

IM Improves Life of Preschooler

“Chris” is a 40 month-old boy with a diagnosis of PDD. In July 2008, at 15 months old, he was evaluated through the NYC Early Intervention Program. He presented with poor sensory regulation. His mother described his behavior as frantic and disorganized. Chris would head bang and throw himself on the floor on a daily basis. He had limited eye contact and said less than 5 words. He did not respond to his name.

In July 2008, at the time of his occupational therapy evaluation, his mother completed the Infant Toddler Sensory Profile and his score was 185/290. This score falls within the definite difference range, 2 standard deviations below the mean. It is indicative of sensory processing delays.

Chris's scores on the Peabody Developmental Motor Skills-II gave him a Fine Motor Quotient of 73, a score greater than 1.5 standard deviations from the mean. The Fine Motor Quotient is a standard score of the combination of the results of the subtests that measure the use of the small muscle systems (grasping and Visual-Motor Integration).

Chris began receiving home-based occupational therapy two times a week for 30 minutes and speech therapy 1 time a week for 30 minutes per session. Progress was slow and steady. Sensory treatment was incorporated into OT treatment but success was limited. Under NYC EI services, children receiving therapy are required to be re-tested every 6 months. In February 2009, Chris's Fine Motor Quotient on the PDMS-II was 76, a slight improvement but still 1.5 standard deviations from the mean. Head banging and tantrumming continued.

In March, 2009, at 23 months old, Chris received a diagnosis of PDD and speech therapy and occupational therapy were increased to 3 times a week, 30 minutes per session. He began receiving 10 hours of Applied Behavioral Analysis therapy per week. Chris continued making slow but steady progress in his skills. He continued to present with sensory processing delays and would consistently tantrum at least 1-2 times per week during occupational therapy sessions as well as his other therapy sessions. The OT and other therapists were unable to initiate certain activities, such as scissors or crayons, because they would consistently elicit tantrumming from Chris. His tantrumming often prevented his mother from taking him out into the community.

In August 2009, Chris's Fine Motor Quotient on the PDMS-II was still 76.

In the fall of 2009, Chris began attending a center-based early



intervention special education program 2.5 hours a day, 5 afternoons a week. By fall 2009, Chris's behavior became a limiting factor in his progress. In December 2009, at 32 months-old, Chris underwent a new evaluation because he would be 'aging out' of Early Intervention services and transitioning into preschool special education services. At this time, his mother described him to the occupational therapy evaluator as in 'perpetual motion', 'quite fearless and extremely over-active'. He loved to jump, climb and crash. She described Chris as having a strong desire for sameness and routine and having outbursts and becoming frustrated when he didn't get his way. The PDMS-II was done and his mother filled out the Short Sensory Profile (SSP) via telephone with the evaluating occupational therapist.

His SSP raw score was 129/190. This falls within the definite difference range (scores 2 standard deviations below the mean) and indicates sensory processing difficulties.

Chris's Fine Motor Quotient on the PDMS-II was 70. This examiner supposes that the drop in his Fine Motor Quotient from 76 to 70 is a result of being tested in a different

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environment (clinic versus home setting) and being tested by a new and different evaluator. Children like Chris with PDD often perform differently in an unfamiliar setting and with unfamiliar examiners. During his evaluation, the evaluating OT described him as 'highly distractible', 'difficult to engage', 'requiring much prompting' and 'frequently leaving his seat'.

About 3 weeks before Chris's evaluations were completed, this OT began introducing the Interactive Metronome (IM), a sound based computer software program. The IM program provides a steady (metronome) beat that is heard through headphones. The patient is required to perform hand and foot exercises to the beat, hitting a sensor (switch). Immediate auditory feedback is provided (measured in milliseconds) to inform the patient of their performance. The IM protocol was modified due to Chris's age. Both Chris and this OT wore headphones. The OT would take Chris's hand or foot and tap it on the sensor, performing hand-over-hand (or foot) motions to activate the switch. The IM was kept at 54 BPM, with guide sounds on. The first 2 weeks (6 sessions) Chris tolerated the headphones poorly, but by the start of week three, he became used to them. Each session consisted of the OT performing 1000 repetitions of hand over hand (or foot) exercises using Chris's foot or hand while he played with a favorite toy that was only available during IM sessions. About 5 weeks of sessions were performed (15 sessions) prior to a 10-day vacation. Ideally, there would be no break during IM treatment.

By this time, Chris's behavior began to be noticeably improved. Tantrums had stopped and he became cooperative and compliant. Chris's impulse control had increased and he was able to complete 'first do this then we will do what you want' tasks. His eye contact and language skills improved. Another 6 weeks of Interactive Metronome sessions 3 times per week were completed. At this point, Chris would no longer require the specific toy that he needed at the start of IM treatment and he would usually perform fine motor tasks during the IM training.

After these additional 6 weeks (total of 3 times a week for 12 weeks –36 sessions) Chris had shown improvement in sensory regulation and the IM was discontinued. He tolerated all toys and activities such as blocks, scissors and crayons without tantrumming. He was able to transition from one activity to the other and did not perseverate on cars or spin objects as he had in the past. By the middle of February, Interactive Metronome treatment was discontinued. In April, due to some concerns regarding focus and participation, the IM was resumed, once per week for one month. This 'tune up' seems to have worked and three months later, Chris continues as a pleasant, cooperative boy.

By the start of June 2010, 6 months after his transitioning evaluation, his mother filled out the Short Sensory Profile again. His score was now 170/190, which falls in the typical

performance area. Chris's score on the PDMS-II Fine Motor Quotient was 82.

After the Interactive Metronome was implemented in occupational therapy sessions, Chris's sensory processing skills increased. His scores on both the Infant Toddler Sensory Profile (July 2008) and Short Sensory Profile (December 2009) were in the definite difference range of two standard deviations from the mean. By June 2010, Chris's SSP score fell within the 'typical performance' range. At the same time, as measured on the PDMS-II, Chris's grasping skills continue to remain at the 14 month-old level (his pincer grasp is inconsistent) but his visual motor subtest scores have greatly increased. His Fine Motor Quotient scores went from 76 to 82. This occupational therapist infers that the increase in Chris's sensory processing skills led him to tolerate activities that he would not have tolerated prior to the implementation of the IM. He would yell and tantrum when presented with scissors or crayons and would throw blocks. This behavior was consistent across all therapists (occupational, speech and Applied Behavior Analysis). Since he now tolerates and will participate in such tabletop tasks, his skills in these areas have increased.

Through the use of modified Interactive Metronome exercises, Chris has made tremendous progress in his sensory processing skills as measured on the Short Sensory Profile, which has translated into improved functional visual motor skills. This progress (a jump of 6 points in his Fine Motor Quotient over 6 months) contrasts sharply with the rate of his prior progress, which was slow and stable.

Using modified Interactive Metronome exercises to adapt to his age appears to have had a tremendous effect on Chris's sensory regulating skills as determined by his scores on the Short Sensory Profile and through clinical observation. Both Chris's family and all his service providers have been pleasantly surprised by the changes wrought by the Interactive Metronome.

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