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Attention deficit hyperactivity disorder : Developments in the last decade concerning causes and treatments

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Abstract

The last ten years have brought major advances in the fields of medicine and technology, advances that have illuminated many of the dark comers of Attention Deficit Hyperactivity Disorder (ADHD). This article seeks to pull together those illuminating advances, condensing the voluminous information available into comprehensive, but readable, pages. The causes of the disorder are discussed from both the scientific and psychological/social perspectives. The controversy resulting from medicating so many, so young is an integral part of this country's interest in ADHD, due largely to coverage by the popular media.

Research concerning successful treatment strategies is also discussed. Medication, behavior modification, and classroom accommodation are the most widespread strategies. Beyond these are the less well known treatments of relaxation therapy, neurofeedback, and others. The overriding motivation behind this article is the knowledge gained both by this author and the reader. Knowledge brings understanding which brightens the world of ADHD people and all the people that surround them.

**ATTENTION DEFICIT HYPERACTIVITY DISORDER:
DEVELOPMENTS IN THE LAST DECADE CONCERNING
CAUSES AND TREATMENTS**

A Graduate Research Article
Submitted to the
Division of Middle Level Education
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Master of Arts in Education

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By
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The last ten years have brought major advances in the fields of medicine and technology, advances that have illuminated many of the dark corners of Attention Deficit Hyperactivity Disorder (ADHD). This article seeks to pull together those illuminating advances, condensing the voluminous information available into comprehensive, but readable, pages. The causes of the disorder are discussed from both the scientific and psychological/social perspectives. The controversy resulting from medicating so many, so young is an integral part of this country's interest in ADHD, due largely to coverage by the popular media. Research concerning successful treatment strategies is discussed. Medication, behavior modification, and classroom accommodation are the most widespread strategies. Beyond these are the less well known treatments of relaxation therapy, neurofeedback, and others. The overriding motivation behind this article is the knowledge gained both by this author and the reader. Knowledge brings understanding which brightens the world of ADHD people and all the people that surround them.

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Attention Deficit Hyperactivity Disorder: Developments from the Last Decade Concerning Causes and Treatments

It seems that in the last twenty years Attention Deficit Hyperactivity Disorder (ADHD) has proliferated wildly. We read about it in the media, see television segments concerning it, know adults who exhibit its tendencies, and teach children on Ritalin in almost every classroom. Why the explosion of ADHD? The diagnosis of a particular condition usually rises when a “cure” for it is found. The success of psychostimulant drugs such as Ritalin and Dexedrine, in treating attention deficit disorder has triggered the ballooning number of children and adults diagnosed as having ADHD. Some say that treatment is just now catching up with the true prevalence of the disorder (Leutwyler, 1996).

Attention Deficit Hyperactivity Disorder has become the most commonly diagnosed childhood disorder (Barkley, 1992). Once thought to be an affliction of childhood, research shows that ADHD will continue on into adolescence in 50-80% of children affected, and two-thirds of those will have ADHD as adults (Barkley, 1998). ADHD knows no boundaries. It has been diagnosed in every country in the world. It crosses racial, ethnic, cultural, and gender lines (Barkley, 1998).

It was 1937 when William Bradley first used the stimulant Benzedrine to help alleviate the hyperactivity and inattention of this disorder (Jordan, 1998). Since then questions have been accumulating concerning the “why and how” of attention deficit. Finally, in the last decade answers appear to be on the horizon. There are no fixed facts yet, but theories are getting more succinct and promising. The technology now at our

disposal portends that the mysterious ADHD will not remain surrounded by a cloud of questions. Answers are forthcoming.

What are the causes of ADHD?

This is a question with many proposed answers, answers which are both scientific and sociological, genetic and environmental. None of these answers have been concretely proven at this point, but research and technology support them as valid theories.

Brain research. Brain research is currently using a technique called magnetic resonance imaging (MRI) which is giving scientists much new information and understanding. A 1996 study done by F. Xavier Castellanos, Judith Rappoport and their colleagues at the National Institute of Mental Health as cited by Barkley and Murphy, 1998, revealed that the right side of the brain, the prefrontal cortex and nerve cells clusters known as the basal ganglia, are significantly smaller in children with ADHD. These are the areas of the brain that regulate attention. The prefrontal cortex is involved in resisting distractions, and one's sense of time and self. The basal ganglia (the caudate nucleus and the globus pallidus) are centers that switch off automatic responses allowing the brain consideration time before action, and they coordinate input from all regions of the brain. Castellanos notes that these studies were conducted with children previously treated with medication, therefore the medications could have implications for the asymmetrical brain development, and further studies need to include the study of brains of non-ADHD children.

Positron emission tomography (PET) joins MRIs as a very useful tool in ADHD research. By injecting an ionizing compound into the bloodstream PET scans can measure the level of blood flow in the brain. During research studies people with ADHD

maintained high level of blood flow, while normal people had the slower flow levels which indicate learning or processing is taking place (Leutwyler, 1996). A promising technique that also measures blood flow is blood oxygenation level-dependent (BOLD) functional magnetic resonance imaging (Castellanos, 1997). This technique eliminates the need for the injection of an ionizing compound into the body.

