

Running head: TEACHER KNOWLEDGE OF ADHD

Assessing Ohio's Teacher Knowledge of Attention Deficit Hyperactivity Disorder (ADHD):  
Are Current Teachers Adequately Prepared to Meet the Needs of Students with ADHD?

A Master's Research Project Presented to  
The Faculty of the College of Education  
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This Master's Research Project has been approved  
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**Abstract**

The principle issue investigated in this study was to evaluate the preparedness of Ohio teachers' ability to meet the needs of students with Attention Deficit Hyperactivity Disorder (ADHD). A 71-item questionnaire collected demographic and empirical data and assessed Ohio teachers' knowledge of ADHD across five domains: assessment and evaluation, causes, characteristics, prevalence, and treatment. Results support the current and past studies that have time and time again supported the fact that teachers lack adequate knowledge of Attention Deficit Hyperactivity Disorder.

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Attention Deficit Hyperactivity Disorder (ADHD) is the most commonly diagnosed childhood psychiatric disorder in the United States (American Psychological Association [APA], 2000; Barkley, 2010; Pastor & Reuben, 2008). Presently, ADHD is the term used to describe the neurobehavioral and developmental disorder comprised of developmentally inappropriate behavior (APA, 2000) with deficits in behavioral inhibition, sustained attention, resistance to distractions, and the regulation of one's activity level on the demand of a given situation (Barkley & Murphy, 2006; Rief, 2005). ADHD is not a new disorder. The evolution of the term and updates in definition span over 100 years (APA, 1967, 1980, 1987, 1994, 2000). Research supporting its existence across time should validate rather than minimize the disorder (Clements & Peters, 1962; Sandoval, 1977). Unfortunately, controversy comes with any disorder without clear-cut answers; especially, its increase in public awareness over the last twenty years. This leaves the door wide open for myths and misconceptions to run rampant throughout society.

Teachers are not immune from this confusion. ADHD is most commonly associated with problems in school resulting in schools serving as the major provider for treatment services (Cheng & Jetmalani, 2009). Having the ability to decipher fact from fiction to employ adequate interventions is becoming increasingly difficult and time consuming (Hinshaw, 2000). As a result, educators are at an extreme disadvantage. In fact, teachers have described the core symptoms of ADHD as “intriguing, beguiling, and complicating” to select and implement appropriate strategies for their students (Dowdy, Patton, Smith, & Polloway, 1997); therefore, it is critical for teachers to have up-to-date and accurate information due to the increasing number of diagnosed students coming into the classroom each year. The characteristic inattentiveness, hyperactivity, and impulsivity make it difficult to succeed in social situations (APA, 2000; Barkley & Fischer, 2010) which result in a controlled classroom setting full of difficult obstacles

instead of productive learning experiences. One question not in the forefront of research, but one that should be addressed inquires: do teachers have the knowledge and ability to reach these students in an environment that is currently set up for failure?

Most studies cite the estimated range of school-aged children in the United States diagnosed with ADHD ranging between 3-5% (APA, 2000); however, data from surveys conducted by the Centers for Disease Control (CDC) (National Center for Health Statistics [NCHS], 2009; Pastor & Reuben, 2008) show a steady increase over the last decade. The national prevalence of ADHD among school-age children has increased from 7-10% since 2005, a fact that will be discussed further later in this paper (See Figure 1).

This trend is apparent even at the state level. Ohio jumped from 19<sup>th</sup> to 8<sup>th</sup> in the national rankings for students diagnosed with ADHD. Over a period of four years, the number of students diagnosed with ADHD in the state of Ohio increased 43% (National Survey of Children's Health [NSCH], 2003, 2007). For Ohio teachers, this translates into an average class size of 22 students, with approximately three students diagnosed with ADHD at any given time (Education Management Information System [EMIS], 2010; Harlacher, Roberts, & Merrell, 2006).

The number of students diagnosed is certain to increase exponentially (Wolraich, Hannah, Pinnock, Baugaertel, & Brown, 1996) with the American Psychiatric Association's announcement of publication of the 5<sup>th</sup> edition to the Diagnostic and Statistical Manual of Mental Disorders (DSM-V) set to be released in 2013 (APA, 2010a). Changes will be occurring in the diagnostic criteria for Attention Deficit Hyperactivity Disorder (ADHD). Notably, changes include the increased age from 7 to 12 years for symptoms to become apparent (Faraone et al., 2006; Polanczyk et al., 2010; Todd, Huang, & Henderson, 2008) and the elaboration of criteria

descriptions (Coghill & Seth, 2010; Woo & Rey, 2005). Updating these core areas in the diagnosis will better reflect the research but may cause enormous obstacles for educators (Barkley, 2010; Kordon, Kahl, & Wahl, 2006).

Teachers know all children experience instances when attention and behavior become problematic and managing these issues is an ongoing challenge encountered on a daily basis; however, students with ADHD can experience difficulties so frequent and severe they interfere with their ability to function within the norm (Daley & Birchwood, 2009). Children experiencing school difficulties, academic underachievement, and trouble with peers, not only chips away at their self esteem (Danckaerts et al., 2010) but can impact a teacher's as well (Glass, 2001; Glass & Weigar, 2000). In attempting to live up to the common theme in today's academic setting of holding teachers responsible for managing students' behavior in a manner that allows for productive learning experiences for all, it is critical teachers take the initiative to educate themselves in preparation for the possible influx of students with ADHD and to successfully advocate for them (Bell, Long, Garvan, & Bussing, 2011; Rief, 2005). The following study reveals just how much of an initiative teachers will need to take. Just how prepared are current teachers to construct a classroom environment conducive to learning for students diagnosed with ADHD?

### **Review of the Literature**

After consulting medical, educational, and psychological databases, such as: Medline, Education Research Complete, ERIC, PsycINFO, Google Scholar, Academic Research Complete, and Social Sciences Index; a compilation of peer reviewed research on Attention Deficit Hyperactivity Disorder was extracted for review. All relevant literature fell into one or

more of the following areas: definition, assessment/evaluation, causes, characteristics, prevalence, treatment, and teacher's knowledge of the disorder.

### **Definitions of Attention Deficit Hyperactivity Disorder**

**National definition.** The American Psychiatric Association (APA) determines and publishes the definitions and set criteria for any mental disorder in the United States. Currently, the Diagnostic Statistical Manual of Mental Disorders (DSM-IV-TR) (APA, 2000) states Attention Deficit Hyperactivity Disorder (ADHD) can be defined by observed behaviors categorized into one, two, or three types: predominately inattentive, predominately hyperactive-impulsive, or combined hyperactive-impulsive and inattentive while showing a characteristic pattern and cognitive functioning which presents difficulties in two of the following areas: social, educational or work performance. The persistent pattern is more frequent and severe than typically observed in developmentally comparable individuals (Efron, Sciberras, & Hassell, 2008).

