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ADHD шзе Effects of Brain Balance Exercises and interactive Metronome on Children with Attention Deficit Hyperactivity Disorder are Similar to the Effects of Stimulant Medication by Martin H Telcher, PhD, MD 33 Subjects: Outcome Measures: • EXPERIMENTAL: n=16 children 8-14 Conner's Parent Rating Scale (CPRS-R) to assess ADHD years of age with confirmed diagnosis symptoms of ADHD who received IM/BB DSM-IV Rating Scale (ADHD-RS) CONTROL: n=8 typically developing Ouotient ADHD System for objective evaluation of age-matched controls hyperactivity, inattention and impulsivity CONTROL: n=19 closely matched Neuropyschological tests: children with confirmed diagnosis of Tower of London ADHD who only received morning light therapy for daytime sleepiness Macworth Clock Corsi Block Tapping Test (phototherapy produces a stimulant effect) · fMRI to examine resting-state functional connectivity 5 interactive metronome

10









ADHD Effects of Brain Balance Exercises and Interactive Metronome on Children with Attention Deficit Hyperactivity Disorder are Similar to the Effects of Stimulant Medication by Martin H Teicher, PhD, MD 2020 Several pre-treatment fMRI neurobiological differences between ADHD and typically developing children were normalized following IM/BB: • Connections between critical brain regions involved in purposeful focusing and attention shifting • Abnormal connectivity within the salience network that contributed to distractibility • Cortical network associated with language, music processing, time estimation and prediction • Cerebellar connections responsible for visual memory and comprehension • Cerebellar volume responsible for weatenents impacting level of hyperactivity, postural control and balance, vestibular reflexes, and eye movements impacting level of hyperactivity, postural control and balance "...it appears that IM//BB reduced these (neurobiological) differences to the point that they were no longer statistically significant."



















































	ASSESSMENT	SKILLS MEASURED	OUTCOME	
٢	DKEFS: Color Word Interference	Attention, response inhibition	Cohen's d= .804 LARGE p=.0001	
DVBIC BRANC BREW COME	RBANS Attention Index	Auditory attention, auditory memory & processing speed	Cohen's d= .511 LARGE p=.004	
JRY	RBANS Immediate Memory Index	Auditory attention, auditory memory & processing speed	Cohen's d= .768 LARGE p=.0001	
INJU	RBANS Language Index	Confrontation naming, verbal fluency, & processing speed	Cohen's d= .349 MED p=.0001	
BRAIN D RESU	WAIS-IV Symbol Search Processing speed, short-term visual memory, visual-motor coordination, cognitive flexibility, visual discrimination, speed of WAIS-IV Coding Visual attention, processing speed, short-term visual memory, visual perception, visual scanning, visual memory, visual aperception, visual scanning, visual memory, visual aperception, visual scanning, visual memory, visual perception, visual scanning, visual memory, visual perception, visual scanning, visual memory, v		Cohen's d= 0.478 MED p=.0001	
ATIC E LISHED			Cohen's d=630 LARGE p=.0001	
PUB	WAIS-IV Digits Sequencing	Auditory attention, working memory, cognitive flexibility, rote memory & learning,	Cohen's d= .588 LARGE p=.021	
TR	DKEFS Trails: Motor Speed	Motor speed, executive functions	Cohen's d= .790 LARGE p=.015	
· · · · · ·	DKEFS Trails: Letter Sequencing	Processing speed, working memory, and executive functions	Cohen's d= .626 LARGE p=.0001	
	IM group demonstrated substantial improvement on 21 of 26 neuropsychological measures			





Traumatic Brain Injury

Effects of Interactive Metronome® Therapy on Cognitive Functioning After Blast-Related Brain Injury: A Randomized Controlled Pilot Trial by Nelson et al. 2013

"The addition of IM therapy to SRC [standard rehab care] appears to have a positive effect on neuropsychological outcomes for soldiers who have sustained mild-to-moderate TBI and have persistent cognitive complaints after the period for expected recovery has passed."

