2013

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Attention Deficit Disorder in Adults, Nutritional Deficiencies, and the Treatments Available: A Literature Review

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Abstract

The prevalence of attention deficit hyperactive disorder (ADHD) in adults has steadily increased within the past decade. However, very few people are aware they have this disorder. Those with ADHD have higher divorce rates, school dropout rates, job termination, car accidents, and higher rates of substance abuse and alcohol dependence (Kates, 2005; Tcheremissine & Lieving, 2009). A high comorbidity rate with ADHD, anxiety, and depression has been found. This literature review includes the significant nutritional deficiencies such as neurotransmitters, trace minerals, omega-3 fatty acids, and several B vitamins which are found in people with ADHD, and a description of the four main medications most commonly prescribed along with their side effects, and a list of the natural foods and supplements that can be used to assist with the symptoms of ADHD and the most common mental disorders that accompany it.

Introduction

Those adults with attention deficit hyperactivity disorder (ADHD) struggle on a daily basis with arriving on time at a destination, interpersonal communication, meeting job deadlines, money management, simple household chores, and misplacing or forgetting important items, documents, and appointments. ADHD has been highly diagnosed in children since the 1960s. The diagnosis has rapidly increased to an estimated 2.4 million, 9% of all children in the United States as of 2009 (Akinbami, Liu, Pastor, & Reuben, 2011; Tcheremissine & Lieving, 2009). It was previously believed that once a child matured through puberty they no longer had the disorder. However, within the past decade it has been widely accepted that ADHD can continue into adulthood. Up to 70% of adults diagnosed with ADHD as children still retain symptoms into adulthood (Matas, 2006). It is estimated that approximately nine million, 4.4% of adults in the United States struggle with ADHD (Kessler et al., 2006; Tcheremissine & Lieving, 2009). Of these estimated nine million adults with ADHD, only 11% are currently diagnosed and in treatment (Tcheremissine & Lieving, 2009).

There are many negative misperceptions associated with adults that have this disorder. For example, these individuals may be called careless, disorganized, flighty, irresponsible, lazy, negligent, stupid, underachievers, uncaring, or unmotivated. These misperceptions are especially true for those who do not have ADHD and cannot contemplate the daily struggles this disorder can cause for an individual with it. Adults that have ADHD and are not aware they have it are impacted the most negatively by it. Those that are undiagnosed have higher rates of divorce, incarceration, job instability, substance abuse, and are more likely to flunk out of school (Kates, 2005; Tcheremissine & Lieving, 2009). It is easy to see how having undiagnosed and untreated ADHD can lead to anxiety, depression, and substance abuse. No matter how hard they try they cannot consistently meet the demands required of them to live a fulfilling and prosperous life.

Symptoms and Diagnosis of ADHD

According to the Diagnostic and Statistical Manual of Mental Disorders-Fourth Edition Text Revision (DSM-IV-TR) (American Psychiatric Association (APA), 2000), there are three types of ADHD. The three types are: predominately inattentive type, predominately hyperactive-impulsive type, and combined type. There are multiple symptoms that the DSM-IV-TR (APA, 2000) lists under three headings: inattentive, hyperactivity, and impulsivity (see...
Appendix). The individual must experience at least six of the symptoms listed under either inattention type or hyperactivity and impulsivity types combined. These symptoms must have been present for at least the past six months to the point where they are disruptive to the individual’s life (APA, 2000). Some of these symptoms must have been present before the age of seven, and some of them must be present in at least two areas of the individual’s life causing impairment (APA, 2000). For example, an individual might have difficulty with both completing school work and maintaining a clean home. There must be clear evidence proving that the individual has significant impairment at home, work, school, or in social settings. Finally, the symptoms must be consistent for the individual and not merely associated with any other mental disorders (APA, 2000).

Comorbidity and ADHD

In evaluating the daily life struggles of individuals with ADHD, it is understandable why they would develop other psychological disorders. If others consistently view an individual with ADHD as lazy, irresponsible, and unmotivated it could drastically affect both their self-esteem and self-efficacy. This low self-worth could most certainly cause depression. Eventually, this person would dread work and deadlines because, based on experience, they know they will not be able to meet expectations placed on them, and may lose their job because of it. It is also understandable that these individuals could develop an anxiety disorder because of this. It is not uncommon for someone who suffers from an anxiety disorder to also suffer from insomnia, which is also found to be common in adults with ADHD. If an individual has undiagnosed ADHD, is depressed, suffers from anxiety, and insomnia, it is also understandable that they could turn to substance abuse as an attempt to self-medicate. According to the National Comorbidity Survey Replication the comorbidity rates for adults with ADHD were 59% for anxiety, 45% for mood disorders, and 36% for substance use disorders, based on lifetime prevalence (Kessler et al., 2006). From this study, comorbidity among adults with ADHD is evidently and reasonably common.