**International definitions.** Some countries use the definition provided by the DSM-IV-TR; however, others implement different terminology and definitions. For example, some use the International Classification of Diseases (ICD) released by the World Health Organization (WHO). The ICD defines all known diseases and disorders. The current International Classification of Diseases (ICD-10) (1992) does not recognize the term ADHD; however, refers to Hyperkinetic Disorders, a group of disorders “characterized to be early onset, a combination of overactive, poorly modulated behavior with marked inattention and lack of persistent task involvement, and pervasiveness over situations and persistence over time of these behavioral characteristics” (p. 206).

Clinical researchers have also defined ADHD in a variety of ways. The International Consensus Statement of ADHD defines it as a developmental neurobehavioral disorder involving a serious deficiency in a set of psychological abilities characterized by developmentally inappropriate degrees of inattention, over activity, and impulsivity (Barkley et al., 2002). Biederman and associates (2011) add that is often arising in early childhood, relatively chronic in nature, not accounted for on the basis of another medical or mental condition, as well as, associations with deficits in rule-governed behavior and functional impairments across multiple academic and social domains (Barkley & Murphy, 2006).

**Future direction.** ADHD is a disorder with ever-evolving definitions and terminology. The evolution of definitions and terminology over the last century has affected the present global consensus, which has been recognized among the scientific community. In 2002, to help alleviate worldwide confusion and give once and for all an international view of ADHD, Barkley along with over eighty international clinical researchers released an International Consensus Statement on ADHD. Official definitions and diagnostic guidelines are due to be published in 2013 and 2015 with the release of the DSM-V and ICD-11, respectively. Researchers have been working together to remedy the conflicts and inconsistencies (APA, 2010b). Both publications are attempting to implement a worldwide consensus for terms and definitions to better reflect current research.

### **Assessment and Evaluation for Attention Deficit Hyperactivity Disorder**

Attention-deficit/hyperactivity disorder (ADHD) is recognized as a mental/behavioral condition with diagnostic criteria listed in the DSM-IV; therefore, diagnosed by a qualified professional. With symptoms frequently manifesting in a school, home, and/or social setting and

not in the doctor's office, an official evaluation by a pediatrician, other primary care clinician, or psychiatrist is usually initiated by teachers or parents (Efron et al., 2008).

Unfortunately, there is not a standardized, objective instrument, test, or medical procedure to determine whether one has ADHD; instead, diagnosis is based on criteria set forth by the DSM-IV. Patients must exhibit six or more of the given symptoms for inattention, hyperactivity and impulsivity, or in combination (Appendix A). Symptoms need to be apparent, developmentally maladaptive, and functionally impairing for at least six months and exhibited before the age of seven (APA, 2000).

Studies find physicians show a wide variation in diagnostic methods and criteria (Stone, Brown, & Hinshaw, 2010; Wolraich et al., 1996). To narrow this variation, the American Academy of Pediatrics (AAP) (2000) released a clinical algorithm to aide in the assessment and evaluation for diagnosis (Appendix B). This guideline emphasizes the importance of implementing multiple methods of assessment to determine if criteria from the DSM-IV render a diagnosis. It recommends doctors work collaboratively with teachers and parents, in order to provide a comprehensive framework for a proper diagnosis. This includes a thorough medical examination, review of family medical history, a neurological examination, as well as family and school assessments.

Past and present teachers are a vital source of information in the assessment and evaluation of ADHD. The amount of time spent with the student and opportunities to observe them in a variety of settings (Dowdy et al., 1997) gives a unique perspective to identify behaviors considered inappropriate for a child's age and/or grade level. Experts recommend teachers use behavior rating scales in conjunction with a variety of assessment tools when preparing information for a child (APA, 2000). To assist in the gathering and organization of

information, teachers can use behavior rating scales that cover symptoms consistent with the DSM-IV for ADHD (Volpe, Briesch, & Gadow, 2011). Many behavior rating scales have been developed to evaluate behavior both summative (Conners, 1998) and formative (Gadow & Sprafkin, 1998; Reynolds & Kamphaus, 2004). Narratives based on observations need to describe behavior and performance at school and provide objective, consistent, and methodical documentation across time (Power, 2009). ADHD is a complex developmental disorder; therefore, assessment and evaluation process for a proper diagnosis should reflect its complexity (Barkley & Murphy, 2006).

### **Causes of Attention Deficit Hyperactivity Disorder**

To date there is no known cause of ADHD; however, many factors likely contribute to the development of the disorder (Weyandt, 2007). Research supporting a biomedical cause is beginning to flourish and suggests a biological basis (Visser & Jehan, 2009). Scientific evidence implicates genetics as a contributing factor, through neuroimaging tools, familial studies, and the identification of eight genes showing a significant correlation to the cause ADHD (Faraone et al., 2005; Furman, 2008; Kent et al., 2005; Visser, & Jehan, 2009).

Other speculated causes of ADHD not supported by empirical research include: environmental, psychosocial, and parental influences (Furman, 2008). Fetal Alcohol Syndrome (Connor, Sampson, Bookstein, Barr, & Streissguth, 2000), maternal smoking (Ernst, Moolchan, & Robinson, 2001), and PCB poisoning (Schantz, Widholm, & Rice, 2003) have been shown to have significant association for developing ADHD; yet, has not been shown to cause it (Banjeree, Middleton, & Faraone, 2007). Pregnancy and delivery complications (Milberger, Biederman, Faraone, Guite, & Tsuang, 1997), such as low-birth weight (Mick, Biederman, Prince, Fischer, & Faraone, 2002; Thapar et al., 2006), and psychosocial adversity (Laucht et al.,

2007) have been found to have a slight but not significant association with ADHD (Banjeree et al., 2007). Poor diet, overabundance of yeast, preservatives, artificial flavors and colorings, sugar and food allergies (Stevens, Kuczek, Burgess, Hurt, & Arnold, 2011), family functioning (Cunningham, 2007; Ghanizadeh, 2007), poor parenting (Deault, 2010; Johnston, Mah, & Regambal, 2010), show little to no association with ADHD. Even the ever popular relationship between television watching and ADHD was confirmed in 2006 as having no meaningful relationship (Stevens, Barnard-Brak, & To, 2009).

Many environmental factors having strong links to the development of ADHD are ones that occur early in development supporting the idea ADHD is a neurodevelopment condition (Banjeree et al., 2007). Nongenetic familial factors are powerful and difficult to measure and include the effects of culture, religion, learning, parenting, and socioeconomic adversity (Bussing, Gary, Mills, & Garvan, 2007; Furman, 2008), which is often confused in research with genetics when environment is plausible.

The exact cause of ADHD is unknown and people from all over the world have controversial and far-ranging opinions on the topic. Teachers and professionals overwhelmingly believe brain functions such as chemical imbalance, the way the brain functions, and genetic disposition are causal factors over any other causes (Dryer, Kierman, & Graham, 2006). In a 2006 study by Dryer, Kierman, and Graham, they found some professionals, teachers, parents with children diagnosed with ADHD and an overwhelming number of parents of children without ADHD believe difficulties at home, school environment, and psychological problems cause ADHD. Regardless of the cause, it is evident that students with ADHD need instructional strategies and behavioral interventions that allow for efficient learning experiences within the classroom; which can be generalized into the real world throughout their lives.

