

## Effectiveness of Sensory Integration Therapy in Children with ADHD (Attention Deficit/Hyperactivity Disorder)

Tia Rahmania and Devi Wulandari  
Psychology Department Paramadina University

ADHD is one of the most frequently diagnosed disorders in childhood. Ratings by teachers and parents indicated that seven to 10 % of American children meet DSM-IV-TR criteria for the disorder, making ADHD the most common childhood disorder. It showed us that it is very important to look for the best intervention therapy for ADHD. A therapy that parents can choose is sensory integration therapy. The present study investigates the effectiveness of sensory integration therapy for children with ADHD. Data was obtained from children who followed sensory therapy for two months up to seven months. A qualitative method was conducted, specifically using interview and observation. Results reveal that subjects show improvement in three important aspects that are the core to ADHD symptoms (inattention, hyperactivity and impulsivity). It can be concluded that sensory integration therapy was effective in improving children with ADHD.

*Keywords:* ADHD, sensory integration therapy

ADHD menjadi salah satu masalah yang kerap didiagnosis pada anak-anak. Peringkat yang dilakukan oleh guru dan orangtua mengindikasikan bahwa tujuh sampai sampai 10% anak di Amerika memenuhi kriteria yang disebutkan dalam DSM-IV-TR. Hal ini menjadikan ADHD kelainan paling umum yang terjadi pada masa anak-anak, sehingga menemukan penanganan dan terapi terbaik bagi anak-anak penyandang sangat mendesak. Salah satu adalah terapi sensori integrasi. Penelitian ini bertujuan menyelidiki keefektifan terapi sensori integrasi untuk penyandang ADHD. Data diperoleh dari anak-anak yang telah mengikuti terapi sensori integrasi selama dua hingga tujuh bulan. Metode yang dipakai adalah metode kualitatif, khususnya cara wawancara dan observasi. Hasil penelitian menunjukkan adanya perbaikan dalam tiga aspek penting yang merupakan masalah utama dari simptom-simtom ADHD (kurang mampu memperhatikan, hiperaktivitas dan impulsivitas). Dapat disimpulkan bahwa terapi integrasi sensori efektif untuk menangani simptom-simtom pada anak-anak dengan masalah ADHD.

*Kata kunci:* ADHD, terapi integrasi sensori

In the history of clinical child psychology, perhaps no disorder has been more challenged and subject to scrutiny than Attention-deficit/Hyperactivity Disorder (ADHD) (Wenar & Kerig, 2005). ADHD is one of the most frequently diagnosed disorders in childhood (Parker, Majeski, & Collin, 2003). Ratings by teachers and parents indicated that seven to 10 percent of American children meet DSM-IV-TR criteria for the disorder, making ADHD the most common childhood disorder (Passer & Smith, 2008). Another study in Saudi Arabia revealed that ADHD and associated comorbid problems are common among

school-age children (Alqahtani, 2010). The meta-regression carried out by Polanczyk's team gave result that the central tendency of prevalence rates reported from research samples over the past 25 years: 5.2%. This over-all rate was derived from an impressive 102 studies comprising 171,756 children sampled from schools, communities, or birth registers (Moffitt & Melchior, 2007).

The major symptoms of children with ADHD are inattention, hyperactivity (in two thirds of patients) and impulsive behavior. Inattention involves symptoms such as difficulty in organizing or avoiding sustained mental effort and making careless mistakes. Hyperactivity-impulsive behavior includes symptoms like fidgeting, excessive talking, and waiting difficulty (American Psychiatric Association, 2000).

