

## REFERENCES

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- Braswell J and Rine R (2006) Evidence that Vestibular Hypofunction Affects Reading Acuity in Children. *International Journal of Pediatric Otorhinolaryngology* Vol 70 Issue 11, 1957-1965. Study results found that reading acuity scores were significantly worse in children with vestibular hypofunction, and that reading acuity scores correlated with dynamic not static visual acuity scores. This reports high lights that gaze instability due to vestibular hypofunction affects reading ability in young children.
- Braswell J and Rine R (2006) Preliminary Evidence of Improved Gaze Stability Following Exercise in Two Children with Vestibular Hypofunction. *International Journal of*

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Case-Smith, J. (1996). Fine motor outcomes in preschool children who receive occupational therapy services. *American Journal of Occupational Therapy*, 50(2), 5260.

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Case-Smith J (2007) Effectiveness of school-based occupational therapy intervention on handwriting. *American Journal of Occupational Therapy* ;56 (1):1725  
**OBJECTIVE:** This study investigated the effects of school-based occupational therapy services on students' handwriting. **METHOD:** Students 7 to 10 years of age with poor handwriting legibility who received direct occupational therapy services (n = 29) were compared with students who did not receive services (n = 9) on handwriting legibility and speed and associated performance components. Visuomotor, visual perception, in-hand manipulation, and handwriting legibility and speed were measured at the beginning and end of the academic year. The intervention group received a mean of 16.4 sessions and 528 min of direct occupational therapy services during the school year. According to the therapists, visuomotor skills and handwriting practice were emphasized most in intervention. **RESULTS:** Students in the intervention group showed significant increases in in-hand manipulation and position in space scores. They also improved more in handwriting legibility scores than the students in the comparison group. Fifteen students in the intervention group demonstrated greater than 90% legibility at the end of the school year. On average, legibility increased by 14.2% in the students who received services and by 5.8% in the students who did not receive services. Speed increased slightly more in the students who did not receive services. **CONCLUSION:** Students who received occupational therapy services demonstrated improved letter legibility, but speed and numeral legibility did not demonstrate positive intervention effects.

Case-Smith J (2007) Effects of occupational therapy services on fine motor and functional performance in preschool children. *American Journal of Occupational Therapy* ;54 (4):372-80  
**PURPOSE:** This study examined how performance components and variables in intervention influenced fine motor and functional outcomes in preschool children. **METHOD:** In a sample of 44 preschool-aged children with fine motor delays who received occupational therapy services, eight fine motor and functional performance assessments were administered at the beginning and end of the academic year. Data on the format and intervention activities of each occupational therapy session were recorded for 8 months. **RESULTS:** The children received a mean of 23 sessions, in both individual

and group format. Most of the sessions (81%) used fine motor activities; 29% addressed peer interaction, and 16% addressed play skills. Visual motor outcomes were influenced by the number of intervention sessions and percent of sessions with play goals. Fine motor outcomes were most influenced by the therapists' emphasis on play and peer interaction goals; functional outcomes were influenced by number of sessions and percent of sessions that specifically addressed selfcare goals.

**CONCLUSION:** The influence of play on therapy outcomes suggests that a focus on play in intervention activities can enhance fine motor and visual motor performance.

Christakis D, Zimmerman F, DiGiuseppe and McCarty C (2004) Early Television Exposure and Subsequent Attentional Problems in Children. *Pediatrics* Vol 113, 708-713. This study reports that for every one hour of television watched per day, there is a 10% increase in attention problems by the age of 7 years.

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Cornhill, H. & CaseSmith, J. (1996). Factors that influence good and poor handwriting. *American Journal of Occupational Therapy*, 50 (9), 732738.

Cotman C, Berchtold N and Christie L (2007) Exercise Builds Brain Health: Key Roles of Growth Factor Cascades and Inflammation. *Trends in Neuroscience* Vol 30 No 9, 464-472. This research profiles how exercise improves cerebral vascular perfusion, increases the production of neurogenic growth factor, and decreases inflammation with subsequent increase in the number and length of survival of nerve cells in the hippocampal region, implicated in learning and memory. This article also shows the positive effects of exercise on reducing depression.

Effectiveness of schoolbased occupational therapy intervention on handwriting. *The American Journal of Occupational Therapy*, 56 (1), 1725.

Cermak, S.A. & Henderson, A. (1989). The efficacy of sensory integration procedures. *Sensory Integration Quarterly Newsletter*, XVII, (4).

Cermak, S.A. & Henderson, A. (1990). The efficacy of sensory integration procedures. *Sensory Integration Quarterly Newsletter*, XVIII, (1).