ADHD is more common in families in which there is a considerable amount of hostility in both mother-father and parent-child relationships (DuPaul, McGoey, Eckert, & VanBrakle, 2001). Children with ADHD also come from over-stimulating, anxious, and intrusive mothers as well as single household families (Banks, Ninowski, Mash, & Semple, 2008). These children are more likely to originate from families with low socioeconomic status (Houck, Kendall, Miller, Morrell, & Wiebe, 2011).

A major goal for the neuroscience research in ADHD is the understanding of its causes which can lead to the development of new and more effective treatments (Konrad & Eickhoff, 2010). Another goal is to demonstrate how the causes produce symptoms unique to an individual; supporting more often than not, that the symptomatology of an individual is the result of interplay between an individual's genes and his or her environment (Banerjee et al., 2007).

### **Characteristics of Attention Deficit Hyperactivity Disorder**

The characteristics exhibited by someone with ADHD are believed to be the result of an interaction between environment and neurological factors (Banerjee et al., 2007; Thapar & Lewis, 2009). The characterized indicators are present in everyone to some degree; however, someone showing the core symptoms of inattention, hyperactivity, and impulsivity, can contribute to significant functional problems (APA, 2000). The incidences of secondary eccentricities in psychological functioning and diminished executive functions (Daley & Birchwood, 2009) occur more often than not.

**Inattention.** Contrary to common thought, it is not that children with ADHD do not attend to things, but rather these children attend to too much. The mind of a student with ADHD attends to all stimuli, whereas the mind of a child without ADHD is able to block out the extraneous stimuli and focus on the main stimulus. This leaves a student with ADHD without the

ability to filter irrelevant stimuli which interfere with task completion that draws their attention away from the main stimuli (Oberlin, Alford, & Marrocco, 2005). So it may appear students with ADHD are focused on tasks, but, in fact, they are distracted by one of the other stimuli and have lost contact with the main stimulus, therefore failing to finish the task (Bulut, 2007). They fail to give attention to details, do not follow through, avoid difficult situations, forgetful, and often lose things (APA, 2000). Children who appear to not be listening probably experience hyperfocus. Dr. Kathleen Nadeau, a psychologist in Maryland, describes “children (who hyperfocus) aren't being disobedient. Their brains just aren't registering what you're saying, “it's almost like pulling someone out of a dream” (Flippin, 2005, p. 33). Children with inattentive characteristics are more prone to academic difficulties (Daley & Birchwood, 2009).

**Hyperactivity.** Hyperactivity is a very visual and noticeable symptom portrayed as fidgeting, running or climbing in inappropriate situations, and difficulty engaging in activities quietly. These children are often described as being continuously in motion, driven like a motor, with constant movement, becoming bored and needing more stimulation (APA, 2000). By the time the child is in a structured classroom, hyperactive behavior is perceived as problematic and often cannot be ignored (Atkins & Pelham, 1991) yet research does not support academic difficulties (Daley & Birchwood, 2009). In fact, a study from the University of Central Florida, found that children with ADHD move around a lot because it helps them stay alert enough to complete challenging tasks (Rapport, Kofler, Alderson, Timko, & DuPaul, 2009).

**Impulsivity.** Impulsivity is characterized by students exhibiting a general lack of self-control, an inability to inhibit behavior, and a tendency to act on an urge. Individuals with ADHD may be aware of what is right or wrong and may be able to cite the rules of the classroom, however they often think about their actions after the fact, when it is too late (Bulut,

2007). They act without reflection or consideration of the consequences. They are accident prone, cannot wait patiently, rush to blurt answers, and appear intrusive (APA, 2000).

**Psychological functioning.** A child may exhibit deficits in adaptive functioning, which are skills necessary to take care of oneself, get along with others, and participate in everyday life (Harrison & Raineri, 2008). Students could have social impairments (DuPaul & Weyandt, 2006), delayed development of internal language, low self-esteem, forgetfulness, confusion, difficulties regulating emotion, motivation, arousal, low self-esteem (Mercugliano, Power, & Blum, 1999), as well as, diminished ability to problem-solve, ingenuity and flexibility in pursuing long-term goals (Barkley & Murphy, 2006; Tannock, 1998). Children with deficits in psychological functioning express more cognitive impairments, delays in motor and language development, negativity and emotion in interpersonal relationships. Terms like “irritable”, “hostile” and “excitable” are often used to describe children with ADHD (Barkley & Murphy, 2006). An often frustrating characteristic is their greater than normal variability in work performance (Bruce, Thernlund & Nettelbladt, 2006).

**Executive functions.** Executive function is an umbrella term used to encompass the complex cognitive processes that serve ongoing, goal-directed behaviors. Elements include: working memory (Tannock, 1998), goal setting, planning, response inhibition, flexibility, self-regulation, and organization of thoughts, time, and space (Barkley, 1997). Neuro-imaging studies have shown a decreased size of the prefrontal cortex in children with ADHD (Cutting et al., 2002). As this is the location for “executive functions,” it can be assumed students with ADHD can have difficulties in their ability to employ them (Barkley, 1997; Tannock, 1998); and could be at the heart of academic underperformance (Daley & Birchwood, 2009).

Characteristics of ADHD usually become apparent when a child starts school due to the difficulty adapting within a new and structured environment (Hughes, 2007) requiring behaviors that are contrary to the core symptoms; inattention, hyperactivity, and impulsivity. This may exacerbate symptoms through the expectation to participate in organized activities, follow specific rules, and socialize with other children (Kos, Richdale, & Hay, 2006).

According to Dryer, Kierman, and Graham (2006), teachers along with other major professionals responsible for the diagnosis and treatment of ADHD found the top five characteristics to be concentration problems, ability to be easily distracted, short attention span, difficulty finishing tasks, and impulsivity. A DSM-IV diagnosis focuses on behavioral problems within the domains of inattention, hyperactivity, and impulsivity which only address behavior control and concentration/attention problems (APA, 2000). The diagnostic criteria do not explain or characterize the cognitive impairments commonly experienced by individuals with ADHD (Barkley, 1997) and these are the characteristics found to interfere with learning and academic achievement (DuPaul et al., 2004).

### **Prevalence of Attention Deficit Hyperactivity Disorder**

In 1980, the American Psychological Association (APA) officially recognized and introduced Attention Deficit Hyperactivity Disorder (ADHD) to the world in the 3<sup>rd</sup> edition of the Diagnostic and Statistical Manual of Mental Disorders (DSM-III) with the addition of the inattentive portion in the 1987 revision. Originally, ADHD was widely considered to be an American disorder. Not until 22 years later, in 2002, an International Consensus Statement on ADHD officially stated all major medical associations and government agencies recognized it as a universal disorder due to the overwhelming scientific evidence (Barkley et al., 2002).