In America, ADHD is a costly and prevalent disorder, especially among youth. It is a wide-spread, behavioral

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condition in the U.S. ADHD is also the source of significant morbidity, including social, emotional, economic, and even secondary physical suffering in affected children. It is associated with an increased propensity for lowered self-esteem, stigmatization, school failure, poor socialization, tobacco use, drug and alcohol abuse, traffic accidents and occupational issues that persist into adulthood (Morley, 2010). In Saudi Arabia, frequently ADHD students were rejected from class or may be exposed to punishment by teacher or parents due to unidentified ADHD and related behaviors. Nevertheless, none of them were referred to receive psychiatric or psychological help (Alqahtani, 2010). Studies also indicated that about 26 % of ADHD children also have anxiety and 18 % of them also have depressive disorders (Stein & Perrin, 2003). ADHD contributes to the risk of having additional problems such as OCD (obsessive compulsive disorder) (American Psychiatric Association, 2000), CD (conduct disorder) (Connor & Doerfler, 2008), anxiety and depression in childhood (Mayes, Calhoun, Chase, Mink, & Stagg, 2009; Blackman, Ostrander, & Herman, 2005), and impaired social and academic developments (Blackman et al.). Children with ADHD tend to forget responsibilities, to speak aloud rather than give themselves silent directions, to be frustrated or angered easily, and to give up when they don't see how to solve a problem (Papalia, Olds, & Feldman, 2009). This data suggest it is important to manage children with ADHD. ADHD is often managed with drugs, sometimes combined with behavioral therapy, counseling, training in social skills, and special classroom placement (Papalia, et al.).

Everyone knows the five basic senses: seeing, hearing, taste, smell and touch. But there are other senses that are not as familiar including: the sense of touch (our sense of tactile), the sense of movement (vestibular), and sense of muscle awareness (proprioception). To be successful learners, the senses of children with ADHD must work together in an organized manner. This is known as sensory integration (Nicholls & Syvertson, 2009). Many children with ADHD also suffer from sensory processing disorder. Parents of children with ADHD described behaviors in their children that could be reflective of difficulties processing sensory input, such as over or under sensitivity to touch and/or movement experiences, distract easily, clumsiness, trouble organizing themselves and their work, emotional reactivity, trouble learning new skill, low frustration tolerance, and/or difficulty making transition between activities or situation (Pollock, 2006).

More than thirty years after the term sensory integration first appeared in the literature, controversy continues to swirl around both the theory and its application (Pollock, 2006). There has been a rising debate of the value of sensory integration. Sensory integration has come under attack from a number of sources including physicians, psychologists, and educators. These professionals point out that sensory integration procedure have not been conclusively demonstrated to be effective, and some have recommended that sensory integration procedures be applied only in a research context (Cermak & Henderson, 1989 & 1990).

Many occupational therapists use sensory integration theory to assist children with a variety of developmental disorders. Therapists use sensory integration therapy to help children with ADHD make sense of their world by receiving, registering, modulating, organizing and interpreting information that comes to the brain from senses. They firmly believe, along with many parents, that sensory integration is effective and that it makes an important difference to the lives of these children. Critics of sensory integration argue that the assumption upon which treatment is based is flawed. There is not consistent agreement regarding the effectiveness of sensory integration (Cermak & Henderson, 1989 & 1990). Some professionals have questioned the existence of disorders in sensory integration and pointed to the growing body of research evidence that demonstrated a lack of treatment efficacy (Pollock, 2006).

Results of this study not only report effects of sensory integration therapy but also suggest some support for families that have children with ADHD. Although much attention had been paid to the ADHD and its treatments, but there is not yet information or research about the effectiveness of sensory integration therapy on subjects in Indonesia. The purpose of this study was to report on the effectiveness of sensory integration therapy and to determine whether the therapy would support positive changes in children with ADHD.

### **Sensory Integration Therapy**

Sensory integration therapy is defined as "the organization of sensory information for use" (Ayres, 1972). It is a process occurring in the brain that enables us to make sense of our world by receiving, registering, modulating, organizing and interpreting information that comes to our brains from our senses, especially our internal senses.

McKibbin (1973) is also using Ayres theories that the sensory integration program is a 40 minutes "gross

motor period including games and relays providing maximum proprioceptive-kinesthetic and vestibular stimulation”.

Sensory integration therapy is a treatment approach that aims to provide the child with graded sensory experiences. These experiences are matched during therapy with a “just right” challenge, an activity that requires the child to give an adaptive response. It is typically carried out by an occupational therapist who is trained and expert in sensory integration. Sensory integration is an active therapy. The child must be motivated by and engaged in the activities; hence, play is the medium of choice. Activities usually involve the use of large pieces of equipment such as a big rolls and balls, trampolines, swinging hammocks, which provide intense proprioceptive, vestibular and tactile experiences. The child is encouraged to explore the equipment (McKibbin, 1973).