Clark, F. & Pierce, D. (1988). Synopsis of pediatric occupational therapy effectiveness. *Sensory Integration News*, 16(2). Cook, T.D. & Campbell, D.T. (1979).

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Fisher, A.G. & Bundy, A.C. (1991). The interpretation process. In A.G. Fisher, E.A. Murray & A.C. Bundy (Eds.), *Sensory integration: Theory and practice*. Philadelphia: F.A. Davis Co.

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Graham, S. (1983). The effect of self-instructional procedures on LD students' handwriting performance. *Learning Disability Quarterly*, 6, 231-234.

Hannaford, Carla (1997) *The Dominance Factor: How Knowing Your Dominant Eye, Ear, Brain, Hand, and Foot Can Improve Your Learning*. Great River Books Publishing, Utah. This book explores the linkages between the side of the body we favor for seeing, hearing, touching, and moving, and the way we think, learn, work, play and relate to others. Hannaford describes 32 dominance profiles and how each profile relates to learning and behavior styles.

Graham S, Harris K, Mason L, Fink-Chorzempa B, Moran S, Saddler B (2008) How Do Primary Grade Teachers Teach Handwriting? A National Survey. To be published in *Reading and Writing: An Interdisciplinary Journal*. This US study reports that 90% of US primary school teachers' college education did not adequately prepare them to provide lessons in penmanship, and therefore do not devote much time to teaching printing. Teachers spend an average 14 minutes per day teaching handwriting, far less than the 45 minutes per day spent in the 60's and 70's, and slightly less than 15 minutes per day mandated in the 80's. Text books offer less methods and methods for student evaluation are inconsistent and non-standardized. 100% of the 169 primary teachers who participated in this study reported they thought printing should be taught as a separate subject.

Hall L and Case-Smith J (2007) The Effect of Sound Based Intervention on Children With Sensory Processing Disorders and Visual-Motor Delays. *American Journal of Occupational Therapy* Vol 61 No 2, 209-215. Results of this study indicate that a therapeutic listening program and sensory diet significantly improved participants' scores on the Sensory Profile, with parents reporting improvement in their children's behaviours related to sensory processing. This information validated use of therapeutic sound in the 'Zone' in Program.

Henderson, A. & Pehoski, C. (1995). *Hand function in the child: Foundations for remediation*. St. Louis, MO: Mosby publishing.

Hillman C, Erickson K and Kramer A (2008) Be Smart, Exercise Your Heart: Exercise Effects of Brain and Cognition. *Nature Reviews Neuroscience* Vol 9 586-5. This article profiles the following studies: achievement in standardized test of reading and math was

positively correlated with physical fitness scores; social isolation reduced positive effects of exercise on hippocampal neurogenesis; exercise training improved depression; cognitive, physical and social engagement decreased the risk of dementia.

Hofler D and Kooyman M (1996) Attachment Transition, Addiction and Therapeutic Bonding – An Integrative Approach. *Journal of Substance Abuse Treatment* Vol 13 No 6, 511-519. This article profiles the concept that addiction is a maladaptive attachment transition and results from a fear of intimacy, and states the clinical implication of using therapeutic bonding as a treatment intervention.

Hosseini, M. (2000). Thesis Research. The effectiveness of occupational therapy intervention to improve the handwriting performance of individuals with sensory motor problems who demonstrate severe handwriting difficulties. Queen's University.

**STUDY DESIGN:** An experimental multiple base-line single subject design consisting of 5 subjects was used. The design involved the systematic collection of repeated measurements of a behavioural response (writing) over time, usually at frequent and regular intervals. In a multiple A-B design there were two phases: baseline phase (A) prior to treatment and intervention phase B during treatment. The same measurements were gathered at regular intervals over both phases. **METHOD:** Sensory Motor Performance components of handwriting and ergonomic factors were assessed. A battery of OT non-standardized and standardized tools, including sub-sections of SIPT were used to assess underlying factors leading to writing difficulties. Children's Handwriting Evaluation Scale was used to assess children's handwriting performance. Standardized tests utilized had high reliability and validity ratios. The treatment intervention was over 8 treatment sessions once every two weeks. OT follow up programs which were carried out at children's homes and schools formed an important part of the intervention. Systematic monitoring programs were in place to ensure therapist's adherence to time frames and treatment programs and to determine whether or not the subjects were following the OT follow up programs. The intervention was based on sensory integration, sensory motor, cognitive and behavioural approaches. To determine the effectiveness of OT intervention, visual, statistical, and clinical data analysis were used. A substantial rate for inter-rater reliability was achieved. Graphic representations of children's quality and speed of writing were provided to display children's performance during baseline and intervention phases. **RESULTS:** The results of the research showed that occupational therapy intervention is effective to improve the quality of handwriting performance in children with handwriting difficulties. Support for findings, discussion on type of intervention, methodology, clinical implications, study limitations and implications for future research were discussed.