Single photon emission computer tomography (SPECT) allows scientists to study the brain by injecting the substance altropane into the patient's body and then photographing the path of that substance in the brain. In a small study reported in December, 1999 issue of Lancet, researchers found a 70% increase in dopamine transporter density in subjects with ADHD as compared to healthy controls (Dougherty, et al., 1999). This overproduction of dopamine is the prime suspect for causing ADHD. With the development of SPECT and altropane, doctors might have the first concrete diagnostic test for ADHD (Arnst, 1999). This test could alleviate the accusations of overdiagnosis and help with the possibility of underdiagnosis. It is, however, still in the clinical trial stage with a long road to travel before the general public will benefit.

Brainwave activity is another avenue technology has enabled scientists to explore. Electroencephalograms (EEG) have shown that people with attention deficit have excessive theta wave activity or more of the "slow" brainwaves. Cognition or completion of a task requires speeded up brainwaves called theta waves (Kotwal & Burns, 1996; Mate, 1999). This imbalance of brainwave activity may be the cause of ADHD students' frustration with school work and lack of comprehension of social cues that most children seem to absorb effortlessly. Perhaps, this is the root of the "blank stare" so typical of an ADHD child.

Brain research and its implications for ADHD are still in their infancy. We are warned by Xaiver Castellanos not to jump to conclusions or to be overly optimistic about a "cure." Speaking about the new findings in brain chemistry and physical abnormalities

he says, "It's only slightly better than phrenology. Now we're just measuring the bumps on the inside of the brain" (Leutwyler, 1996).

Genetics. The primary reason for the brain abnormalities of ADHD children appears to be genetic. Genetics have long been a suspect for one of the causes of ADHD because research early on began to show that the disorder seems to run in families. If a parent exhibits ADHD tendencies, their children are 50% more likely to develop the disorder than children from non-ADHD parents. If a child has ADHD, their siblings are five to seven times more likely to develop the disorder than children in other families (Barkley, 1998). Studies of identical twins are some of the most convincing of the phenomena of genetics being the basis of ADHD, and studies of grandparents of ADHD people showed increased rate of alcoholism, sociopathy, and hysteria over the normal population (Cantwell, 1984).

The defective genes seem to be the ones that dictate the way dopamine, a neurotransmitter, works in the brain. Neurotransmitters are chemicals that move messages from one nerve cell (neuron) to the next. Dopamine is secreted by neurons in parts of the brain to control other neurons, especially those concerned with emotion and movement. The dopamine transporter gene DAT1 was reported in 1995 by Edwin H. Cook of the University of Chicago as the possible primary culprit for the for the behavior and inattention problems associated with ADHD (Barkley, 1998). But most researchers in the field believe that there is more than one gene involved in the disorder.

Alan Zametkin of the National Institute of Mental Health has found that some people with ADHD have a different receptor for thyroid hormone. In his research 70-80% of the people studied who had this anomaly also had ADHD (Leutwyler, 1996). James M. Swanson of the University of California at Irvine has examined the "novelty seeking" gene which codes for the dopamine receptor DRD4 and found that one

variation of that gene is very common in ADHD children (Leutwyler, 1996). Dr. Ken Blum at the University of North Texas has developed a DNA test that shows the presence of dopaminergic genes which increase the likelihood of ADHD characteristics (Brim & Whitaker, 2000) in the person tested.

Neurodevelopmental lag. Neurodevelopmental lag is another proffered explanation for ADHD. Researchers estimate that ADHD children lag behind their healthy counterparts by about two years, a fact supported by cognitive testing. Quite often this is even physically evident, as children with this disorder tend to be smaller in both height and weight than their classmates (Flick, 1998). In most children, toddlerhood brings an increase of inhibitory effects in the brain with a corresponding decrease in dopamine concentrations. However, the cerebrospinal fluid of hyperactive boys has been shown to contain high levels of dopamine metabolite, which would be consistent with the theory that they are developmentally behind their healthy peers (Castellanos, 1997).

Developmental lag could account for the findings of brain areas whose size is smaller than normal, and for the fact that ADHD symptoms often improve with the onset of puberty as puberty is a time of brain growth and maturation (Brim & Whitaker, 2000). Teens almost 50% of the time outgrow their hyperactivity outwardly, but still report feeling restless and queasy inside (Garber, Garber, & Spizman, 1996). However, symptoms of inattention do not usually abate (Castellanos, 1997).

Psychosocial causes. All of the causes for ADHD discussed so far have their roots in medical research. But there are some compelling theories concerning the disorder based on social and psychological issues. Factors like lifestyle, family relationships, nicotine, alcohol and media all influence today's children and adults.

Lifestyle and environment. Dr. Gabor Mate would sum up the cause of ADHD in one word, “stress,” particularly any stress felt by an infant’s mother or “mothering figure.” In his 1999 book, Scattered Minds, he paints a poignant picture of ADHD as a sufferer himself and how it affected his family, self image, and his medical practice. Mate’s book addresses brain research including diminished prefrontal cortex size, dopamine receptors, and MRIs. But his overriding conclusion is based on the theory that brain circuitry is developed and basically cemented in place within the first two years of life, and that “a calm and consistent emotional milieu throughout infancy is an essential requirement for the wiring of the neurophysiological circuits of self-regulation” (Mate, 1999, p. 68). He believes the formation of a child’s brain circuits is influenced by the mother’s emotional state. “Psychological tension in the parents’ lives during the child’s infancy is, I am convinced, a major and universal influence on the subsequent emergence of ADD” (Mate, p. 55).