Biological correlations with nutrition deficiencies

With anxiety and depression commonly present in adults with ADHD it is important to understand the biological correlations associated with all three mental disorders and not just with ADHD. Young, Maharaj, and Conquer (2004) conducted a study analyzing the phospholipid fatty acids (PUFA) present in the blood stream of 88 adult subjects. There is evidence that abnormalities in certain long-chain PUFA (LCPUFA) can be associated with both mood disorders and ADHD in adults (Young et al., 2004). Young et al. (2004) found that the group with ADHD had significantly lower saturated and polyunsaturated fatty acid levels in their blood serum as well as lower docosahexaenoic acid (DHA) levels, which is commonly known as an omega-3 fatty acid. Zinc, copper, and B vitamins, especially folate, have also been found to be significantly deficient in children with ADHD (Kiddie, Weiss, Kitts, Levy-Milne, & Wasdell, 2010). This study has not been repeated in adults. However, it seems reasonable to project that the similarities found between children and adults with ADHD, in regards to other nutritional deficiencies is enough to predict zinc, copper, and vitamin B6 would be deficient in adults as well.
Lakhan and Vieira (2008) researched deficiencies in several different mental disorders. They found that those suffering from depression had significant deficiencies in the neurotransmitters serotonin, dopamine/noradrenaline, and gamma-aminobutyric acid (GABA) (Lakhan & Vieira, 2008). Omega-3, folate/vitamin B, magnesium, and S-adenosylmethionine (SAM) were also found as deficient in those with depression (Lakhan & Vieira, 2008). The participants with anxiety were also found to have deficiencies in serotonin (Lakhan & Vieira, 2008).

The exact etiology of ADHD has not been precisely determined. However, it is believed that a dysfunction of the dopamine receptors influences the cognitive disorganization those with ADHD experience. Through the use of functional MRIs and positron emission topographies, brain researchers have been able to validate the neurobiological features of ADHD (Weiss & Murray, 2003). It has long been understood that the frontal cortex of the brain is what manages critical thinking, organization of ideas, and problem solving. Researchers have found that the frontal cortex shows significantly less activity in people with ADHD (Wilens et al., 2008).

**Treatments of ADHD**

**Medication.** The most common treatment option that is used in the United States to treat ADHD is pharmaceuticals. Benzedrine was the first treatment administered for ADHD in children (Perera, Padmasekara, & Perera, 2007). Strohl, (2011) reviewed the history of Charles Bradley and his work with children. He conducted a study on “problem children”, administering Benzedrine Sulfate, which was published in 1937. Bradley’s focus was to treat headaches in these children caused from other experimental treatments he was performing on them. However, the results showed significant improvement in mental performance, motivation, and drive for achievement. Unfortunately, the idea of medicating children was not considered ethical in the 1930s, so this treatment was not widely accepted until the late 1950s (Perera et al., 2007; Strohl, 2011). Ritalin (methylphenidate) was the first widely accepted treatment for children with behavioral disorders. Psychiatrists began prescribing Ritalin to children in 1956 (Strohl, 2011).

Currently the main pharmaceuticals used in treating ADHD for both children and adults are dexamphetamine (Adderall), methylphenidate (Ritalin), atomoxetine (Strattera), and bupropion (Meijer, Faber, Ban, & Tobi, 2009; Perera et al., 2007; Tcheremissine & Lieving, 2009; Weiss & Murray, 2003). Adderall and Ritalin are both stimulant medications and are the most commonly prescribed of the four listed. The reason the stimulants are prescribed as a treatment is because they block the reuptake of dopamine and norepinephrine and also increase the release of these monoamines (Tcheremissine & Lieving, 2009).