**History.** Characteristics of ADHD have been documented numerous times throughout the last 200 years from all over the world. A Scottish doctor, Sir Alex Crichton, in 1798, used the phrase “mental restlessness” to describe what today is known as the inattentive subtype of ADHD. Later in 1845, a German, Dr. Heinrich Hoffman, described the hyperactive/impulsive subtype in a children’s poetry book, “The Story of Fidgety Philip”; depicting a restless, wild, misbehaving child whose parents want him to act like a gentleman. By the turn of the century in Britain, Sir George Still, gave three lectures in 1902 on “Morbid Defect of Moral Control” describing a group of impulsive children with significant behavior problems, suggesting a genetic disorder not poor parenting (Still, 2006). Since then, the definitions and terminology have been refined and improved across the history of the disorder. Table 1 shows the evolution of ADHD during the 20<sup>th</sup> century in the United States.

**Table 1**

*Evolution of ADHD During the 20<sup>th</sup> Century*

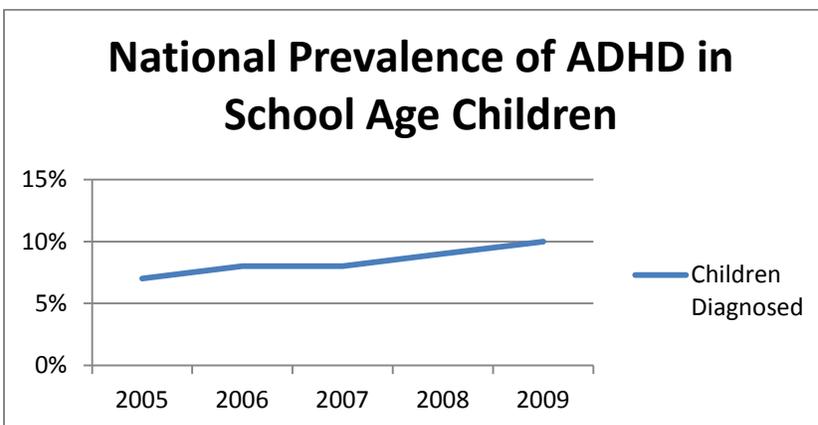
1922	Named “Post-Encephalitic Behavior”
1937	Dr. Charles Bradley implements the use of amphetamines for hyperactivity symptoms
1940	Name changed to “Minimal Brain Damage”
1956	Ritalin is introduced as a treatment option for “hyperactive” children
1960	Name changed again to “Minimal Brain Dysfunction”
1968	Clinically termed in the DSM-II as Hyperkinetic Reaction to Childhood
1980	Becomes an official disorder by the National Institute of Mental Health
1980	DSM-III coins the term Attention Deficit Disorder +/- Hyperactivity
1987	DSM-III-R adds the criteria for the inattentive portion of ADHD
1994	DSM-IV officially replaces ADD with Attention Deficit Hyperactivity Disorder

1998	AMA stated ADHD “one of the best-researched disorders in medicine”
2000	DSM-IV-TR provides the current diagnostic criteria

**Rates.** According to the APA and the AAP (2000), the national prevalence of school-aged children with ADHD is between 3-5%; however, after pulling data from the following reports; Bloom and Cohen (2007), Bloom, Cohen and Freeman (2009a), Bloom, Cohen and Freeman (2009b), and Bloom, Dey, and Freeman (2006), a new percentage emerges. Figure 1 shows the national prevalence rates from 2005 – 2010.

**Figure 1**

*National Prevalence of ADHD in School-Age Children*



In 2005, there was already a 2% increase indicating a national prevalence of 7%. Presently, the national prevalence has increased to an astounding 10%; indicating a 5% increase over the course of one decade. This means in an average public classroom in Ohio, teachers should expect to be teaching at least two children diagnosed with ADHD.

ADHD may not be referred to as such or treated in the same manner but studies show a universal existence (Akram, Thomson, Boyter, & McLarty, 2009; Bekle, 2004; Brook, Watemberg, & Geva, 2000; Jerome, Gordon, & Hustler, 1994; Ghanizadeh, Bahredar, & Moeini, 2006; Holst, 2008; Hong, 2008; Nur & Kavakci, 2010; Syed & Hussein, 2010). Data suggest the

difference in prevalence rates across the world differ due to differences in diagnostic criteria, definitions, and terminology; not differences in behavior (APA, 2000; Faraone, Sergeant, Gillberg, & Biederman, 2003; WHO, 1992). In 2003, Faraone and colleagues compared studies that used the same diagnostic criteria, confirming a lack of difference in prevalence rates among the United States and other countries.

**Gender.** Worldwide gender effects are consistent with national findings (Rescorla et al., 2007). Empirical studies indicate prevalence rates for boys at approximately 12% and approximately 5% for girls (Cuffe, Moore, & McKeown, 2005; Froehlich & Lanphear, 2007). Health statistics from the CDC support these findings indicating that boys are anywhere between two to three times as likely to be diagnosed as girls, with girls on a steady increase (Bloom & Cohen, 2007; Bloom, Cohen & Freeman, 2009a; Bloom, Cohen, & Freeman, 2009b; & Bloom, Dey, & Freeman, 2006). Data also indicates the gender ratio decreases with age, suggesting the gap may be due to girls being less likely to exhibit externalizing behaviors in the classroom than boys which tend to be a red flag for teachers to refer a student and could also suggest developmental changes within the disorder itself differing among the genders (Grskovic & Zentall, 2010).

**Comorbidity.** Gillberg and colleagues (2004) estimated between 60-100% of those diagnosed would exhibit one or more comorbid disorders and appear to have a more severe form of ADHD (Bauermeister et al., 2007; Jensen et al., 2001). Studies indicate a strong correlation between ADHD and Oppositional Defiant Disorder (Gillberg et al., 2004; Rescorla, 2007; Rommelse et al., 2009), and a strong correlation with autism spectrum disorders (Rommelse et al., 2009); which is viewed as a developmental rather than a psychiatric disorder. Other psychiatric comorbid conditions shown to have a correlation with ADHD include: personality

disorders, anxiety and depression disorders, bipolar disorder, tic disorder, and obsessive-compulsive disorder (Gillberg et al., 2004; Rommelse et al., 2009) Furthermore, correlations have been found with various learning disorders, motor coordination problems, and reading difficulties that can have a major impact on academic functioning (Rasmussen & Gillberg, 2000) resulting in poor grades, poor standardized test scores, poor school performance, and significantly lower scores than peers in all academic subjects (Daley & Birchwood, 2009).

**Longevity.** Data from the National Health Interview Survey indicates 50-70% of children will retain symptoms into adulthood (Bloom & Cohen, 2007; Bloom, Cohen, & Freeman, 2009a; Bloom, Cohen, & Freeman, 2009b; & Bloom, Dey, & Freeman, 2006), supporting previous research (Biederman, 2011; Cuffe et al., 2005). Numerous studies have validated late-onset ADHD and the current age-at-onset criterion as needing flexibility (Faraone, 2006; Garnier-Dykstra, Gillian, Pichevsky, Caldeira, Vincent, & Arria, 2010; Tucha et al., 2009).