Stress, marital discord, maternal depression and divorce are all common in the families of ADHD children and the disintegration of the family in North America is another suspect in the recent proliferation of ADHD. Dr. Mate calls the United States “the most frenetic of cultures.” The doctor also says, “The factors that maintain the ADD-related turmoil and behaviors are only in part biochemically internal to the individual, and have more to do with the circumstances in which an adult or child lives her life” (Mate, 1999, p. 314). The big “bonding” emphasis between parents and infant of the 1980s aligns well with Dr. Mate’s beliefs. His nomenclature for “bonding” is “attunement and attachment;” same idea, different name.

Another interesting view of ADHD is presented in several books by Thom Hartmann such as Attention Deficit Disorder: A Different Perception and Beyond ADD: Hunting for Reasons in the Past and Present. When Hartmann’s thirteen-year-old son was diagnosed with ADD he made it his business to find out all there was to know. This

dad worked with problems of youth while serving as the executive director of a home for abused and abandoned children. His knowledge of ADHD also includes working with Dr. Feingold on his famous diet which eliminated additives from children's diets as a way of controlling hyperactivity. With all this experience and knowledge Hartmann concluded that ADHD is neither a deficit or a disorder, but "an inherited set of skills, abilities and personality traits" (Hartmann, 1997, p. 41).

However, Thom Hartmann does accept and even advocates the genetic theory of ADHD. He proposes that the people of the world can be classed into one of two categories: hunters or gatherer/farmers. These classifications date back hundreds of years, and describe the lifestyles of different civilizations. Today, according to Hartmann's calculations, only 2% of the world's population have "hunter" genes and that ADHD is a product of those ancient hunter genes. He contends that the impulsivity and hyperactivity of ADHD would serve hunters well as they scan the horizon for prey, make quick decisions, and roam the plains in search of food.

In addition to genetics, Mr. Hartmann blames societal and ecological factors for the explosion of ADHD in today's world. Deterioration of our public schools due to large class size and underfunding contribute to the current ADHD rates. Also our technology driven society is more likely to produce ADHD-type people (Hartmann, 1997). A toxic environment due to PCBs, lead, cigarette smoke, stress, and sleep disorders could all contribute to the rise of ADHD (Hartmann, 1996).

Diet and nutrition. In 1975 Dr. Benjamin Feingold stated that ADHD was diet based. He reported alleviating the disorder's annoying symptoms by taking the artificial additives out of food. The idea became very popular, but no controlled studies ever substantiated his claims. However, twenty-five years later the idea of controlling behavior by diet is still around. Thom Hartmann (1996) cited poor nutrition due to processed food, and Better Nutrition recently printed an article by Leo Galland stating

that Ritalin wasn't needed; controlling food allergies would control ADHD behavior (Galland, 1999). Nutrition Action Health Letter as recently as March, 2000 reported a study where students with ADHD returned to normal childhood behavior when additives were eliminated from their diets. Sugar has often been cited as a cause of hyperactivity, but controlled studies have debunked the claim that sugar causes children to be more active (Barkley, 1998).

Parenting style. Permissive parenting or parenting style is another possible cause of ADHD behavior. In Running on Ritalin Lawrence H. Diller (1998) decries the fact that PC (politically correct) parenting has resulted in a whole host of behavior problems and just plain naughty children as evidenced in the classrooms and public places of this country. He says that physical discipline is acceptable as long as it is preplanned, controlled, and limited. "In fact, the best designed studies demonstrate better outcomes - for example, improved compliance without lowered self-esteem or greater delinquency - for children who experienced physical discipline from their parents" (Diller, 1998, p.188). This is supported by observation of other researchers that ADHD children respond better to their fathers than their mothers (Barkley, 1992). Other studies show that sudden, strong reprimands for disruptive behavior are effective in decreasing unwanted behaviors (Garber, et al., 1990).

Positive/negative reinforcement. The education community in the last few decades has had an infatuation with positive reinforcement, almost to the point that a negative word to a student is taboo. Praise saturates our classrooms and as usually happens with such a situation, desensitization occurs; constant compliments become meaningless. Dr. Robert Reid and Dr. Anne Abramowitz in their work with ADHD children acknowledge that praise alone is not effective and recommend tempered reprimand and appropriate punishment (Reid, 1999; Garber, et al., 1990).

Alcohol, smoking and abuse. Children born into homes where drinking alcohol and smoking are common are more apt to have ADHD (Jordan, 1998). Research shows that mothers who drink or smoke during pregnancy disrupt normal brain development in their baby, thus, giving rise to more frequent occurrence of ADHD (Flick, 1998). Abuse, neglect, and poverty might all have a part in a child's development of ADHD (Bower, 1998-b).

Television. This section wouldn't be complete without a word about society's favorite scapegoat - television. What happens to youngsters' brains when they sit in front of the television, either watching shows or playing video games for hours and hours? Can the bright lights of the tube affect brain circuitry? They can and they do. Evidence comes out of an incident in Japan (Vizard, 1998). An animated show called "Pokemon" had a section where a "vaccine bomb" exploded onscreen as part of the story line. The explosion was a bright red flash followed by five seconds of intensely bright alternating red and blue lights. Almost immediately, it is estimated, over 700 viewers experienced nausea, headaches, dizziness, and even seizures. Hospital emergency rooms reported the phenomena (Vizard, 1998). Researchers at the National Institute of Mental Health say exposure to television and video games may promote brain development that scans and shifts attention rather than the more desirable ability to focus attention (Bower, 1998-b).