Kimball, J. (1988). The emphasis is on integration, not sensory. *American Journal on Mental Retardation*. 92(5), 423-424.

Koomar, J.A. & Bundy, A.C. (1991). The art and science of creating direct intervention from theory. In A.G. Fisher, E.A. Murray & A.C. Bundy (Eds.), *Sensory integration: Theory and practice*. Philadelphia: F.A. Davis Co.

Landhuis C, Poulton R, Welch D and Hancox R (2007) Does Childhood Television Viewing lead to Attentional Problems in Adolescence? *Pediatrics* 120, 352-537. This study found that not only does childhood television viewing contribute to attention problems in adolescence, but that the effects may be long lasting.

Learning Disabilities Association of British Columbia – Fact Sheet Statistics (2007) Learning Disabilities Fact Sheet. [www.ldav.ca/info.html](http://www.ldav.ca/info.html). This document states that 15% of the elementary population has learning disabilities, with reading deficits the most prevalent condition. 35% of the learning disabled population will drop out of school, 60% will receive treatment for substance abuse, and they will have twice the unemployment rate of the nondisabled population. Parham L, Cohn E, Spitzer S, Koomar J, Miller L, Burke J, BrettGreen B, Mailloux Z, MayBenson T, Smith Roley S, Schaaf R, Schoen S, Summers C (2007) Fidelity in Sensory Integration Intervention Research.

Leah H, CaseSmith J (2007) The effect of soundbased intervention on children with sensory processing disorders and visuo-motor delays. *American Journal of Occupational Therapy*;61 (2):20915.

This study investigated the effects of a sensory diet and therapeutic listening intervention program, directed by an occupational therapist and implemented by parents, on children with sensory processing disorders (SPD) and visuo-motor delays. A convenience sample was used of 10 participants, ages 5 to 11 years, with SPD and visuo-motor delays. In the first phase, each participant completed a 4 week sensory diet program, then an 8week therapeutic listening and sensory diet program. The Sensory Profile was completed by the participants' parents before and after both study phases. The Draw-A-Person test, Developmental Test of Visual Motor Integration (VMI), and Evaluation Tool of Children's Handwriting (ETCH) were administered before and after each phase. Over 12 weeks, the participants exhibited significant improvement on the Sensory Profile, increasing a mean of 71 points. Parents reported improvements in their children's behaviors related to sensory processing. Scores on the VMI visual and ETCH legibility scales also improved more during the therapeutic listening phase. Therapeutic listening combined with a sensory diet appears effective in improving behaviors related to sensory processing in children with SPD and visuo-motor impairments.

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Madsen, P.S. & Conte, J.R. (1980). Single subject research in occupational therapy: A case illustration. *American Journal of Occupational Therapy*. 34, 263-267.

Malloy-Miller, T., Platajko, H., & Anstett, B. (1995). Handwriting error patterns of children with mild motor difficulties. *Canadian Journal of Occupational Therapy*, 62 (5), 258-267.

May-Benson M, Koomer J (2007) Identifying Gravitational Insecurity in Children: A Pilot Study. *American Journal of Occupational Therapy* Vol 61 No 2, 142-147. This study reports that the GI Assessment is a promising clinical tool for objectively identifying children with gravitational insecurity.

Miller L, Anzalone M, Lane S, Cermak S, and Osten E (2007) Concept Evolution in Sensory Integration: A proposed Nosology for Diagnosis. *American Journal of Occupational Therapy* Vol 61 No2, 135-140.

Miller, LJ & Kinnealey, M (1993), *Sensory Integration International*, 21(2), 1,3,57. Originally published in 1993 by *Sensory Integration International*, Volume XXI, Number 2. Reprinted with permission.

Miller L, Anzalone M, Lane S, Cermak S, and Osten E (2007) Concept Evolution in Sensory Integration: A Proposed Nosology for Diagnosis. *American Journal of Occupational Therapy* Vol 61 No 2, 135-140. This article defines terminology for Sensory Processing Disorder diagnosis for eventual inclusion in the Diagnostic and Statistical Manual V, as described in the Zone' in Workshop.