Research does support the prevalence of ADHD as a legitimate, lifelong, complex disorder, affecting school-aged children and adults worldwide in every ethnic group and socio-economic status (Froehlich et al., 2007; Rescorla et al., 2007).

### **Treatment of Attention Deficit Hyperactivity Disorder**

Medication in isolation, without teaching the skills necessary to improve performance and behavior is not likely to improve long-term prognosis (Pelham et al., 2000). Current best practice guidelines as set by the American Pediatric Association (2000) advocate for a multidisciplinary approach for management of ADHD. A multi-modal treatment program should be implemented for optimal reduction of symptoms (AAP, 2000; Miranda, Presentacion, & Soriano, 2002). This typically requires a combination of pharmacological, behavioral and educational strategies (Jensen et al., 2007).

**Medication.** Since the 1950's, medication is the recommended first choice in treatment for hyperactivity; however, should not be the only treatment (AAP, 2000). Stimulant medication has shown positive effects in academic productivity and accuracy, fidgetiness and motor restlessness, parent and teacher behavior ratings, aggression and other antisocial behavior and social functioning and peer relations (Murray & Kollins, 2000). When stimulant medications are unresponsive, tricyclic antidepressants and non-stimulant medications can be used to alleviate symptoms; however, 20-30% still will not respond to medication, suggesting medication is not the best possible treatment for every child with ADHD (Barkley, 2007). Keep in mind, medication stops the symptoms of ADHD; it does not cure it; once medication stops, symptoms return.

**Behavioral modifications.** Barkley (1997) suggests the self-regulation difficulties children with ADHD have appear to deal with performance not knowledge; therefore, efforts need to address all aspects of their environment. Children with ADHD need to be taught how to better monitor their behaviors in the areas of internalizing, externalizing, social competence, family functioning, self control, and academic performance; then modify those behaviors appropriately (Corcoran & Dattalo, 2006). A team of adults within the child's environment should work together to develop strategies for dealing with certain situations and resulting behaviors. Parent training and counseling may make positive changes within the child and social functioning. Corcoran and Dattalo (2006) found research lacking on the effect of behavior modification; however some studies did support an increase in academic performance, memory, and IQ with parent training. Behavioral therapies may be most helpful with features associated with ADHD rather than the symptoms, such as, peer problems and academic difficulties (Corcoran & Dattalo, 2006).

**Educational supports.** These supports usually occur in the child's educational environment in the form of interventions. Academic interventions are designed to help a child in the areas of environment, behavior, and instruction. Through the ability of direct classroom observation and access to academic records, teachers are in a unique position to implement appropriate behavioral modification techniques, cognitive behavior strategies, and instructional management (Miranda et al., 2002).

**Environmental.** Structuring the classroom atmosphere is helpful to ease the effects of ADHD symptoms in classrooms. By reducing the external stimuli, teachers can provide a less destructive environment for ADHD children (Reiber & McLaughlin, 2004).

**Behavioral.** Behavior modifications and cognitive-behavioral interventions do improve academic performance, reduce activity level, and increase students' time on task. Peer mediated interventions (DuPaul & Weyandt, 2006), peer tutoring, and social skills training (Ozdemir, 2010) can help improve peer relationships, acceptance, friendships, and reduce peer victimization (Wiener & Mak, 2009).

**Instructional.** By altering tasks and materials presented, children with ADHD are more likely to accurately complete more problems when high levels of engaging stimuli are included within a task (Jitendra et al., 2008). Other models known to be effective for students with ADHD are working one-on-one, determining own instructional pace, continuous prompting, and providing them with frequent, immediate feedback about the quality of their performance (Jitendra et al., 2008). Taking the time to enhance presentation of material can also improve students' motivation and academic achievement.

Treatments for ADHD must often be combined and maintained over long periods of time so as to sustain the initial treatment effects. In this regard, ADHD should be viewed like any

other chronic medical condition that requires ongoing treatment for its effective management but whose treatments do not rid the individual of the disorder. For optimal gains in treatment effectiveness, they need to be combined and maintained over long periods of time and view ADHD as a chronic medical condition requiring ongoing treatment for management. Consideration of behavioral and educational treatments helps individuals understand their condition and learn techniques to successfully manage their ADHD.

Treatment needs to involve a multidisciplinary team and be provided for a long period of time to assist those with ADHD in the ongoing management of their disorder which allows many with the disorder to lead productive lives. Approaching therapy by realizing symptoms vary from person to person; therefore, cannot be addressed in a one-size-fits all mentality then utilize a unique combination of treatment options to best meet their needs is the most useful way to help manage the condition.

### **Recent Studies of Teacher's Knowledge of Attention Deficit Hyperactivity Disorder**

In the year the current guidelines for diagnosing ADHD were released, Jerome, Gordon, and Hustler (1994) expressed concern regarding a lack of published literature on teacher's knowledge of ADHD. This is alarming considering their frequent involvement in the assessment and treatment process; as well as the fact that educators serve as the common source of information for parents of children with ADHD (Bussing, Schoenberg, & Perwien, 1998).

Since the implementation of the DSM-IV in 1994, only seventeen studies worldwide have attempted to assess teachers' knowledge of ADHD. It should be noted only six of the studies involved U.S. teachers with five assessing only elementary teachers – indicating the studies have been few and far between.

**United States studies.** One of the six studies in the United States was conducted by Jerome, Gordon, and Hustler (1994). A twenty-item true/false self-report questionnaire assessing basic knowledge of diagnosis and treatment of ADHD was given to Canadian and American teachers. The American sample derived from teachers from only two districts and had an overall score of 77%. This is a bit alarming considering 85% stated they work with more than one student with ADHD in the classroom at any given time. Results show teachers with specific training in ADHD did better than those with little to no training indicating teacher training with respect to ADHD was improving. Furthermore, 89% had no instruction at all on ADHD and 98% indicated they wanted additional training.

A second study was conducted by Barbaresi and Olsen (1998). A twenty-seven item ADHD knowledge questionnaire was developed in a true/false manner based on items from Jerome et al. (1994) questionnaire. The purpose was to determine if teacher's knowledge of ADHD improved after professional development. The questionnaire was administered to forty-four teachers before and one month after professional development related to ADHD. Results indicate teacher knowledge did improve with proper education regarding ADHD with an increase in overall scores from 77% to 85%.

Sciutto, Terjesen, and Bender-Frank (2000) conducted the third study. Attempting to address the possibility of skewed results (Barbaresi & Olsen, 1998; Jerome et al., 1994), Glass and Weigar (2000) used a forced-choice format (true, false, don't know) to assess teacher perceptions of ADHD. Using this concept to examine teachers' knowledge as opposed to their misconceptions of ADHD, the researchers developed the Knowledge of Attention Deficit Disorders Scale (KADDS), a thirty-six item forced choice questionnaire assessing teacher knowledge in three specific content areas: symptoms/diagnosis, treatment, and prevalence. The

questionnaire included positive and negative indicators to assess for negative response bias and all questions were supported by empirical research. KADDS was completed by one hundred and forty-nine elementary school teachers from six schools. The data from KADDS is consistent with previous studies indicating teachers have an insufficient knowledge base; however, results show overall teacher knowledge was a shocking 47%. Every subscale scored at failing levels after evaluating each domain: symptoms/diagnosis (66%), treatment (33%), and prevalence (42%).