What does research show about successful treatment?

The MTA Study. The most comprehensive study to date about the treatment of ADHD in children was commissioned in 1992 by the National Institute of Mental Health. They were concerned that studies of ADHD treatment thus far had been only short term. This study was titled "The Multimodal Treatment Study for ADHD" and dubbed MTA for convenience. It involved 579 children at six different sites across the nation. These children were randomly assigned to one of four different treatment groups:

- #1. monthly medication management with supportive care
- #2. intensive behavioral psychosocial treatment alone
- #3. both medication and behavioral treatment combined
- #4. community based treatment by clinicians other than the researchers.

The study continued for fourteen months and was scrupulously documented (Jensen, 1999).

Clinical results and parent assessment. Analysis of the results was truly intriguing and was rather misconstrued by the popular media (Pelham, 1999). The first results showed that the monthly medication group (#1) outscored all other groups on nineteen measures. But further results showed that treatments # 1, 2, and 3 did not differ significantly in their effect on the children's social skills, academics, parent-child relationships, oppositional and aggressive symptoms, anxiety, and depression. Note that group #2 performed as well as groups #1 and 3 without the aid of medication. All three outperformed #4, community based care. None of the treatments dramatically improved academics (Jensen, 1999). The combined treatment group (#3) ended the study on medication doses that were 20% lower than those in the medication only group (#1). The medication only group had relatively high doses, 65% higher than those used by the community based treatment patients. Also the medication only group (#1) had to have their dosages adjusted upward due to deterioration in behavior.

Some of the most interesting findings of the MTA study came from the parents' assessments. The parents most likely to rate their child as "normalized" after the study were the parents of children in the combined treatment group (#3), and most parents indicated that they would prefer the combined treatment option over medicine only options (Pelham, 1999). The results of the MTA study seem to support what most

doctors and psychologists have advocated for years: the best treatment for ADHD is a combination of avenues.

What is the role of medication in treatment of ADHD?

Most, if not all, of the controversy surrounding the ADHD explosion in the United States centers around the controversial use of stimulant and other drugs to control the disorder's outward symptoms. In 1995, 2.8% of all children aged 5-18 in this country were prescribed Ritalin (methylphenidate) (Robison, Slar, Skaier, & Galin, 1999). In 1998 the United Nations questioned the high rate of medical use of stimulant drugs in the United States, condemning "societal attitudes encouraging pharmaceutical solutions" (Morris, 1999). The decision to medicate yourself or your child is a highly personal one that should be based on available factual information and your values and priorities, not media hype.

The psychostimulants. The name of this class of drugs is a deceiving one.

"Why would you give stimulants to people who are already hyperactive and impulsive?" is the obvious question. The chemicals that these drugs stimulate are the inhibitors in an ADHD brain. Research (Barkley, 1998) indicates that ADHD people have an excess of dopamine and possibly other neurotransmitters in their brains which cause them to function with increased activity and impulsiveness. The psychostimulants work to inhibit the neurotransmitters thereby giving the brain more time to reason, evaluate, and react more as a normal person would. They allow a person to focus on a task and control motor movements (Barkley, 1998).

Ritalin (methylphenidate), Dexedrine (dextroamphetamine), and Cyclert (pemoline) are the three psychostimulants that have been used to treat ADHD. Of all prescriptions for ADHD written in the United States, 90% are for Ritalin (DuPaul &

Barkley, 1991). Of the people prescribed these drugs, 70% respond positively with improved behavior and concentration (Flick, 1998).

Ritalin and Dexedrine have been found to reach their peak effectiveness quickly, within 30-60 minutes of ingestion, and work for three to four hours. The newer forms, Ritalin-SR and Dexedrine Spansule, are effective about eight hours. They are water soluble and are out of the body within a few hours (Garber, et al., 1990; Barkley, 1992). Attenade and Concerta are brand names of new, longer acting medications that use the same stimulant as Ritalin. Adderall, an amphetamine, has also proven effective against ADHD symptoms (Arnst, 1999).

Patients usually are not kept on medication 24 hours a day. Doses are timed to coincide with school or work activity that require concentration and motor control (Garber, et al., 1990). School children often take medication doses that cover only the school day, but some ingest a third, possibly smaller, dose to use its benefits during homework and family time. When used in the doses recommended, these drugs are not addictive (Garber, et al., 1996; Leutwyler, 1996; Harmann, 1997). One must be ready to experiment and juggle dosage size in order to achieve maximum benefit from the stimulants. There is a “rebound” effect for some people as the drug is wearing off. This effect may include headache or increased irritability and aggressiveness (Garber, et al., 1996).

The other stimulant used in ADHD treatment is Cyclert (pemoline). Current literature contains two disturbing reports. Cyclert has been taken off the market in Canada as of October, 1999. Liver complications including liver failure was cited as the reason (Hogan, 2000). In a study reported in Journal of American College Health researchers found that 46% of ADHD college students had adverse effects when treated with Cyclert (Heiligenstein & Anders, 1997).

