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## ABSTRACT

The increase in the diagnosis of attention deficit disorder (ADD) and the characteristics and treatment of ADD using sensory motor exercises are discussed. Reasons for the disability are explored, including neurological differences and difficulties in interpreting sensory input. Problems with focusing and hearing as well as hypersensitivity to light and sound are reviewed. Research indicating nutritional deficits in children with ADD is also described. Finally, the lower blood flow in the cortex of children with ADD is discussed. The report then highlights the effectiveness of a sensory motor program that used creeping for treating children with ADD. A list is attached of sensory motor exercises that have helped children labeled with ADD and can be conducted by parents or licensed therapists. Exercises include turning the child in a chair, log rolls on the floor, twirling, trampoline jumping, jogging, massage, and crawling on the stomach. (Contains 11 references.)  
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**ATTENTION DEFICIT SYNDROME : EDUCATIONAL BUGABOO**  
**OF THE 90s**

by

**Svea J. Gold**

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Too many parents almost wear it like a badge of honor! "Ah, yes, my child had ADDH!" "My grandchild has attention deficit syndrome!" They accept the verdict with the same finality as if someone had said: "Your child has blue eyes."

In 1990, Alan Zametkin reported that anywhere from two to four percent of Americans had Attention Deficit Syndrome. Yet in 1995 the newspaper reports that 20 percent of kids in American schools are on Ritalin - the accepted medication for ADD. My quick spot-check with a teacher friend found that out of the forty kids in his Junior High School home room, there are six on Ritalin—that amounts to 15%. And with a class load of that size, he suspects that there are several more who need it.

Is Ritalin bad? Are the powers-that-be getting your children addicted? No, not necessarily, but if only two to four percent are having this clinical symptom, there are a great many children wrongly diagnosed, wrongly treated and all in the name of keeping peace in overcrowded class rooms. The label ADD, just like the former catch-all labels of *MBD*, *hyperactive*, *learning disabled*, *special needs child*, is not a diagnosis, but an excuse for not bothering to find out exactly why a child is not functioning.

When a child has been referred for to a doctor for attention problems in school, the doctor tends to prescribe Ritalin on the presumption that children with ADD have a reverse reaction to stimulants and that if Ritalin calms down the child, a diagnosis of ADD would be correct. Yet, as far back as 1978 a study Judith L. Rapoport indicated that all children respond to Ritalin with decreased motor activity and increased attention and performance. Not only that, but she reports that there was a remarkable rebound effect starting about five hours after medication had been given. This consisted of talkativeness, excitability and possibly euphoria. A trial run of Ritalin should therefore not be taken as confirmation of ADD.

Fortunately, a few parents are beginning to reject such a diagnosis. They find out what is not working – and fix it. Even if the diagnosis should be correct, they are aware that this need not be a life sentence and much can be repaired that is now being swept under the rug with drugs.

Attention Deficit Disorder is defined as a developmental disorder, characterized by the impairment of one or more of the basic cognitive processes related to orienting, focusing or maintaining attention. What do we actually know about what constitutes this syndrome?

Alan Zametkin studied the PET scans (Positron Emission Tomography) of twenty-five adults who had been diagnosed as hyperactive since childhood. (PET scans are used to detect brain activity as indicated by blood flow in various parts of the brain. Special modern PET cameras are used to photograph the brain right after the subject has been injected with a small amount of water 'labeled' with the radioactive isotope oxygen-15. Over the next minute following the injection, the radioactive water accumulates in the brain in direct proportion to the blood flow, and can therefore be measured accurately. (Children could not be studied since there is some danger of exposing children to a radioactive tracer.) Zametkin found that these adults with an early diagnosis of hyperactivity had less than normal overall brain metabolism and that low functioning was especially prevalent in areas involving attention and motor activities.

One of these areas is the premotor cortex. Having a low functioning premotor cortex, translated into the vocabulary of real children, might mean that --at rest-- the children don't know where their body is – i.e. they have to move it all the time to get input from their muscles in order to know where they are in space. The other most obviously low functioning area is the prefrontal cortex, which acts as an inhibitor of inappropriate responses. In other words: most children can access information stored in this area so that if they want to say or do something they can judge whether to go ahead or to decide: "Oops, I better not do this." Children with ADD can't do this.