Kimball (1988) identified the following as characteristics of sensory integration procedures: a) Active participation, b) Child directed, c) Individualized treatment, d) Purposeful activity, e) Need for adaptive response, f) Input varies based on child’s response, g) Activity rich in proprioceptive, vestibular and tactile input, h) Implied or stated goal of improving processing and organization of sensation (not the teaching of specific skills), i) Administered by a trained therapist (OT or PT).

In sensory integration therapy, treatment varies from one individual to the next, and changes in response to the individuals’ response to therapy (Cermak & Henderson, 1989 & 1990).

### Attention Deficit Hyperactivity Disorder

Attention deficit hyperactivity disorder (ADHD) is a neurological condition that involves problems with inattention and hyperactivity-impulsiveness (Passer & Smith, 2008) that are developmentally inconsistent with the age of child (Paige, Pasternack, Lee, & Danielson, 2003). Children with ADHD are classified as having three core behavioral symptoms: inattention, hyperactivity, and impulsiveness. Inattention involves symptoms such as difficulty in organizing or avoiding sustained mental effort and making careless mistakes. Hyperactivity-impulsiveness includes symptoms like fidgeting, excessive talking, and waiting difficulty. According to DSM-IV-TR (American Psychiatric Association, 2000), ADHD have some criteria.

#### A. Either (1) or (2).

(1) Six (or more) of the following symptoms of inattention have persisted for at least six months to

degree that is maladaptive and inconsistent with development level:

**Inattention.** a) Often fails to give close attention to details or make careless mistake in schoolwork, work, or other activities, b) Often has difficulty sustaining attention in tasks or play activities, c) Often does not seem to listening when spoken to directly, d) Often does not follow through on instructions and fails to finish schoolwork, chores, or duties in the workplace (not due to oppositional behavior or failure to understand instructions), e) Often has difficulty organizing tasks and activities, f) Often avoids, dislikes, or is reluctant to engage in tasks that require sustained mental effort (such as schoolwork or homework), g) Often loses things necessary for tasks or activities (e.g. toys, school assignments, pencils, books, or tools), h) Is often easily distracted by extraneous stimuli, i) Is often forgetful in daily activities

(2) Six (or more) of the following symptoms of hyperactivity-impulsiveness have persisted for at least 6 months to a degree that is maladaptive and inconsistent with developmental level.

**Hyperactivity.** a) Often fidgets with hands or feet or squirms in seat, b) Often leaves seat in classroom or in other situations in which remaining seated is expected , c) Often runs about or climbs excessively in situations in which it is inappropriate (in adolescents or adults, may be limited to subjective feelings of restlessness), d) Often has difficulty playing or engaging in leisure activities quietly, e) Is often “on the go” or often acts as if “driven by a motor,” f) Often talks excessively

**Impulsivity.** g) Often blurts out answers before questions have been completed, h) Often has difficulty awaiting turn, i) Often interrupts or intrudes on others (e.g. butts into conversations or games)

#### B. Hyperactive-impulsive or inattentive symptom.

Some hyperactive-impulsive or inattentive symptom that caused impairment were present before age 7 years.

**C. Impairment from the symptom.** Some impairment from the symptom is present in two or more setting (e.g., at school [or at work] and at home)

**D. Clear evidence.** There must be clear evidence of clinically significant impairment in social, academic, or occupational functioning

**E. Not Exclusive symptoms.** The symptoms do not occur exclusively during the course of a Pervasive Developmental Disorder, Schizophrenia, or other Psychotic Disorder and are not better accounted for by another mental disorder (e.g., Mental Disorder, Anxiety Disorder, Dissociative Disorder, or a Personality Disorder).