As with any medication, there are some side effects when using stimulants. They might include insomnia, decreased appetite, weight loss, headache, irritability and stomachache. Psychotic episodes are a possibility up to 6% of the time (Cherland & Fitzpatrick, 1999). Stimulants may also cause ritualistic behaviors like excessive hand washing similar to obsessive compulsive disorder (Flick, 1998). Medication does not always make the patient feel happy. Some exhibit more anxiety and report not wanting to interact with peers (Garber, et al., 1996). Most patients will experience some of these at the onset of their medication routine, but usually the side effects will dissipate within a few weeks.

There are some people who should not take these medications: people with marked anxiety, motor tics (eye blink, muscle twitch, throat clearing), or a family history of Tourette's syndrome. Stimulants have been shown to intensify these problems if they are already present in the patient (Flick, 1998).

Decreased appetite and weight loss have been a concern for parents, and years ago there were reports of arrested growth in children taking stimulant medication. Study of this phenomena shows that there is no significant growth suppression and no effect on the onset of puberty for adolescents (DuPaul & Barkley, 1991).

The antidepressants. The antidepressants Tofranil (imipramine hydrochloride) and Norpramin (desipramine hydrochloride) have been found to be successful in the treatment of ADHD (Flick, 1998; Barkley, 1992). They are especially effective if the patient suffers from anxiety or depression plus ADHD. Their effects are not immediate; two to four weeks may pass before improvement in ADHD symptoms occurs. Because of the possibility of tachycardia, irregular heart beat, an electrocardiogram (EKG) is recommended before treatment begins and close monitoring should continue for the

length of the treatment. Other possible side effects are dry mouth, decreased appetite, headache, stomachache, dizziness, and constipation (Flick, 1998).

Antihypertensives. Usually prescribed to treat high blood pressure, Catapres (clonidine hydrochloride) has been shown to improve ADHD symptoms in hypertensive or very aggressive people (Flick, 1998). Sleepiness, hypotension, headache, stomachache, nausea, and dry mouth might all be experienced as side effects of this drug. Sudden withdrawal of the medicine can result in immediate elevation of blood pressure (Flick, 1998). Catapres in some studies appeared to interfere with the fine motor control of patients (Connor, Barkley, & Davis, 2000).

The positive aspects of ADHD medication. For the 70% of people who respond positively to prescribed ADHD medication, life seems to become easier, more “normal.” The stimulant medications have been found to inhibit impulsive responses, aggressive and disruptive behavior, and noncompliance with authority figure commands (DuPaul & Barkley, 1991). They enable the student to sustain attention in class and to do assigned work to the point that the student appears no different than his classmates. Recent studies show that ADHD students on medication improve in academic productivity and accuracy (DuPaul & Barkley, 1991). A Swedish study reported improvement in intelligence scores for children treated with stimulant medication (Bower, 1997). While these two studies reported that stimulants did help children’s academic performance, the majority of studies find no long term academic improvement due to medication (Garber, et al., 1996).

Social interaction becomes more acceptable. Children on Ritalin were found to be less aggressive, acted more positively toward their peers, and were generally more accepted by their peers (DuPaul & Barkley, 1991). With all these positive and pleasant

things happening in their lives, their self-esteem tends to elevate which makes life more enjoyable and worthwhile. Dr. Lawrence Greenberg, a longtime ADHD researcher, reports that while medication does not cure the disorder, it does help people to not develop the secondary problems of conduct disorder and depression (Shaughnessy & Martin, 1999).

One aspect of opposition to medication has been that treating children with medication so early in life sets them up to be drug abusers or drug addicted later in life. Actually, the opposite has been found to be true. If the ADHD condition is treated and controlled the person will have no need to seek illicit drugs. It is the untreated, out of control ADHD person who drives recklessly, seeks thrills, uses illegal drugs, and is likely to end up a denizen of one of our prisons (DuPaul & Barkley, 1991).

The negative aspects of ADHD medication. There is a societal stigma in this country for relying on medication instead of being strong and striving on your own to do the right thing (Leutwyler, 1996). Taking medication is seen as a weakness, a cop-out. Parents and children resist on this basis. Add this attitude to the anti-drug education at school and in the media, and you can understand the negative reactions ADHD sufferers are going to get from peers and parents. “Drugs” aren’t typically viewed as acceptable in our society.

Though the psychostimulants do not seem to be addictive, no really extensive studies have been done on long term use of Ritalin. The longest study so far has consisted of only fourteen months of medication and in that study, to maintain acceptable behavior, the dosage had to be progressively increased (Pelham, 1999). Why? Over time what does Ritalin do to brain chemistry? Most patients stay on medication only a little over a year (Pelham, 1999). What is the reason for that? We know that they aren’t “cured” in a year. Why aren’t ADHD people medicated around the clock so they can

reap benefits continuously? These are just a few of the gaps in knowledge about treatment using stimulant medications, lots of unanswered “whys.”

The “rebound” effect, or “coming down” in street vernacular, would have to be dealt with on a daily basis, a definite negative. Adjusting to your child on medication and then off medication might be difficult for parents and the ADHD person. Certainly, there probably aren’t going to be any Dr. Jekyll and Mr. Hyde situations, but the possibility for personality differences is always present.