One more area in which Zametkin finds variations from the norm, is the corpus callosum. The corpus callosum is a thick band of nerve fibers by which the two brain hemispheres are tethered together, and which makes it possible for the two hemispheres to communicate with each other. The early knowledge that the two hemispheres function in a different manner came when Roger Perry cut the entire corpus callosum of patients to stop their previously untreatable seizures. This was in the early 60s, but since

then, with MRIs and PET scans, it has become possible to pinpoint exactly where the seizures originate and now, when such dissection has to be made, it is made only in a small area of the corpus callosum. This new procedure has shown that each section carries highly specialized information across.

Translated into every day language, this means that a child may have perfect communication from one side of the brain to the other in some functions, but there may be others in which there is a problem. This would explain the variations of the symptoms of ADD. The secret lies in finding out which function is affected and to make sure that this area becomes connected to the other side.

Here is one possibility in which eye function is affected: William Ludlam of the College of Optometry in Vision Development, tested *visually evoked response* of children who had been diagnosed as having vision problems and were scheduled for vision training. The procedure consists of flashing lights into the children's eyes and measuring how much information actually reaches the visual cortex at the back of the brain. In the process, which is similar to using an EEG bio-feedback machine, he found out that these children were unable to attenuate alpha waves. What it means is that the children could not dampen down these waves, which is necessary for paying attention. After successful completion of the visual therapy -- which involves a whole body process -- when he repeated the experiment, he found that now the alpha waves on the graphs showed to be normal and the children no longer had problems paying attention.

Ludlam interpreted this to mean that now that the children could rely on their eyes for information, they no longer had to monitor all their other senses to find out what was going on.

To get an idea of what this entails, imagine walking your dog on a bright sunny day. While you're walking along, you are preparing a shopping list, writing a letter in your mind, planning the organization of your day's work. Now imagine walking the same street, with the same dog, early on a dark winter morning. At this hour, in a slight fog, you can't see more than about thirty feet ahead. You've got a dog for protection - right? But it's such a tiny dog for such a dark night! There is a strange noise, to your right. Tap, tap, tap....as you get closer, you realize it's just a rain spout dripping onto the tarp of the sail boat in the neighbor's drive way. Suddenly there's a hissing noise...is someone trying to get your attention? You laugh a little nervously, of course not, it's the water sprinkler which is set to go off automatically at six o'clock. Every sound needs to be analyzed as you go your way. Suddenly the headlights of a car appear behind you, and as you step to the side, the car slows down and comes to a stop. All the kidnapping shows that you've ever seen on TV seem to turn into reality. The car starts off again, and the paper delivery girl waves to you as she drives by. You should have known her car, but in the dark all you could see were the lights. The adrenaline had gone to work, because in spite of the fact that it's quite cold in the morning there is a hint of perspiration on your upper lip. In the dark you did not recognize the car! Eventually you get back home and hang up the dog's leash. But you haven't achieved anything. Your shopping list is not planned, the outline for your conference report is not in shape. You had been too busy protecting yourself to get anything else done.

Children whose senses fail them have trouble paying attention. This could be either that the two eyes don't work together and as a result there is no space perception, or the ears don't work together, so they have no stereo hearing and don't know where sound comes from. It is possible that they have auditory delay, which means it takes them so long to decipher the first sentence, they lose out on hearing the second.

Children may be able to hear well, but their hearing does not tell them what they heard without their looking at it. They may be able to see, but they can't tell what it is they are seeing without touching it. The connection between the senses has not been made. Whatever the cause, it is so difficult for the child to make sense of the world, that it becomes almost impossible for them to pay attention.