Unfortunately, with all medications there are always side effects. The most frequent side effects reported for stimulants are problems sleeping and loss of appetite (Meijer et al., 2009; Tcheremissine & Lieving, 2009; Weiss & Murray, 2003). However mild these side effects seem, they could lead to insufficient nutrition and sleep deprivation which would only increase the symptoms of ADHD. The minor side effects that adults have reported have been dry mouth, headaches, insomnia, irritability, loss of appetite, stomach aches, and skin picking (Meijer et al., 2009; Tcheremissine & Lieving, 2009; Weiss & Murray, 2003).
The severe side effects of these stimulant medications are possible cardiovascular effects (Meijer et al., 2009; Tcheremissine & Lieving, 2009; Weiss & Murray, 2003). These include increased blood pressure, cardiac rhythm, and heart rate. Though these severe symptoms are rarely reported, they have lead to deaths in those with preexisting heart conditions (Meijer et al., 2009). There is also concern that stimulants are easily addictive and can lead to substance abuse (Tcheremissine & Lieving, 2009; Weiss & Murray, 2003).

Strattera encourages dopamine production and activity in the frontal cortex and is a selective norepinephrine reuptake inhibitor (Matas, 2006). Negatively, it has also been found to have cardiovascular effects even though it is a non-stimulant medication (Meijer et al., 2009; Tcheremissine & Lieving, 2009). An increase in suicidal ideation has also been found in adolescents taking Strattera (Meijer et al., 2009). The minor side effects that have been reported from taking Strattera are constipation, dizziness when standing, dry mouth, erectile dysfunction, insomnia, and nausea (Matas, 2006; Tcheremissine & Lieving, 2009; Weiss & Murray, 2003). There are no concerns with substance abuse with those that take Strattera because it is not a stimulant medication.

Buproprion is one of the most recent medications prescribed for ADHD. Rather than the typical stimulant medications, Buproprion is an antidepressant (Tcheremissine & Lieving, 2009; Weiss & Murray, 2003). Because it is not a stimulant it is not a concern for substance abuse among those taking it. The minor side effects for Buproprion are headaches and insomnia (Matas, 2006; Tcheremissine & Lieving, 2009; Weiss & Murray, 2003). There are no concerns with substance abuse with those that take Buproprion because it is not a stimulant medication.

Several of the side effects from these medications can be quite severe. It is always important to consider the side effects before taking any medication that is meant to treat symptoms of ADHD. Unfortunately, medications can also be expensive and some cannot afford the prescriptions on a monthly basis as they would be needed. Fortunately, there are other alternative treatments for ADHD if someone chooses to avoid taking these medications.

**Alternative Treatments for ADHD**

There are several alternative treatments for ADHD that can be used to avoid pharmaceuticals. Among these are acupuncture, audio-visual entrainment, cerebellar stimulation, coaching on life skills and how to adapt to having ADHD, herbal remedies, nutritional supplements, and psychological treatment including cognitive-behavioral therapy (Perera et al. 2007; Weiss & Murray, 2003). Unfortunately, the majority of these treatments are expensive and/or take an extensive amount of time to reach the desired results.

Of these alternative treatments, nutritional supplements and herbal remedies are the least expensive and have relatively immediate results in comparison. There have been several studies which have found significant correlations between certain nutritional deficiencies and ADHD (Kiddie et al., 2010; Lakhan & Vieira, 2008; Young et al., 2004). A major proponent for proper brain functioning are omega-3 fatty acids (Holford, 2003; Lakhan & Viera, 2007; & Murray, 2003). It is recommended that if someone has a history of an eating disorder, alcohol dependence, or seizures that they do not take Buproprion because the chance for seizures is increased (Matas, 2006; Weiss & Murray, 2003).
McNamara et al., 2010; Sathyanarayana Rao, Asha, Ramesh, & Jagannatha Rao, 2008; Young, Conquer, & Thomas, 2005). These fatty acids are found in numerous natural food sources and can also be taken as nutritional supplements. A commonly known supplement for Omega-3 is fish oil. The suggested safe supplement dosages for fish oil vary from 400mg to a maximum of 1200mg daily to ease symptoms of both ADHD and depression (Lakhan & Viera, 2007; McNamara et al., 2010). The food sources omega-3 fatty acids can be found in are eggs, fish, flax seed, meat, poultry, and seafood. Fish and seafood yield the highest levels of omega-3 (Holford, 2003; Meyer et al., 2003; Young et al., 2005).