## Method

There were two respondents in this study. They were patients from a private psychological clinic in South Jakarta, Indonesia. This clinic endorses children with special needs in the psychology assessment and regular therapy. Both respondents were 6 years old boys. They were diagnosed ADHD by a registered psychologist. One of the respondents spent two months of sensory integration therapy, and the other spent seven months. They were presented to the clinic by their parents with suggestion from school. The ADHD respondents were not paid to participate because they were clinic patients, but they were offered a clinical evaluation with a report signed by a registered psychologist and therapist. Neither of the respondents was taking medication before sensory integration therapy. Therefore the only form of treatment provided to the respondents at this time was sensory integration therapy.

This study was using a qualitative method, with case study type. Anecdotal record was used to collect all information when respondents were given sensory integration therapy by the therapist. The parents were interviewed about their children to provide evidence about their children's behavior changes. It was also supported by anecdotal records.

## Results

Based on Table 1, both respondents have same age and sex. They were brought by their parents because of complains from their school. They had similarity in ADHD symptoms, such as having difficulty sustaining attention in tasks or play activities. M and N often had difficulty sustaining attention in tasks. They often did not seem to listen when spoken to directly. They were not making eye contact consistently when speaking with

Table 1  
*Respondents Demographic*

Data	Respondent 1	Respondent 2
Name (initials)	M	N
Age	6 years	6 years
Sex	Male	Male
Therapy Duration	2 months	7 months
Referral	Parent but suggest come from school	Parent but suggest come from school
Problem Diagnosed	ADHD	ADHD
Times doing sensory integration therapy	8 times (@ 40 minutes)	28 times (@ 40 minutes)
Problem Description	M had short attention span and concentration (less than 5 minutes). He was a hyperactive child. His school complained with his parent because M could not sit during learning time and follow teacher instruction. He often left his seat in classroom or in other situation in which remaining seated is expected. In fine motor skill, M was not drawing and coloring with concentration. His motor planning was not optimal. Activities requiring gross motor skill, balancing and concentrating are not performed to expectation. M continued to have difficulty maintaining eye contact with someone who spoke with him. When someone called him, he acted as though he did not hear that call. We called him a few times before he responded. He was speaking a lot when doing activities. He copied the way movie figure speak many times. When someone asked him something, M could answer out of context.	N had short attention span and concentration (less than 7 minutes). His motor planning has not been optimal yet. It made his activities that need gross motor skill, balancing and concentrating were not doing scrupulously. He tended to rush and didn't pay attention with his own safety. He was impulsive child; he changed his activity to other activity in few seconds. In fine motor skill, N was not doing drawing and coloring with concentration and didn't finish it. N was not doing eye contact to someone who spoke with him consistently. When someone called him, He would act like not hear that call. We need to call him a few times to make him notice.

Table 2

*Condition after Sensory Integration Therapy:*

Core ADHD symptoms	Result from M	Result from N
Inattention	<ul style="list-style-type: none"> <li>- M could sustain attention to finish 40 minutes of activities in therapy room. There are four activities with the longest time is 13 minutes (based on observation record in therapy room)</li> <li>- M could pay attention to make writing lesson at home.</li> <li>- Problem with his attention happen when M goes outside home. He was still distracted by extraneous stimuli easily (based on parent's interview).</li> <li>- M could made eye contact more than before when talked to someone (observation and parent's interview).</li> </ul>	<ul style="list-style-type: none"> <li>- N could sustain attention to finished 40 minutes of activities in therapy room. There are 4 activities with the longest time 15 minutes (based on observation record in therapy room).</li> <li>- Sometimes difficulty to organize task to solve simple problem in daily activities like open the door with new simple model (based on observation).</li> <li>- N could finish mathematic assessment (Kumon) in his after school class about an hour with degradation work quality after half hour (based on parent's interview).</li> <li>- N could make eye contact more than before but still needed verbal direction to see someone eyes (observation and parent's interview).</li> <li>- N sometime didn't seem to listen when spoken to directly but the frequency was much better than before therapy (based on observation)</li> </ul>
Hyperactivity	<ul style="list-style-type: none"> <li>- He could sit quietly. He didn't say "what we do next?" anymore like what he did at the first therapy session (based on observation in the therapy room).</li> <li>- When he did activities on desk, he was not as verbally active as before (based on parent's interview).</li> </ul>	<ul style="list-style-type: none"> <li>- He could sit and do activities on desk quietly. His verbal activities were already rare when he was doing something, but would come out when he was tired (based on observation in therapy room).</li> </ul>
Impulsivity	<ul style="list-style-type: none"> <li>- M could answer a short question like "how are you?" but sometime he talked outside the context (based on parent's interview and observation).</li> </ul>	<ul style="list-style-type: none"> <li>- N could answer question after question have been completed (observation).</li> </ul>