Fourth, Snider, Busch, and Arrowood (2003) assessed teacher's knowledge regarding the treatment of ADHD, specifically stimulant medication. One hundred forty five randomly selected teachers rated 13 statements using a 5-point Likert scale on a questionnaire developed specifically for the study. Overall, teacher knowledge was rated at 46%.

Next, the fifth study was conducted by Vereb and DiPerna (2004). The Knowledge of ADHD Rating Evaluation (KARE) survey was developed to assess teacher's knowledge of ADHD. KARE consisted of forty-three questions in a true, false, don't know format pertaining to the general knowledge and treatment of ADHD. Forty-seven elementary teachers participated in the survey. Overall knowledge was 67% which was an increase from past studies.

Finally, in the last of the studies from the United States, Weyandt, Fulton, Schepman, Verdi, and Wilson (2009) conducted a study to investigate teacher and school psychologists' knowledge of Attention-Deficit/Hyperactivity Disorder (ADHD). A sample of 78 teachers responded to a 24-item questionnaire to assess knowledge regarding the causes and treatment of ADHD. Overall knowledge scores were 45%. These results support previous studies that teachers appear to have limited knowledge of ADHD.

**International studies.** Teacher knowledge of ADHD has been assessed in numerous countries including Canada, the Middle East, Australia, Europe, and Asia (Akram et al., 2009; Bekle, 2004; Brook et al., 2000; Ghanizadeh et al., 2006; Havey, 2007; Holst, 2008; Hong, 2008; Jerome et al., 1994; Kos, Richdale, & Jackson, 2004; Nur & Kavakci, 2010; Ohan, Cormier, Hepp, Visser, & Strain, 2008; Syed & Hussein, 2010; West, Taylor, Houghton, & Hudyma, 2005). Interestingly enough, no studies were found investigating ADHD in Africa, or Central and South America.

During pediatric consultations, a significant proportion of parents have reported feelings of frustration regarding their child's school and their knowledge and attitudes toward ADHD (Efron et al., 2008).

Although teachers can be involved in the diagnostic process, the breakdown reveals alarming information considering teachers are essential for the development and implementation of educational interventions to ensure proper treatment.

### **Methodology**

The principle issue investigated in this study was to evaluate the preparedness of Ohio teachers' in their ability to meet the needs of students with Attention Deficit Hyperactivity Disorder (ADHD). The knowledge teachers obtain is key when developing and implementing successful interventions to meet the individualized needs of students with ADHD (Arcia, Frank, Sanchez-LaCay, & Fernandez, 2000; Barkley, 2007). This study assessed teacher knowledge of ADHD across five domains: assessment and evaluation, causes, characteristics, prevalence, and treatment.

## Research Design and Procedure

Online surveys are perceived as easier, less expensive to administer, and offer more flexibility and features than alternative survey methods (Kalantari, Kalantari, & Maleki, 2011). Email invitations with an URL included, give teachers the ability to respond at their convenience (Harlow, 2010). For the researcher, online survey and data collection software designed to automatically verify and store survey responses, made for easy access to the data.

A seventy-one item electronic survey was designed to be completed by any teacher with a valid State of Ohio teaching license in Special Education or General Education currently working in Ohio's public school system. The survey took into consideration confidentiality of the participants and contained no identifying markers to breach this confidence. After the questionnaire's development, a college professor, a special education teacher, and two general education teachers were enlisted to take the survey and provide feedback on content, presentation, and relevance of the items.

After appropriate revisions to the survey, a proposal was submitted to the faculty advisor followed by the university's Internal Review Board for the Use of Human Subjects. Upon approval, the questionnaire was set up using an online data collection instrument, Qualtrics. Once the sample of participants were chosen, email invitations (Appendix C) were sent describing the purpose of the study, expectation of confidentiality, and provided a survey link that by clicking, gave consent for participation in the study. A follow-up reminder email was automatically sent after one week. At the end of the fourteenth day, surveys were officially collected and data analysis began with no further human participation after the close of the survey.

## **Participants**

The population for the study included any licensed teacher currently teaching in the public sector for grades K – 12 in the state of Ohio. Using the Educational Management Information System (EMIS) database from the Ohio Department of Education (ODE), data for all city, exempted village, and local public school districts were collected and placed into the appropriate Ohio's State Support Team Region as set by ODE (Appendix D). This resulted in a sampling frame of 108,382. Simple random sampling provided a sample representative of the population (Trochim & Donnelly, 2006). The use of a random number generator determined three districts from each of the sixteen regions. Once forty eight districts were extracted, district websites were utilized to obtain teacher email addresses for every building giving a geographic sampling frame of  $n = 8802$ . Again, a random number generator was enlisted to randomly select 100 email addresses from each region; giving a sample size  $n=1600$ . A 39% response rate yielded an overall sample of  $n = 629$ .

## **Instrumentation**

The survey described earlier was divided into three parts to obtain optimal information. Part one consisted of the collection of demographic information (Appendix E) through a series of sixteen forced-answer questions. Part two was comprised of **ACCEPT** ADHD (Appendix F). A fifty-item survey specifically designed for this study was used to assess teacher knowledge of ADHD. Part three closes the survey with five open-ended optional questions used to gather qualitative information.

The demographic questionnaire supplied information regarding gender, age, ethnicity, highest degree completed, number of years teaching, Ohio county district of residence, classroom setting, subject areas currently teaching, and the number of students responsible for in

a typical day. Information pertaining specifically to students and ADHD was collected from the number of personal referrals for students based on gender, the staff responsible for accommodating the needs of a student with ADHD, the amount of ADHD training received, other professionals involved when teaching a child with ADHD in the classroom, and personal preparation to meet the needs of students.

ACCEPT ADHD takes Sciutto et al. (2000) Knowledge of Attention Deficit Disorders Scale (KADDS) to the next level. KADDS measures knowledge in the areas of symptoms/diagnosis, treatment, and general information. ACCEPT ADHD builds on these concepts by measuring the knowledge of ADHD across five domains: *assessment* and *evaluation*, *causes*, *characteristics*, *prevalence*, and *treatment*. Fifty statements about ADHD use a true, false, or don't know format to allow for the differentiation between what is actually known and misperceptions (Glass & Wegar, 2000). Ten statements were constructed for each domain chosen to reflect evidence-based research. Each item was carefully researched to ensure only well-documented and empirically supported statements were devised. To assess for negative response bias, ACCEPT ADHD items refer to both positive and negative indicators of ADHD (Sciutto et al., 2000).