Here's another experiment that has been done, and you can repeat it and see what it feels like to have a problem of this nature. Ask someone to take a needle and prick your finger, but to tell you ahead of time which one that would be. Keep your eyes closed

while this is being done. What did you feel while you were waiting for the touch. Now ask them to prick you somewhere else, but this time not to tell you where that will be. Close your eyes. What did you feel then? Experiments have shown that when you expect contact at a specific point, all other parts of the sensory cortex will dampen down, i.e. normally we can pay attention only to one thing at a time. Children who do not know things are, are expecting danger from anywhere and everywhere, and so can't pay attention to what the teacher is doing.

Another fact that must be taken into consideration, is that hyperactive children tend to be abnormally sensitive to sounds, especially in the high frequencies. This is a painful hypersensitivity, especially in school rooms which have fluorescent lights, because these often give out a fine whine. Since many of these children are also hypersensitive to visual cues, the subtle flicker of the light will add to their discomfort.

Sally Goddard, at the Institute for Neuro-Physiological Psychology in England, states: "Where there is arousal, internal excitation and muscle tension increase. Where there is prolonged muscle tension eventually there is fatigue. Fatigue will reduce performance, so that in order to maintain the same level of performance and make up the loss of efficiency, there will need to be an increased level of arousal. Thus a vicious circle is created. Tiredness becomes an enemy to be overcome, not by rest and restoration, but by increased movement. This is similar to changing gear up as the revs increase. A crisis is reached when after top gear and overdrive, there are no further gears to change up to, but somehow the same level of performance has to be maintained. This may be achieved temporarily by boosting adrenaline in the system, whether it be through drugs, more excitement, or by violent out burst in the form of anger, extreme depression or states of elation."

Physicians have known since there first was a label for "hyperactivity" that sedatives actually increased the children's restlessness, and stimulants, whether Ritalin -- or even just coffee -- could calm them down. Sally Goddard explains it this way: "These children need their constant activity to keep them going. Momentum and movement are means of survival -- by sedating these, you take away the only way they know of functioning. If given a stimulant such as Ritalin (Dextroamphetamine), you actually help them to perform to their level without the constant need for self-induced arousal."

One of the ways to interrupt the 'vicious spiral' that Sally Goddard describes, would be to stop the hypersensitivity, so that the child does not need to go into shut-down and then overactivity. Even though these problems are of neurological origin, it is important to remember that the brain does not function only like a computer with electrical impulses, but that the speed of transmission of these impulses depends on chemical factors. If there is something amiss in the chemistry of the brain, it will affect the sensitivity of a child to one or often all the different senses. Again, no two children are exactly alike, and to some, to dampen the sensations so that they can live comfortably in our world, certain vitamins known to relieve stress may be helpful.

In Minneapolis, the school district charters the *New Visions School* to teach all the children who, for some reason or other, fail in their regular schools. At *New Visions* children who had been labeled Attention Deficit Syndrome are given a course of about twenty EEG bio-feedback sessions. They are tested before and after with a test called TOVA (Test of Variable Attention) to measure the improvement. What is quite readily visible, however, is that out of 14 students who had been on Ritalin at the beginning of the semester, only four were still on medication at the end of the sessions. It must be remembered, of course, that these children also have vision therapy if needed, take part in a group or individual classes of sensory-motor activities and are taught in a manner to benefit auditory, visual or tactile learners.

Sally Goddard looks further into the causes of ADD by checking the total development of the child.. One clue may be that if certain primitive reflexes are active, the child remains 'stimulus bound'. A newborn baby can pay attention to only one thing at a time. When there is sound, the baby stops looking and listens to the sound. (It's called: staring at sound.) If there is movement in front of the baby's eyes, the baby stops listening and pays attention only to the movement. It takes a while for the different senses to become connected in the brain, so that the child knows that a specific sound is connected to a specific happening: Mama talks, and it means she is about to pick me up! But during the first month or so, when

the baby's functions are entirely reflexive and not voluntarily controlled, the baby's eyes have to move when something crosses its field of vision. It has to pay attention to sound, if it occurs within its hearing. So it is with many so-called attention deficit children --they have to pay attention to every thing that moves, every sound in the room.