Miller L, Coll J and Schoen S (2007) A Randomized Controlled Pilot Study of the Effectiveness of Occupational Therapy for Children with Sensory Modulation Disorder. *American Journal of Occupational Therapy* Vol 61 No 2, 228-238. Children diagnosed with Sensory Processing Disorder made significant gains following a sensory integration approach on goal attainment scaling and on the Attention subtest and the Cognitive/Social composite of the Leiter International Performance Scale Revised.

National Resource Center on ADHD – Statistical Prevalence (2007) About ADHD. [www.help4adhd.org/en/about/statistics](http://www.help4adhd.org/en/about/statistics). This report states that 7% of elementary children have a diagnosis of ADHD, with 61% of these children also having learning disabilities.

Niehues, A.N., Bundy, A.C., Mattingly, C.F., & Lawlor, M.C. (1991). Making a difference: Occupational therapy in the public schools. *The Occupational Therapy Journal of Research*, 11(4), 195-212.

Oliver, C.E (1989). A sensorimotor program for improving handwriting readiness skills in elementary age children. *American Journal of Occupational Therapy*, 44 (2), 111-116.

Olsen, J. Z (1994). *Handwriting without tears*, (4th edition), Potomac. Ottenbacher, K. (1982). Sensory integration therapy: Affect or effect? *American Journal of Occupational Therapy*. 36, 571-578.

Ottenbacher, K. (1991). Research in sensory integration: Empirical perceptions and progress. In A.G. Fisher, E.A. Murray & A.C. Bundy (Eds.), *Sensory integration: Theory and practice*. Philadelphia: F.A. Davis Co. Ottenbacher, K., Short, M.A., Watson, P.J. (1981). The effects of a clinically applied program of vestibular stimulation on the neuromotor performance of children with severe developmental disability. *Physical And*

Occupational Therapy In Pediatrics 1, 111. Reed, K. (1991). Quick reference to occupational therapy. Graithersburg, M.D: Aspen Publication.

Parham L, Cohen E, Spitzer S, Koomar J, Miller L, Burke J, BrettGreen B, Mailloux Z, Many Benson T, Smith Roley S, Schaaf R, Schoen S, SummersC (2007), Fidelity in Sensory Integration Intervention Research. American Journal of Occupational Therapy Vol 61 No 2, 216227. This article describes identification of 10 core sensory integration intervention elements, with subsequent review of 34 sensory integration studies showing only one core element was addressed in all studies. These results show that validity of sensory integration outcome studies is threatened by week fidelity in regard to therapeutic process.

Pelligrini A. and Bohn C. (2005) the Role of Recess in Children's Cognitive Performance and School Adjustment. Education Researcher Vol 34 No 1, 13-19. This study reports that providing breaks over the course of a child's school day enhances their ability to attend and learn, this study also reports that kindergarten's playground social behaviours was significant factor in first grade achievement, and discussed that the playground may be the only areas where "latch-key" kids get to socialize with their peers.

Rine R, Braswell J, Fisher D, Joyce K, Kalar K, and Shaffer M. (2004) Improvement of Motor Development and Postural Control Following Intervention in Children with Sensorineural Hearing Loss and Vestibular Impairment. International Journal of Pediatric Otorhinolaryngology Vol 68 Issue 9.1141-1148. This study showed that motor development scores increased significantly in children with sensory neural hearing loss and vestibular impairment following balance, visual and somatosensory training. This study substantiates that impaired vestibular development affects postural and motor ability.

Roberts D, Foehr U, Rideout V, Brodie M (1999) Kids and Media at the New Millennium: A Comprehensive National Analysis of Children's Media Use. The Henry J Kaiser Family Foundation Report, California. This report documents that children spend on average 6.5 hours per day of combined media use (TV, Videogames, computers), and 32% of 2-7 year olds and 65% of 8-18 year olds have TV's in their bedrooms.

Rogers J, CaseSmith J (2007), Relationships between handwriting and keyboarding performance of sixth grade students. American Journal of Occupational Therapy ;56 (1):349 OBJECTIVES: This study examined the relationships between sixth-grade students' handwriting speed and legibility and their keyboarding speed and error rate. A second purpose was to examine how well handwriting performance discriminates students as slow or fast in computer keyboarding. METHOD: After participation in a school-required keyboarding class, 40 sixth-grade students were asked to copy a familiar poem using handwriting and keyboarding. Handwriting legibility and speed and keyboarding speed and errors were measured. Relationships among these variables were analyzed using Pearson product-moment correlations and discriminant analysis. RESULTS: Keyboarding speed correlated with handwriting legibility (n = 38, r = .361, p



= .026), suggesting that handwriting performance accounts for 12% to 13% of the variance in keyboarding performance. Handwriting speed and legibility together accurately categorized 71% of students as slow or fast in keyboarding. On average, students were able to keyboard faster than handwrite. Of the 20 slowest handwriters, 75% achieved more text production with keyboarding than with handwriting. CONCLUSION: Keyboarding performance demonstrated low to moderate correlation with handwriting performance, suggesting that these forms of written expression require distinctly different skills. Most students who were slow at handwriting or had poor legibility increased the quantity and overall legibility of text they produced with a keyboard. These results suggest that keyboarding has the potential to increase and improve a student's written output.

