. When interviewed by the ARI she was asked about the importance of providing security and setting a calm tone in the home environment, especially after a busy day of schooling or therapy.

She responded, **"It may be as simple as having a rocking chair in their room".**

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Vestibular & Proprioceptive System issues, observations, treatments:
The Autism Research Institute.
http://www.autism.org/si.html