It is estimated that 1% of children with ADHD treated with stimulant medication will develop a tic disorder or the medication will intensify an existing tic (DuPaul & Barkley, 1991). Tourette’s syndrome is also exacerbated by these medications and in some cases the medications have caused Tourette’s syndrome to develop (Flick, 1998).

Another disadvantage of medication is a controversial one: it’s too easy (Pelham, 1999). Once behavior improves, tensions subside, and life gets a little more enjoyable, parents and patient have a tendency to let the medication do all the work. They stop trying to help themselves or their child. Almost all psychologists and educators agree that medication should never be the only form of treatment. Unfortunately, if medication is used before any behavior modification or therapy is tried, there is less effort by both parents and doctors to make the behavior strategies work (Pelham, 1999).

As with any kind of medication there is always the possibility of abuse or mistaken misuse. With street names like “R-Ball” and “Vitamin R,” Ritalin has found a niche as a recreational drug among teens. Statistics out of Texas show that in 1991 there were 25 emergency rooms visits concerning Ritalin. By 1995 that number had jumped to 400 visits. In 1995-96 the Substance Abuse and Mental Health Services Administration found that of emergency room patients ages 10-14 nearly 75% said they had used Ritalin for psychic effects or recreation. In a 1997 survey by Indiana University of 44,232 students, a question about the nonmedical use of Ritalin revealed that 7% had used

Ritalin recreationally in the past year and 2.5% reported using it monthly or more often (Associated Press, 2000). Kentucky poison control centers report a large jump in the number of cases of overdose of Clonidine, the hypertensive prescribed for ADHD people. In 1990 they had only ten cases reported. In 1997 that number jumped to 65. Clonidine is taken in very small doses, and has some very serious side effects: respiratory depression, heart problems, and hypotension. Of the 285 cases reported from 1990 to 1997, half were from the child's own prescription, 25 from a sibling's medication, and 103 resulted from other relative's prescription ("Watch out," 1999).

One major flaw in the medication cycle now common for ADHD is the lack of follow-up or supervision by the physician, and lack of knowledge and assessment by the child's teacher ("Watch out," 1999; DuPaul & Barkley, 1991). Every person responds to medication differently. Optimum doses will take weeks or months to figure out if the people involved are paying attention, monitoring dosage and noting behavior, both academic and physical. In one survey of pediatricians less than half of them followed-up their patients' response to Ritalin with any kind of data collection (DuPaul & Barkley, 1991). This lack of supervision results in overdosage or underdosage for many patients.

What are the options in behavioral psychosocial treatments?

Behavior modification. This is probably the most prevalent treatment option for attention and behavior problems at home and school. Most parents practice behavior modification without even thinking about it every time they reward a child for a job done well, or offer a reward as an incentive for homework and chores getting done. Negative consequences such as spanking, time out, and loss of privileges are also behavior modification techniques. Both positive and negative behavior modification are a daily part of parenting and exist ubiquitously in today's classrooms.

For the normal student the behavior modification system being used in the classroom is part of the background, something he does not think about too often. However, for the ADHD student the behavior modification system is a major part of his/her day. Whatever the system used, if it is applied with consistency, cooperation, and compassion by both parents and teachers, it can be successful in helping “normalize” the world of the ADHD child as evidenced by the MTA study and many others.

Behavior modification is typically characterized by its creative reward systems. But as discussed previously, several ADHD researchers acknowledge that mild punishers have a place in behavior modification. Also, ignoring unacceptable behaviors can be a powerful tool in getting children to change.

Classroom accommodation. Not every student can fit into the same mold. Teachers need to be flexible. Classroom accommodations are things that will make living with an ADHD person much easier. ADHD students need lots of attention and frequent feedback, that’s why they do much better in a class with fewer students. Lowering the student to teacher ratio would help them and all of their classmates. A structured situation, four walls and desks in a row with a stable and predictable regimen, seem to favor the ADHD mindset. But there has to be some accommodation for their need to move. One researcher showed through EKG’s that ADHD children actually concentrate better when they are moving (Brim & Whitaker, 2000). Allowing the ADHD student to move to different situations, a special desk, a place in the hall, a reading corner with carpet and pillows, or to a study carrel may help him concentrate. A stand-up desk , lectern or podium, would offer a break from the monotony of sitting all day.

Frustration is another element of ADHD. A student can be easily overwhelmed and just quit if he is presented with work too difficult or too massive. Assignments need to be broken into small segments and be consistent with the student’s current level of

performance . The material needs to be made as interesting as possible. Use morning hours for more challenging instruction as attention and concentration wane in the afternoon hours. Peer tutoring or a “study buddy” system works well for ADHD children. Teaching style is a big factor in any student’s learning, but attention deficit students especially need lively presentation in order to stay tuned in on what is being taught. Adding color, music, or motor response to lessons appeal to all students.

Special education. Special education classes are an option for ADHD students. Both the Individuals with Disabilities Education Act (IDEA) and Section 504 of the Rehabilitation Act of 1973 provide opportunities for ADHD treatment in the special education system of a school. Up to 40% of ADHD students would qualify for special education (Barkley, 1992). These classes would provide a smaller, less competitive and more individualized learning environment for students with this disorder (Barkley, 1998).