**Assessment and evaluation.** *Assessment & Evaluation* questions address the gender gap in referrals by the differentiation of symptoms between boys and girls, whether other diagnosis can be made in conjunction with ADHD, who can and what confirms a diagnosis, reliable assessments, current guidelines, and the difficulty in proper assessment, evaluation, and diagnosis of children with ADHD.

**Cause.** *Cause* questions concentrate on the contributing factors and how they interplay. Also, the validity of the research and what is known and not known about the disorder are covered in this category.

**Characteristics.** *Characteristic* questions attend to the traits of student populations, commonality of students, lifelong outcomes, where types of ADHD come into play, and the role of certain exhibited behaviors.

**Prevalence.** *Prevalence* questions deal in part with skills needed for success, best routes for management, what part of the child is affected, classroom influences on symptoms, and world-wide relevance.

**Treatment.** *Treatment* questions address medication, as well as side effects, nutrition, parental education, school's role, teacher responsibilities, and individual or combined interventions. Also, they investigate the impact of untreated ADHD.

Each respondent had the opportunity to express their needs, concerns, questions, and comments immediately after completing ACCEPT ADHD through the qualitative portion of the survey. In this section, respondents could save the survey and come back later before submission to allow optimal wait time to ensure every opportunity was given for teachers to express themselves. Information gathered provided insights and implication for practice.

### **Data Analysis**

Descriptive statistics and t-tests were used to compare group means. The results of the analysis determined teachers' overall knowledge and knowledge in each domain. Scores were also analyzed as a whole to determine overall knowledge levels. Additionally, scores were analyzed by sub-domains to find possible reasons why knowledge levels were sufficient or insufficient.

## Results

The purpose of this study was to evaluate Ohio teachers' current knowledge of Attention Deficit Hyperactivity Disorder. Teachers were assessed in the areas of assessment/evaluation, causes, characteristics, prevalence, and treatment of ADHD.

### Teacher Demographics

Table 2 illustrates where the 629 participants fall within the demographics for Ohio teachers. At a rate of 4:1, the majority of the participants were female, teaching an average of fourteen years. Over half the teachers who participated in the study had a master's degree with another quarter having training above and beyond the master's level. Greater than 60% were general education teachers, 25% special education, and another 13% were multi-age teachers i.e., Art, Music, and Physical Education. In the classroom, each teacher was responsible for an average of fifty-nine students, with over 40% teaching more than one subject and half teaching all three core subjects: Reading, Language Arts, and Mathematics.

**Table 2**

*Demographics of Participants: Practicing Ohio Public School Teachers*

Number of Participants

629

	Mean (SD)
Age in Years	41 (11.5)
Number of Years Teaching	14 (9.8)
	Percent (%)
Gender	
	Female
	79%

	Male	21%
<b>Race/Ethnicity</b>		
	Caucasian	93%
	African American	3%
	Other	4%
<b>Level of Education</b>		
	Bachelor's	21%
	Master's	52%
	Master's +	25%
	Doctorate	1%
<b>Type of Teacher</b>		
	Special Education	25%
	General Education	62%
	Other	13%
<b>Number of Students Taught</b>		
	0-20	22%
	21-40	31%
	41-60	7%
	61-80	8%
	81-100	9%
	101-150	16%
	151-200	6%
	200+	1%

## Subjects Taught

Language Arts	52%
Mathematics	49%
Reading	49%
Science	37%
Social Studies	37%
Other	29%

## Number of Subjects Taught

1	58%
2	1%
3	12%
4	5%
5	22%
6	2%

**Teachers' Knowledge of Attention Deficit Hyperactivity Disorder**

Figure 2 shows overall teacher knowledge of ADHD representing what they know, number of correct responses, misconceptions, and what they admitted they just don't know. With 15% of the questions answered incorrectly, only 46% were actually answered correctly, leaving almost 40% as unknown. These results are aligned with findings from a previous study by Scitutto et al. (2000) indicating teachers having an overall knowledge score of 47%.

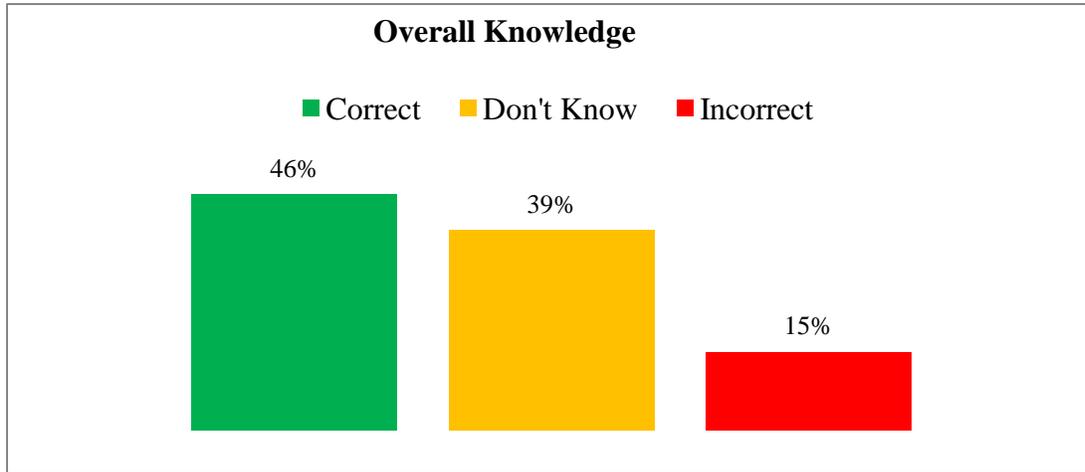
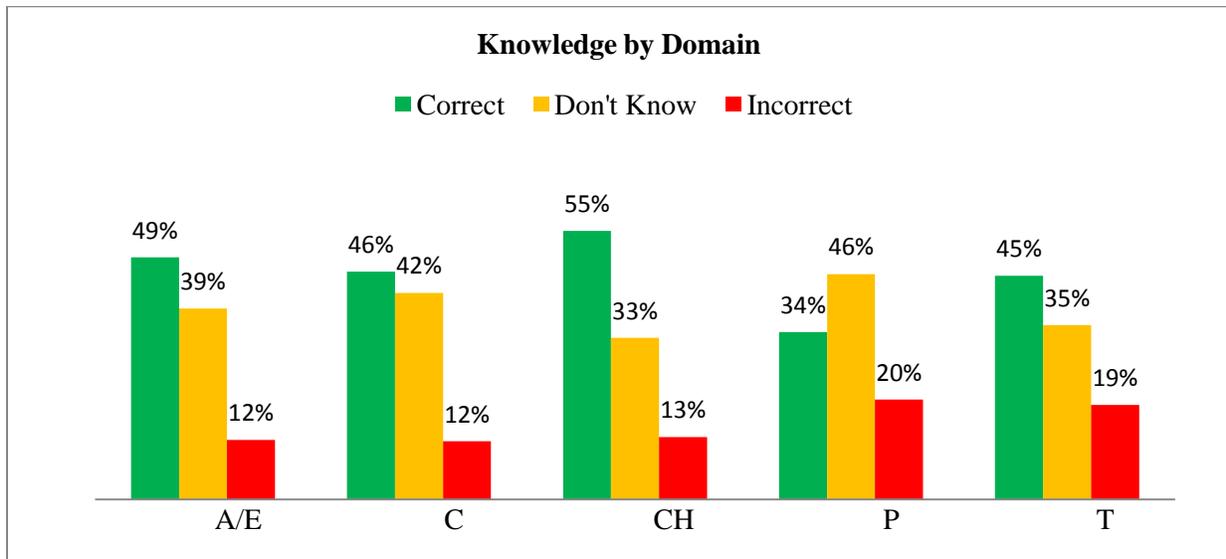
**Figure 2*****Teachers Overall Knowledge of Attention Deficit Hyperactivity Disorder*****Teachers' Knowledge of ADHD by Domain**