Copper and Zinc have also been found to be deficient in those who have ADHD (Kiddie et al., 2010). It is not advised to take individual supplements for copper or zinc without seeking a medical professional. The trace minerals are vital for proper bodily functioning; however, high levels of these minerals can be poisonous, causing severe medical problems, and in extreme cases death (Ma & Betts, 2000). The best way to safely increase these trace minerals in the system is by increasing the number of foods that include them to the diet. Copper is naturally found in beef, chocolate, legumes, nuts, potatoes, seeds, and shellfish. Zinc occurs naturally in beef, hot cereals (grains), lamb, legumes, oysters, pork, and poultry (Ma & Betts, 2000). Both copper and zinc play a role in the production of dopamine and noradrenaline (Kiddie et al., 2010). Deficiencies in these neurotransmitters have also been found not only in those that suffer from ADHD, but depression, mood disorders, and other mental disorders (Kiddie et al., 2010; Lakhan & Viera, 2007; Sathyanarayana Rao et al., 2008). Another trace mineral deficiency that has been linked to depression is Magnesium (Lakhan & Viera, 2007; Sathyanarayana Rao et al., 2008). Magnesium is most commonly found in broccoli, meat, oranges, sunflower seeds, tomatoes, and whole wheat (Karppanen, Karppanen, & Mervaala, 2005).

B vitamins, specifically B6, B12, and folate, have also been found deficient in individuals with ADHD and/or depression (Holford, 2003; Kiddie et al., 2010; Lakhan & Viera, 2007; Sathyanarayana Rao et al., 2008). The production and control of several neurotransmitters depends on the presence of these B vitamins (Holford, 2003; Sathyanarayana Rao et al., 2008). B12 specifically, has been related to increasing activity in the frontal lobe (Sathyanarayana Rao et al., 2008). Extreme folate deficiencies are commonly found in individuals with depression (Holford, 2003; Sathyanarayana Rao et al., 2008). When folate supplements are combined with antidepressant medications there is significantly higher improvement and quicker recovery rates than those with antidepressants alone (Holford, 2003; Sathyanarayana Rao et al., 2008). Foods high in B vitamins are asparagus, bananas, beans, beef liver, broccoli, cantaloupe, chickpeas, grapefruit, greens (collard, mustard, turnip, etc.), lentils, lettuce, orange juice, other legumes, peanuts, spinach, strawberries, and tomato juice (Rampersaud, Kauwell, & Bailey, 2003). Enriched grains, that have had folic acid added to them, can also easily be found in most ready to eat breakfast cereals distributed in the United States (Rampersaud et al., 2003).

Several neurotransmitters, such as, serotonin, dopamine, adrenaline, and noradrenaline are also found significantly deficient in individuals who have anxiety, ADHD, and/or depression (Bruinsma & Taren, 1999; Holford, 2003; Kates, 2005;
Serotonin has specifically been found to influence mood, whereas dopamine, noradrenaline, and adrenaline have been found to influence motivation (Holford, 2003). In order to produce serotonin the body needs the amino acid tryptophan. Tryptophan is most commonly known to be found in turkey. The tryptophan is then turned into 5-hydroxytryptophan (5-HTP) with the help of vitamins B and C, and Zinc (Holford, 2003). From 5-HTP the body can then create the neurotransmitter serotonin. The administration of 5-HTP has been shown to result in significant improvement of depression, anxiety, insomnia, and even mental focus, equivalent to antidepressants if not even better (Holford, 2003). What is disturbing is that doctors and psychiatrists virtually never prescribe 5-HTP, even though it is readily available at any nutrition store, is relatively inexpensive, and has significantly fewer side effects than any of the medications that are normally prescribed (Holford, 2003). Direct sunlight also stimulates serotonin production (Holford, 2003). Dopamine, noradrenaline, and adrenaline need proteins for the body to be able to produce these neurotransmitters. These proteins can be found in meat, milk, eggs, legumes, nuts and grains (Sathyanarayana Rao et al., 2008). Another excellent food that stimulates serotonin and dopamine production, as well as being an excellent source of magnesium, is chocolate (Bruinsma & Taren, 1999). Finally, recent studies have found L-theanine to have a significant influence on the production of serotonin, dopamine, and gamma aminobutyric acid (GABA) (Lyon et al., 2011). This non-protein amino acid is found naturally in green tea leaves and has been found to reduce stress and slow brain waves, as well as, improve mood, alertness, and cognitive/mental performance (Lyon et al., 2011). Not only has L-theanine been found to increase focus and alertness, but it has also been found to promote relaxation and improve quality of sleep (Lyon et al., 2011).