someone. They often left their seat in classroom or in other situation in which remaining seated is expected. M and N often avoided, dislike, or were reluctant to engage in schoolwork. They talked excessively and often blurted out answers before questions had been completed. They had problems with motorize planning. Table 2 summarizes that M and N have improvements in three important aspects that are core ADHD symptoms (inattention, hyperactivity and impulsive). They could sustain attention for 40 minutes of activity in therapy room which are four activities with the longest time that is 13 minutes for M. Based on observation in therapy room, the longest time that N could sustain activity was 15 minutes. M could pay attention to engage in writing lessons at home. M and N also have shown improvement, they can sustain eye contact for longer than before when talking with someone. With regard to hyperactivity, we could see that M and N can sit and do activities quietly at their desk. Their verbal activities were already rare when they were doing something, but M would come out when he was tired (based on observation in therapy

room). In terms of impulsiveness, both of them demonstrated they could wait to answer question until after question had been completed. Sometimes M still talked outside the context of conversation.

## Discussion

Although the SI efficacy research studies have been criticized for methodological flaws, according to Ottenbacher (1988), establishing the effectiveness of intervention from sensory integration therapy for ADHD (Attention Deficit Hyperactivity Disorder) is an important step in ongoing efforts toward public awareness and education about this condition.

It is important to identify ADHD symptoms by competent registered professionals. Also cooperation between psychologists and therapists will promote the use of evidence-based clinical practices. This study suggests that to ensure validity of therapeutic interventions all clinicians and therapists should possess the necessary

skills and abilities to evaluate the influence of many variables that need to be considered in sensory integration therapy. Examples of variables that might influence the efficacy of intervention include such factors as, individual growth and medications. The findings of this study support the need for more rigorous studies about effectiveness of sensory integration therapy to ADHD children.

## Limitations

Several limitations of this study should be noted. First, generalization of these results is limited to the demographic respondents represented in this study. Sensory integration therapy is an individualized treatment and child directed, so that results will also depend on the characteristics of the child. Second, the researcher conducting this study has difficulty finding research sample about ADHD and sensory integration therapy in Indonesia. This study therefore, is only one step in the direction of exploring ADHD in Indonesia population. Third, this study did not evaluate the presence, or absence, of disorder other than ADHD. For example, these respondents' symptoms might have been the result of other disorders such as co-morbid sensory processing disorder or other disorders, which were not clarified by this study. More research is needed to examine relations among and to other disorders. Fourth, the effect of co-morbidity on reported symptoms of ADHD should be carefully studied. For example, in another study, a double-gating laboratory procedure was utilized to select "pure" ADHD and "pure" sensory processing disorder groups (Ognibene et al., 2002). The Ognibene study more clearly discriminated between both disorders with two measures: response inhibition and sensory habituation.

## Conclusion

Generally, this study is an important step in ongoing efforts toward public awareness and education about ADHD and sensory integration therapy in Indonesia population. Sensory integration therapy could be recommended for children with ADHD, especially children of the same demographic represented in this study. The success of therapy is influenced by many factors, such as: active participation from child and parents, individualized treatment, and age of child. Sensory integration therapy should be administered by a trained therapist (OT or PT) because it is a very personal intervention and needs a skillful therapist.

In this study, sensory integration therapy reduced three core behavioral symptoms of ADHD. Sensory integration seemed to influence the ability of the child to sustained attention and eye contact. With regard to hyperactivity, respondents were not as verbally active as before. Concerning relation to impulsiveness, respondents could wait to answer a question until after question had been asked.

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