Yet another cause for a problem which we carelessly label "hyperactivity" is also described at the Institute for Neuro-Physiological Psychology. Before a baby is born, there is a reflex called the spinal Galant. If the new baby is in the prone (on tummy) position and a light stroke with some object such as a feather or a pencil is drawn across the baby's back approximately an inch to the side of the spine, the hip will kick out toward the side that was stimulated. (All reflexes have some function in the development of the child, but the reason for this reflex is not entirely clear. It may help the baby screw itself down the birth canal in coordination with the mother's contractions.)

Once the baby is born, this reflex should disappear. In rare cases it will persist -- either on one side or on both. If this is the case, every time there is pressure on the child's back in that particular area, be it by a belt, the elastic in the skirt, the back of the desk -- the child's hip will want to move. Teacher now says: "Can't you sit still?" and the child, desperately trying to keep his bottom planted firmly on the seat has little time to pay attention to the work that is required of him. Sally Goddard calls them the 'ants in the pants' children' and when I have discovered the spinal Galant to be still active in adults, they --without ever having heard of Sally Goddard -- describe themselves in childhood as having been an 'ants in the pants' child and as always getting into trouble.

It seems that all children with ADD need some form of neurological reorganization. Dr. Lendon Smith, who's specialty is nutrition, studied a group of children with Attention Deficit, Attention Deficit with Hyperactivity and Hyperactivity without Attention Deficit. He found a series of nutritional deficiencies, each one different for that specific syndrome. Each group then responded favorably if these needs were met. The one thing all three groups had in common, however, was that they had some problem in their neurological development. Nutrition was helpful, but it did not address the neurological aspects of the restless child. Therapy for these problems still need to go hand in hand with the specific nutrients which in turn would help the necessary brain connections to be made more easily.

Other alternatives to drugs have long been recognized. As far back as 1962, Dr. Holly E. McHugh after working with 500 children who had been referred to the Hearing and Language Disorders study group at the Montreal Children's Hospital reported that that they all had been found to have hearing, vision or vestibular problems. She stated that for some reason not then fully understood, these problems yielded to a sensory motor approach. A multi-sensory and multi-disciplinary approach was recommended. Somehow, the report was overlooked in the multitude of research and methodological experiments pioneered at the time.

What is different today, is that after over thirty years of independently performed research on what happens in the brain, we are beginning to understand just why a sensory-motor program would help.

We know --more and more every week--what is happening in the development of the brain and where in the brain it is happening. Even more important is that scientist have shown that the brain is highly plastic and that we can quite easily affect what is working or, for that matter, not working there.

Yes, we know that children with ADD have a lower glucose consumption in the brain, but we also know that we can change that. We already knew that it can be changed 25 years ago, when I first started investigating sensory motor programs. The California Association for Children with Learning Disabilities, on my request, gave me the references of some people who had experience with the techniques then pioneered by the Institute for Achievement of Human Potential in Philadelphia. Of the five names they gave me, all had success stories to tell. The one story that stayed with me over the years, was the experience of a mother of five. Three were fine, she was then pregnant with the fifth, but the fourth was as hyperactive as they come. Even though she had already tried a gymnastics approach, nothing seemed to change the child. Then she happened to attend one of Carl Delacato's lectures and afterward told him of her

problem child. "Creep with him for fifteen minutes every day." he told her, and she was desperate enough to try it.

With four children one becomes creative, and she had all of them playing crawling and creeping games every evening. For the first three weeks the hyper child got more and more wild and drove them all crazy. Then, on the twenty second day the child calmed down – and was never hyperactive again. And the others, she told me, though they had been doing all right in school, suddenly started to excel !

(Peter Blythe, at the Institute for Neuro-Physiological Psychology, who employs different sensory-motor techniques, also warns that during the early periods of therapy the child will regress, and, as he says, becomes like a four year old with a cold.)