There is evidence to support that the prevalence of ADHD is ever increasing among both children and adults. In 2003 the estimated prevalence was 4% among children and 2% among adults (Weiss & Murray, 2003). In 2005 the estimated prevalence had increased in both children and adults. Studies at that time estimated 6% to 9% of children and 3% to 6% of adults had ADHD (Kates, 2005). A national study done in the United States by Kessler et al. (2006) determined only a 4.4% prevalence rate of ADHD in adults. In 2007 again, the estimated prevalence had changed. It was then determined 6.9% to 10.3% of children suffered from ADHD and 50% of adults that were diagnosed as children continued to struggle with symptoms (Perera et al., 2007). Akinbami et al. (2011) looked at how the prevalence of ADHD had changed from 1998-2009 in the United States. They found that ADHD had increased in diagnosis from 7% of all children between 1998-2000, to 9% of all children between 2007-2009 (Akinbami et al., 2011). In assessing and comparing these numbers it becomes clear that the estimated prevalence was based only on those children that were actually diagnosed with ADHD. Tcheremissine & Lieving (2009) explain that in 2009 the estimated prevalence of adults with ADHD was still only 4.4%. This percentage was determined from the 8.7% of children in the United States that currently were diagnosed with ADHD and the assumption that only 40% - 65% of the children diagnosed would experience symptoms into adulthood (Tcheremissine &
It is then stated that only 11% of adults that have ADHD were receiving treatment for it (Tcheremissine & Lieving, 2009). If these adults had been diagnosed as children with ADHD, is it really conceivable that 88% of them would stop seeking treatment when these symptoms are something they would struggle with on a daily basis? These gaps in estimation for the prevalence of ADHD in adults and the additional gap of three years between 2009 and 2012, considering the previous increasing trend in diagnosis, signifies the possibility that significantly more than 4.4% of adults in the United States struggle with ADHD.

Previous studies support the prevalence rates for the diagnosis of ADHD in children and adults have steadily increased of the past 14 years (Akinbami et al., 2009). Currently the most commonly used treatments for ADHD are pharmaceuticals (Meijer, Faber, Ban, & Tobi, 2009; Perera et al., 2007; Tcheremissine & Lieving, 2009; Weiss & Murray, 2003). Even though, there are several supplements through past studies which have been found as effective as pharmaceuticals in treating the symptoms of ADHD, they are very rarely prescribed to patients who have been diagnosed with ADHD (Holford, 2003).

Typically, southern dishes are overly cooked until the majority of the nutrients are cooked out of the foods. Therefore, there is a possibility that the southern diet may correlate with the nutritional deficiencies found with ADHD. College students specifically, tend to neglect a balanced diet. Often times this is because of a lack of funds to purchase the proper foods; instant microwavable meals, pizza, and ramon noodles are not uncommon staples of a college student’s diet. Another factor influencing their diet could be the lack of time available for them to cook proper meals. Especially during finals week students consume mainly “comfort foods” as they cram for their exams. This poor diet could certainly play a role in developing nutritional deficiencies that would correlate with ADHD. There is a possibility ADHD may be more prevalent among college students than the general population because of these eating habits and possible nutritional deficiencies. Significantly more research should be done to determine if first, food preparation and diet may correlate with the deficiencies found with ADHD, second, if ADHD is found to be more prevalent among college students than the general population, and third, if ADHD is found to be more prevalent in the southern US than in other areas of the country.

There are also several limitations with this literature review. First, this review only discusses common treatments used in the United States. ADHD has been recognized and diagnosed around the world (Kiddie et al., 2010; Meijer et al., 2009; Meyer et al., 2003; Perera et al., 2007). It is very possible that other treatments or supplements/herbs that have been found successful in treating the symptoms of ADHD, but because of the lack of empirical literature on them they cannot be included in this literature review.

Another limitation of this literature review is that it only briefly mentions a number of alternative treatments for ADHD. Biofeedback and audio-visual entrainment are among the newest treatments available for ADHD. Unfortunately, there is very limited literature regarding these treatments. The availability of published research within the past three years regarding ADHD is also very limited and therefore could not be included in this review. A more thorough review including more literature published
within the past three years would certainly add to the significance of this literature review.