Cognitive training. David B. Stein of Longwood College in Farmville, Virginia (Bower, 1998-a) conducted a study that showed impressive positive results with cognitive training. The parents of 37 children ages 5 to 11 were trained to identify problem behaviors, punish those behaviors immediately and have the child recall what he or she did wrong. Social activities were rewards for good behavior. The 37 children attended six sessions of cognitive therapy and were taken off all stimulant medications. The therapy sessions centered on thinking about what situations cause problem behavior, discussing alternative ways to act, and social skills instruction. When parent and child put their training into effect ADHD symptoms worsened slightly for one week and then improved over the next three weeks. One year later the parents reported that the

improved behavior and attention had not faded and none of the children had resumed taking medication (Bower, 1998-a).

Schools have had success teaching attention deficit students self management strategies. This is based on self instruction and problem solving work where the student works at his own pace, corrects his own work, and charts the results of that work. There is no empirical data to support the success of this strategy, but schools report positive effects on students taught this method (Shapiro, DuPaul, & Bradley-King, 1998).

Cognitive training using computer programs have shown improvement in ADHD symptoms in at least two studies. "Captain's Log" is a computer software program with a wide range of cognitive exercises designed to enhance attention, concentration, memory, eye-hand coordination, numeric concepts, and problem solving/reasoning skills. "THINKable" from IBM is another program that has been used with success for ADHD people (Kotwal & Burns, 1996).

Neurofeedback. One of the most promising options for ADHD treatment is neurofeedback, training your brainwaves. Technology has shown that ADHD people have too much theta wave activity and not enough beta wave activity in the brain. Today people can sit in front of a computer screen, strap some electrodes on their head and view their own brainwaves (Hartmann, 1997). With concentration, the waves can actually be controlled and trained. Research is showing us that the brain is much more trainable than once thought. Scientists theorize that regular brainwave training improves blood flow to particular regions. Dr. Joel Lubar, a University of Tennessee psychologist, claims that 90% of his patients with ADHD have benefited from neurofeedback. When combined with family therapy and a supportive school environment, many were able to eliminate the need for medication. It is emerging as a tool to treat epilepsy, anxiety, depression, head injuries, sleep disorders, and addictions (Robbins, 2000). Researchers Marianne

and Arreed Barabosz cite five other studies that found neurotherapy improved both long-term academic performance and social functioning (Barabosz & Barabosz, 1996).

One of the problems with neurofeedback is that it is expensive. The computers required currently are in the \$20,000 range, but a company is working on a smaller, cheaper model for about \$3,000 (Hartmann, 1997). At a clinic, evaluation and the twenty or more sessions the training requires cost \$2,000-\$5,000. Cost sometimes becomes inconsequential in the face of seemingly miraculous results as illustrated by Mr. Robbins' account of Jake Flaherty's neurofeedback experience in the June 19, 2000 issue of Newsweek.

Relaxation therapy. ADHD sufferers benefit from employing relaxation techniques (Garber, et al., 1996). Lower blood pressure is one of the tangible benefits of relaxation therapy. Renewed vigor and a more positive outlook, plus the ability to control aggression, irritability, and emotions are positive results reported by many who use relaxation therapy. Deep breathing or diaphragmatic breathing is one aspect of therapy. Progressive muscle relaxation training was first developed by Dr. Edmund Jacobson in the 1930's (Garber, et al., 1996) and is essentially the same system used for the Lamaze method for natural childbirth. Each muscle group in the body is tensed and then purposely relaxed until the whole body is in a tension-free state. Meditation and imagery are two more techniques that can be added to one's relaxation routine. Practice is necessary to become comfortable with these techniques.

Family therapy. In Scattered Minds, Dr. Mate (1999) concluded that family therapy is the most beneficial of all treatments for ADHD. A supportive home environment is almost essential for any treatment to succeed. Teaching a child coping strategies does no good unless those strategies are understood and supported by his family. It makes

ultimate sense to involve the whole family in therapy because research shows that ADHD tends to be genetic and the parents or siblings of the diagnosed child are quite likely to have ADHD themselves. If all family members are normal except the diagnosed child, the therapy can center on understanding the disorder, helping alleviate jealousy for special treatment, and family discord due to the tension ADHD people can cause in the home.

What are we to conclude with all this information?

Medicine and education are partners in the diagnosis and treatment of ADHD. The technology advances of our world have given the medical field powerful tools like magnetic resonance imaging and electroencephalograms that have facilitated the explosion in brain research, genetics and pharmacology. The education community has used this knowledge explosion as the foundation for improving behavioral and social treatments.

The ADHD world is getting brighter. Knowledge brings power and illumination, and the whole world prefers light over darkness, knowledge over ignorance. ADHD researchers are working to give the public the power to understand this disorder; the power to guide those who need it; and the power to induce change where change is needed. This information becomes the responsibility of the parents, patients, educators, and the general world to digest and process; but, most importantly, to use the inherent power of knowledge to improve life for ADHD students and adults. The ADHD people of the world will appreciate the effort, and we will all benefit.