Neurologically speaking, during the creeping on hands and knees period, --which is the time during which the cerebellum becomes myelinated -- many of the child's sensations become connected. As the child creeps, with the head turning slightly from side to side, the vestibular or balance system becomes stimulated. Also, as the child at that stage is still stimulus bound, as each hand moves forward, the eyes follow the movement of the forward hand and the child's eyes learn to move across the midline. (This is a skill absolutely necessary for reading.) As sounds reach the ears from different directions, each side of the brain receives the information at minutely different time intervals, and the child learns to judge where the sound comes from.

At the time, all this sounded like black magic. Today we know so much about the brain that we are beginning to understand why all of this happens. In the 80s we learned that the stimulation of a nerve path causes Nerve Growth Factors to develop. But we still did not know how a specific movement would cause changes to happen in the specific part of the brain for which the stimulation was intended. Then, in 1995, the gentlemen Mark Tessier-Lavigne, Jonathan A. Raper and Corey S. Goodman explored the puzzle as to how developing nerve cells are told what connections to make. How do axons that sprout from motor neurons to activate muscles go to their special destination and then not bump into the axons which send messages back to the brain? They were able to identify the chemical markers which guide axons into the intended area or conversely repulse them from the wrong destination. These markers were named Netrin I and Netrin II, from the Sanskrit word for 'guide' and then further such marker chemicals were given the beautiful names of semaphorin, collapsin and connectin.

Apparently it takes exactly three weeks for connections to be made in the brain, and when I suggest to people that they do a sensory-motor program with their child, I urge them not to start the program unless they know they have an uninterrupted twenty-one days to get things to happen. After that, missing a day or two will not make that much of a difference. ( This was confirmed to me not only from personal experience, from vision specialist Dr. Winona Firth, but also from Jean Rigby of ANSUA, a series of child development centers in Australia.) To make the progress truly permanent, the work will have to go on much longer, but then an occasional interruption will not matter as much.

What we know about the brain has become so specific that neurology text books are generally written not by one, but by many different experts, each specializing in another function. But even such experts as Gazzaniga, instead of just talking about location are now talking about rehabilitation. There is no need to remember all of this information, except to know that it exists and that working with a child can actually eliminate many problems. There is no age limit either. Monique Le Poncin at the National Institute for Research on the Prevention of Cerebral Aging, experimented with a multi-sensory stimulation to stop age related senility. Using PET scans, after as little as three months, she has been able to document increased blood flow in the brains of older people.

The fact that ADD children have lower blood flow in the cortex is not a life sentence. Arousal centers are in the reticular activating system which lies in the brainstem. Therapy may even have to be aimed at these centers, and today we know how to do that. It takes time, it takes a little work, but first we must evaluate the children not just label them.

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## Exercises which have helped children who had been labeled Attention Deficit Syndrome.

Obviously children may have a variety of reasons for not being able to pay attention. The exercises here are geared to help most children with ADD and will not hurt those who might not fall into the category of those being helped by them. Since it is not always possible to do all of them, choose those exercises whose intents would seem to be the most important for a particular child. If nothing else, try the suggestions marked with a \*.

Improvement should be visible by three to four weeks. If it is, you have found a successful type of therapy, but it is still important to continue, and it would be advisable to find someone who is expert in a developmental approach to helping children, so that the child can get rid of any other problems which are contributing to the syndrome.

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When in doubt where to start therapy, start at the lowest level: i.e. prenatal stimulation. This is done by repeating movements the fetus makes in the womb. Ideally these would be done -eyes closed --in a warm pool. The floor or a bed will do fine.

If any of the following exercises cause nausea, slow them down to the point where the child can tolerate them.

1 min. each way : total 2 min.

Almost miraculous is the method of slowly turning the person in a rotating chair. Eyes should be closed . The time is as close as possible to one minute in one direction, a few seconds rest, then equally slow return. The easiest way would be to time it with a second hand watch or clock and time about 15 seconds for each quarter turn. This is similar to what the child would have experienced in utero.

2 min.

This needs to be followed by having the therapist turn the chair rapidly, with the therapist controlling the speed, interrupting the movement, and changing directions and speed often. The child during this should have eyes open. This forces quick adjustment of the eyes.

3 min.