Schaaf R and McKeon Nightlinger, K (2007) Occupational Therapy Using a Sensory Integrative Approach: A Case Study of Effectiveness. *American Journal of Occupational Therapy* Vol 61 No 2, 239246.

Schaaf R, McKeon Nightlinger M (2007), Occupational therapy using a sensory integrative: a case study of effectiveness. *American Journal of Occupational Therapy* Vol 61 No 2, 239246. A single case study design. Poor sensory processing indicates improvement in goal attainment and behaviour with OT using a SI approach.

Schneck, C.M. (1991). Comparison of pencilgrip patterns in first graders with good and poor writing skills. *American Journal of Occupational Therapy*, 45, 701706  
Smith, E. R. (1989). Ergonomics and the occupational therapist. In S. Hertfelder & C. Gwin (Eds.), *Work in progress: Occupational therapy in work programs* (pp. 127155). Rockville, MD: American Occupational Therapy Association.

Schilling D, Washington K, Billingsley F and Deitz J (2003) Classroom Seating for Children with Attention Deficit Hyperactivity Disorder. *Therapy Balls Versus Chairs*. *American Journal of Occupational Therapy* Vol 57 No 5, 534-541. This research found that use of therapy balls for students with ADHD facilitates in-seat behaviour and legible word productivity.

Statistics Canada (2006). *Time Spent with Family During a Typical Workday, 1986 to 2006*. This study reports that parents spend an average 3.5 minutes per week in meaningful conversation with their children.

Tomcheck S and Dunn W (2007) Sensory Processing in Children with and without Autism: A Comparative Study Using the Short Sensory Profile. *American Journal of*

*Occupational Therapy* Vol 61, No 2, 190-200. This study reports that 95% of sample of 281 children with Autism Spectrum Disorder demonstrated some degree of sensory processing dysfunction on the Short Sensory Profile, with greatest differences reported on the Underresponsive/seeking Sensation, Auditory Filtering and Tactile Sensitivity Sections.

Tseng, M.H. & Cermak, S.A (1993). The influence of ergonomic factors and perceptualmotor abilities on handwriting performance. *American Journal of Occupational Therapy*, 74 (10), 919-926.

Tseng, M.H. & Mourray, E.A. (1994). Differences in perceptual motor measures in children with good and poor handwriting. *Occupational Therapy Journal of Research* (14)1. Wells, M.E., & Smith, D.W. (1983). Reduction of selfinjurious behavior in mentally retarded persons using sensory integrative techniques. *American Journal of Mental Deficiency*. 87, 664-666.

Tsuzuku T. and Kaga K. (1992) Delayed Motor Function and Results of Vestibular Function Tests in Children with Inner Ear Anomalies. *International Journal of Pediatric Otorhinolaryngology* Vol 23 Issue 3, 261-268. This study reports that children with vestibular impairment demonstrated delayed motor function, supporting Dr. Jean Ayres findings that the vestibular system is the foundation for bilateral and ocular coordination and development of postural tone.

Waldman M, Nicholson S and Adilov N (2006). *Does Television Cause Autism?* Cornell University, New York. This study showed that heavy TV use prior to age 3 years positively corresponds to increase in prevalence of Autism.

Weil, M.J., & Cunningham, S.J. (1994). Relationship between visual motor and handwriting skills of children in kindergarten. *American Journal of Occupational therapy* 48, 982-988.

Welch M. MD (1989) *Holding Time*. Published by Simon and Schoester, New York. In this fascinating book written by Dr. Martha Welch, child psychiatrist and president of Mothering Center and Cos Bob, Connecticut describes a technique called “forced holding”, where the mother holds the child close to her on her lap, as if she were nursing the child, and doesn’t let go! Even if the child squirms and screams, the mother hangs onto the child, maintaining essential eye contact and repeating to the child “I love you over and over again”. While this technique has met mixed reviews, it does offer interesting information regarding the mother child connection, and offers families with Autism an alternative technique for establishing bonding. The technique should only be attempted in the presence of a trained therapist.

Williams M and Shellenbergers S (1995) *How Does Your Engine Run? Therapy Works* Inc, New Mexico.