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Appendix A
Journal Submission Cover Letter

15095 Pine Terrace Drive
Council Bluffs, Iowa 51503
July 30, 2000

Attn: Ms. Cheri Howman, Publications Assistant
National Middle School Association
4151 Executive Parkway, Suite 300
Westerville, OH 43081

Dear Ms. Howman:

Enclosed is an article I would like to submit for publication consideration in the Middle School Journal. The subject is attention deficit hyperactivity disorder and is extensively documented from research published within the last ten years. It consists of twenty-two pages of text, plus three pages of references. The title is "Attention Deficit Hyperactivity Disorder: Developments from the Last Decade Concerning Causes and Treatment."

This article has never been published or submitted to any other journal. In 1999 I did have a much shorter article, a general overview on the same subject, published in the Middle Level Educator, the journal of the Iowa Association for Middle Level Education, and reprinted in the Georgia Middle School Association's Becoming.

Following is my personal communication information:

Phyllis E. Damgaard
15095 Pine Terrace Drive
Council Bluffs, Iowa 51503
Phone: 712-323-7708
e-mail: PEDamgaard@aol.com

Thank you for your time and attention. I look forward to your response.

Sincerely,

Phyllis E. Damgaard

Appendix B

**Middle School Journal
Editorial Policy and Guidelines for Authors**

Middle School Journal

Editorial Policy and Guidelines for Authors

Middle School Journal, a refereed journal, is an official publication of National Middle School Association. The *Journal* publishes articles that promote middle level education and contribute to an understanding of the educational and developmental needs of youth between the ages of 10 and 15.

Articles submitted should specifically relate to the theory and practice of middle level education and should speak directly to practitioners in the field. The *Journal* seeks reports of successful programs, descriptions of effective techniques, thought-provoking essays, and application of research. The editor especially welcomes articles that focus on middle level schooling in urban settings and in rural or small schools.

The *Journal* publishes both thematic and general interest issues. *Middle School Journal* invites articles that have not been previously published and are not under review by any other publication. Manuscripts that do not meet the submission requirements will be returned to the author.

Submission Requirements

- Length** Manuscripts, including bibliography and references, should be in the range of 10 to 20 double-spaced pages. Tables, charts, and figures should be kept to a minimum, and if included should be placed at the end of the text.
- Format & Style** All text, including title, headings, quotations, bibliography, and references should be double-spaced with wide margins. The editor strongly encourages the use of sideheads which increase readability. For matters of style, authors should follow the guidelines of the *Publication Manual of the American Psychological Association* (Fourth Edition).

Submission Process

- Copies** Submit five clear copies, one with a cover page giving author(s) names, professional affiliation, home and work addresses and telephone. The names of the authors should appear only on the cover page.
- Submit to** *Middle School Journal*, Attn: Chen Howman, Publications Assistant, National Middle School Association, 4151 Executive Parkway, Suite 300 Westerville, OH 43081. Faxed or electronic submissions are not accepted.
- Acknowledgment** *Middle School Journal* acknowledges receipt of manuscripts by postcard. Manuscripts that meet submission requirements will be logged and sent to referees. Authors will be notified by letter of this action.
- Review Process** Three members of a manuscript review board read and evaluate independently each manuscript. A decision regarding publication will be reached within four months of the date that the manuscript is sent out for review. This decision will be communicated to the lead author. Articles will not be published until a copyright assignment form is received. Assignment forms will be sent with the letter of acceptance. Authors whose manuscripts are selected for publication will be asked to submit finished copies including any editorial changes on diskette.
- Editing** *Middle School Journal* reserves the right to edit manuscripts to improve clarity, to conform to style, and to fit available space.

Information for Contributors

Middle School Journal has a circulation of over 27,000 and is published five times during the school year — September, November, January, March, and May. *Middle School Journal* encourages manuscript submissions on all phases of middle school education. Manuscripts are initially reviewed by the editor. Each individual manuscript is given a careful reading. Manuscripts that meet the *Journal's* guidelines are forwarded to a panel of reviewers who are practicing professionals in all phases of middle school education. Author identities are kept confidential.

Manuscripts that do not meet the guidelines or are not ready for the complete review process are returned to authors with specific commentary. Often, authors are encouraged to resubmit the manuscript in a revised format or to an affiliate journal.

Contributors should be aware of additional points that influence a positive review at each level. Authors should avoid the following:

- generalities
- excessive adjectives
- personal asides
- passive verbs & constructions
- academic jargon
- references to "this author"

Manuscript references must be in correct APA style. Please consult the *Publication Manual of the American Psychological Association* (Fourth Edition).

The *Journal* will not consider manuscripts that are undergoing review by another publication or have been previously published. If accepted, authors must sign a statement that transfers copyright to National Middle School Association.

Based upon reviewer comments, the following is a partial list of reasons for the rejection of manuscripts:

- The manuscript relates a personal, not a professional experience.
- The subject is so overly specialized it would appeal only to a small segment of readers.
- The material in the manuscript is neither timely nor new in its insights.
- The manuscript is largely in list format.
- The manuscript is a research report rather than an interpretation or application of research.
- The manuscript promotes a person or commercially available product.

Policy on Letters to the Editor

The *Journal* publishes brief comments in response to articles it publishes. Letters to the Editor are published in accordance with these guidelines:

- Must be limited to 200-300 words.
- Should directly address a point made in a published article.
- Must be issue-oriented and not personal.
- Must not promote commercial products or services.
- Will be subject to editing for clarity and space considerations.