It is best to do all three, but the latter two exercises can't be done, much can be achieved by doing 'log rolls' on the floor. both slowly and fast. Doing them as slowly as possible allows for the greatest input into the brain. Eyes closed stimulates the vestibular system, and eyes open affects the visual in relation to the vestibular. Eyes closed should come first. This movement provides the child input from the senses of touch, smell, and adjustment to the distance of the walls of the room, combined with vestibular adjustments. Talking to the child during these exercises also helps develop auditory space perception.

\* 5 min

Lyelle Palmer has the child twirl - "like a helicopter" - with arms out to the sides until the child gets dizzy. About 15 seconds is usually enough. Then wait - with eyes closed - with someone helping the child not to fall until the dizziness passes. Repeat this ten times as soon as the child feels ready to go twirl again. Stimulation of the vestibular system occurs during the eyes closed period, when connections are made between signals from the vestibular to the muscles which control posture.

5 - 10 min.

Trampoline jumping achieves some of the visual stimulation, combined with input to the entire body. As the child reaches the highest part of the jump there is a moment of weightlessness. This is similar to what the child experienced in utero. Then as gravity takes hold and the child again hits the trampoline, the brain has to make all the adjustments it had to make once the baby left the womb. As the body feels its weight on return, compression between the joints adds to the child's body image.

\* 5 min - 10 min.

If no trampoline is available, jogging is excellent, because the pressure of hitting the ground jars the spaces between the joints, which helps tell the brain to know where the body is. The eyes constantly have to adjust to changes in space and the vestibular canals in the ear are stimulated by the constant up and down movement.

\* (To avoid accusation of abuse, this should be done by parents or licensed therapist only.) 5-10 min.

Ideally, there should be deep and light massage every day. This should include the face and the scalp. If the child is ticklish start with deep massage and slowly move to light touch. If the child is hypersensitive and experiences touch as painful, start it very mildly and slowly increase the exposure. This can be done before the child gets out of bed in the morning as this will also have the child wide awake before eating breakfast and going off to school.

\* (Parents or licensed therapist only.) 3 - 5 min.

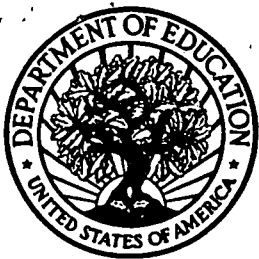
An excellent way of helping the child learn to know his body, is to stimulate information to the brain by giving compression to all the accessible joints in the body. This is done by giving a pull and then a push and a slight twist at each joint of the fingers, then the wrist, the elbow, shoulder. Push down on shoulders and on head. This can be also done on the lower parts of the body. None of this should be painful and usually the child experiences a "grounded" feeling immediately afterward.

5-10 min.

Crawling on stomach --call them "marine crawls" or "soldier crawls"-- and creeping on hands and knees can be added later to help integrate what has been achieved. Call the creeping "tiger stalking" or "Indian stalking" and it won't offend the child. Stress the expected improvement in athletics, since this is often far more important to the child than the academic aspects. Improvement there will also follow.

Once the child's body has been better coordinated, and the child still has not established a preferred or dominant side, start encouraging the child to become either totally right sided, or totally left sided. Which side is to be chosen depends on the side of the stronger eye use, since this would be hardest to change. (Ask the child to write something with a pencil between the toes. The side picked is a good indication of the preferred side) A strongly established handedness allows the child to know right from left - whichever side is the stronger for him. This is vitally important not only for writing and reading, but simply for knowing which side to use to pick up a hammer..

It would be preferable to do these exercises every day for at least three weeks, but results can be achieved by doing them five days a week. Work should be continued longer than the three weeks to make sure that the progress becomes integrated and the myelination of the new pathways becomes strong enough withstand later fevers or disuse. It is therefore important to gain the cooperation of the child and of the parents. Teens might be persuaded to give this a four-week try, though probably more time will be needed, but they should be able to see some changes especially in athletic skills and then be willing to continue a while longer if there is no nagging by the grown-up.



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