There are several implications from this literature review. The first is a presentation leading to the clear understanding that the prevalence rates of adults with ADHD has steadily increased over the past decade (Akinbami et al., 2009). The estimation that only 11% of adults with ADHD were being treated for their symptoms, as of 2009, suggests that there are millions of adults in the United States that are struggling in their day to day lives with this disorder (Tcheremissine & Lieving, 2009). There is a very clear description of the symptoms of ADHD. Individuals who can relate to these symptoms can now seek medical help if they choose to. Hopefully this literature review will bring awareness and understanding to both undiagnosed individuals seeking relief, and those that may know someone that struggles with the symptoms of ADHD.

The second implication of this literature review is that it includes a thorough description of the nutritional deficiencies that correlate with ADHD, as well as the most common mental disorders that accompany this disease. There is also a detailed explanation of the supplements and foods that can help to put those deficiencies back into balance in treating the symptoms of ADHD. To date there is very limited literature if any recent empirical works including both the nutritional deficiencies of ADHD and the supplements and foods that contain exactly what the body needs to offset these deficiencies. There is also limited literature describing all of the main medications that are prescribed for ADHD, along with the reported side effects of these medications. Individuals can now make an educated decision in seeking treatment for the symptoms of ADHD.

This literature review brings awareness of the several natural treatment options available. Not only are natural treatments available, but they have significantly fewer side effects than the typical medications that are prescribed. (Holford, 2003). These supplements are also significantly less expensive than the typical prescriptions (Holford, 2003). ADHD is a disorder that if gone untreated can cause an individual to struggle every day of their life; constantly wondering why they can’t seem to complete anything they start, or why they can’t get the things done that they need to. The hidden truth is, there are steps that can be taken for an individual suffering with ADHD. Whether an individual decides to seek a medical professional for a prescription, or decides to use natural supplements and a change in diet to treat their symptoms of ADHD, there are clear options now available for an individual to make an educated decision. ADHD can certainly be a debilitating disorder for those who suffer from it, but it doesn’t have to be. There are treatments available for those individuals with ADHD so they can regain their independence and their sense of achievement.

References


Young, G. S., Conquer, J. A., & Thomas, R. (2005). Effect of randomized supplementation with high dose olive, flax or fish oil on serum phospholipid fatty acid levels in adults with attention deficit hyperactivity disorder. EPD Sciences, 45, 549-558. doi:10.1051/rnd:2005045

### Appendix

<table>
<thead>
<tr>
<th>DSM-IV-TR (APA, 2000) criteria for Attention Deficit Hyperactivity Disorder (ADHD)</th>
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<tbody>
<tr>
<td><strong>INATTENTION</strong></td>
</tr>
<tr>
<td>• Fails to pay close attention to details or makes careless mistakes in schoolwork, work, or other activities</td>
</tr>
<tr>
<td>• Has difficulty sustaining attention in tasks or play activities</td>
</tr>
<tr>
<td>• Does not seem to listen when spoken to directly</td>
</tr>
<tr>
<td>• Does not follow through on instructions and fails to finish schoolwork, chores, or duties in the workplace</td>
</tr>
<tr>
<td>• Has difficulty organizing tasks and activities</td>
</tr>
<tr>
<td>• Avoids, dislikes, or is reluctant to engage in tasks that require sustained mental effort</td>
</tr>
<tr>
<td>• Loses things necessary for tasks or activities</td>
</tr>
<tr>
<td>• Easily distracted by extraneous stimuli</td>
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<tr>
<td>• Forgetful in daily activities</td>
</tr>
<tr>
<td><strong>HYPERACTIVITY OR IMPULSIVITY</strong></td>
</tr>
<tr>
<td>• Fidgets with hands or feet or squirms in seat</td>
</tr>
<tr>
<td>• Leaves seat in classrooms or other situations in which remaining seated is expected</td>
</tr>
<tr>
<td>• Runs about or climbs excessively in situations in which it is inappropriate</td>
</tr>
<tr>
<td>• Has difficulty playing or engaging in leisure activities quietly</td>
</tr>
<tr>
<td>• Is always “on the go” or acts as if “driven by a motor”</td>
</tr>
<tr>
<td>• Talks excessively</td>
</tr>
<tr>
<td>• Blurts out answers before questions are completed</td>
</tr>
<tr>
<td>• Has difficulty awaiting turn</td>
</tr>
<tr>
<td>• Interrupts or intrudes on others.</td>
</tr>
</tbody>
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