Lonnie Nelson, PhD



37

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Developmental Coordination Disorder Timing abilities among children with developmental coordination disorders (DCD) in comparison to children with typical development

- by Rosenblum & Regev 2013 • n=42 children ages 7-12
 - EXPERIMENTAL: n=21 with DCD
 - CONTROL: n=21 typically developing
- Study revealed much slower motor response times in children with DCD
- IM timing scores accurately predicted
- handwriting performance
- "...strongly recommend IM as an evaluation and intervention tool for children with DCD"

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- Single subject
- ABA study design
- Child with hemiplegic CP demonstrated significant improvement in bilateral coordination and balance following 12 sessions of IM training twice weekly

41





Cerebral Palsy

Short- and long-term effects of palsy: A two case study by Joha

• Both children demonstrated smoother and shorter bimanual movement trajectories, especially for the affected side.

nized metronome training in children with hemiplegic cerebral t al. 2012 шзес

One child exhibited increased smoothness of the non-affected side.

 Noticeable improvement in motor learning occurred immediately post training and was maintained at 6 months post training.

"IM training incorporates many of the factors that have been described to be important in the induction of plastic changes in the brain and, thus, appears to be a promising intervention method for persons with sensori-motor deviations."

43

















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Healthy Aging Effects of the Interactive Met Leonard G. Trujillo 2015	g Fall Risk ronome on Memory P	rocess and Balance with Aging Adult 60+ Population by
Assessment	Overall Improvement	Most notable effect on Four Step Square Test
Modified IM Long Form Assessment	77%	indicating improved
Short Form Test	31%	Balance
Math Fluency (WJII)	23%	Motor speed
Reading Fluency (WJII)	12%	- Motor speed
Decision Speed (WJII)	5%	Decreased fear of falling
Visual Matching (WJII)	4%	Results of Math Fluency, Reading Fluency & d2
The d2 Test of Attention	16%	Test of Attention indicate increased
Four Step Square Test	88% *	lest of Attention indicate increased
The 9 Hole Peg Test	3%	Attention
		Cognitive speed



Fall Risk Reduction

Interactive Metronome addresses fall risk reduction by improving:

- Attention in distractions
- Executive functions, including impulse control
- Cognitive & motor speed
- Motor control & coordination
- Weight-shifting, balance & dynamic gait



52

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53





CONCLUSION

NEXT STEPS:

- Unpack equipment box (if necessary)
- Print out or pull up the PowerPoint PDF in preparation for the day long Virtual Certification Course
- Download the IMPRO software in preparation for use during the Virtual Course

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- Download the Big Marker link and log in
- Set up webcam and turn volume to 'mute'

55



56



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Research Review

LITERACY AND READING

 Improvements in interval time tracking and effects on reading achievement by Taub et al. 2007 Reading Intervention Using Interactive Metronome in Children with Language and Reading Impairment: A
 Preliminary Investigation by Ritter at al. 2012

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MOTOR SKILLS

- Validity of Long Form Assessment in Interactive Metronome as a Measure of Children's Praxis by Kim et al. 2015.
- Timing abilities among children with developmental coordination disorders (DCD) in comparison to children with typical development by Rosenblum & Regev 2013
- The Effects of Interactive Metronome on Bilateral Coordination, Balance, and Upper Extremity Function for Children with Hemiplegic Cerebral Palsy: Single-Subject Research by Jung & Kim 2012 Short- and long-term effects of synchronized metronome training in children with hemiplegic cerebral palsy: A two case study by Johansson et al. 2012

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58

Research Review TRAUMATIC BRAIN INJURY Effects of Interactive Metronome* Therapy on Cognitive Functioning After Blast-Related Brain Injury: A Randomized Controlled Pilot Trial by Nelson et al. 2013 HEMIPLEGIA & CVA Computer-Based Rhythm and Timing Training in Severe, Stroke-Induced Arm Hemiparesis by Beckelhimer et al. 2011 Effects of Interactive Metronome training on upper extremity function, ADL and QOL in stroke patients Ga-Hui Yu et al. 2017 HEALTHY AGING & BALANCE Effects of the Interactive Metronome on Memory Process and Balance with Aging Adult 60+ Population by Leonard G. Trujillo 2015

PARKINSON'S Computer-Based Motor Training Activities Improve Function in Parkinson's Disease: a Pilot Study by Togasaki

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