Figure 3 categorizes teachers' overall knowledge of ADHD into individual domains: assessment/evaluation, causes, characteristics, prevalence, and treatment. With overall correct responses at 46%, breaking responses into domains illustrates the areas of needed focus. Hovering at or just above the mean, assessment/evaluation (49%), causes (46%), and characteristics (55%) are correctly answered with the least number of misconceptions; however, 38% responded they did not know. Not only were the prevalence (34%) and treatment (45%) domains below the mean; they also contribute to the highest percentage of misconceptions (20%) and lack of knowledge (41%).

**Figure 3***Teachers Knowledge by Domain*

*Note – A/E: assessment and evaluation, C: causes, CH: characteristics, P: prevalence, T: treatment.*

Once individual statements were analyzed, it became apparent which statements were correct, not known, and incorrect within each domain. Tables 3 – 5 indicate the percentage of each statement in each domain in terms of correct, unknown, and incorrect.

The statements in each domain with the highest number of correct responses were answered with an average of 76% (Table 3). The majority of teachers knew high IQ and giftedness were not factors in ADHD, treated symptoms do not cure academic troubles, and teachers are responsible for accommodating the student. Most knew ADHD is not caused by an inability of controlling one's own behavior and the characteristics displayed by girls can lead to emotional difficulties if untreated.

**Table 3***Questions with Most Correct Answers in Each Domain*

%	Question
85%	Children with high IQ scores and assessed as gifted can also be diagnosed with ADHD.
80%	Once the symptoms have been treated, a student may still have trouble academically due to gaps from their previous learning experiences.
76%	I am responsible for accommodating a student with ADHD in my classroom.
71%	ADHD is caused from children not doing what they need to do to control their own behavior.
66%	Girls with untreated ADHD are at risk for low self-esteem, underachievement and problems like depression and anxiety.

Allowing respondents the ability to choose “don’t know” in the survey, not knowing information about ADHD could be separated from teachers’ misconceptions about ADHD. Two-thirds of those surveyed have several pieces of information lacking in their knowledge within each domain (See Table 4).

Not only were teachers unaware of inconsistencies in ADHD diagnosis worldwide, Ohio teachers were unaware the number of students diagnosed with ADHD in Ohio is above the national average. Teachers reported not having information about specific behaviors, side effects of non-stimulant medication used by some students or how environment and biology are contributing factors to the different types of ADHD.

**Table 4***Questions with Most 'Don't Know' Responses in Each Domain*

%	Question
78%	Ohio's average for school age children diagnosed with ADHD is less than the national average.
74%	Non-stimulant medication causes agitation or sleeplessness.
73%	Environmental factors cause ADHD predominately hyperactive type while biological factors are the cause ADHD predominately inattentive type.
66%	To keep a worldwide consistency, a student with ADHD coming into your classroom from a different country would have been diagnosed using the same criteria as stated in the DSM-IV.
65%	Verbal impulsivity is a defining feature of ADHD behavior in girls.

Even with the ability to indicate “don’t know” on the survey, teachers had several misconceptions about ADHD. Table 5 outlines the statements most frequently answered incorrectly in each of the five domains. Within the treatment and prevalence domains, over 60% of the participants think medication eliminates difficulties in social adjustment and school performance for students with ADHD. The characteristic and cause domains show incorrect knowledge in thinking aggression is a major characteristic and a lack of awareness that children from single-mother families are more likely to be diagnosed. In assessment/evaluation, it is thought diagnosis can occur if the symptoms were apparent after age 7 and the use of checklist as a diagnostic tool is valid and reliable.

**Table 5*****Questions Most Frequently Answered Incorrectly in Each Domain***

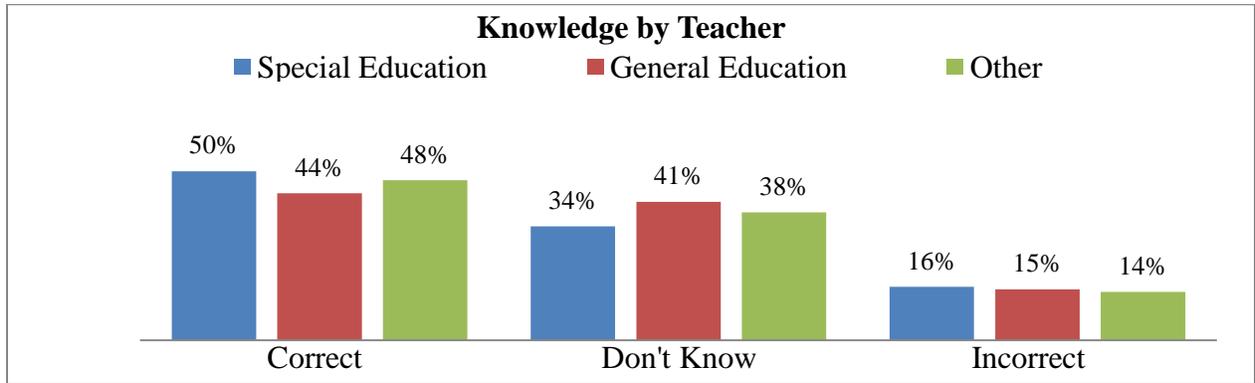
%	Question
65%	Medication eliminates social adjustment difficulties and school performance deficits in students with ADHD.
60%	Children who have problems in school but get along well at home and with friends are not considered to have ADHD.
36%	Aggression is a common characteristic shown by students with ADHD.
30%	Children in single-mother families are more likely to be diagnosed with ADHD.
27%	Under the current guidelines for diagnosing ADHD, a child can be diagnosed as long as the symptoms were apparent before the age of 7.
27%	Checklists are a valid reliable way to diagnose ADHD.

**Knowledge of Special Education, General Education and Other Multi-Age Teachers**

Comparisons were made between special education and general education teachers to determine if one group had better knowledge of ADHD than the other. Figure 4 illustrates knowledge level by type of teacher. Special education teachers gave answers to more questions and answered more questions correctly than general education and other multi-age teachers. On the other hand, general education teachers scored fewer number of questions correctly and responded “don’t know” to more questions than the other group of teachers. All three groups incorrectly responded to questions at approximately the same rate (15%).

**Figure 4**

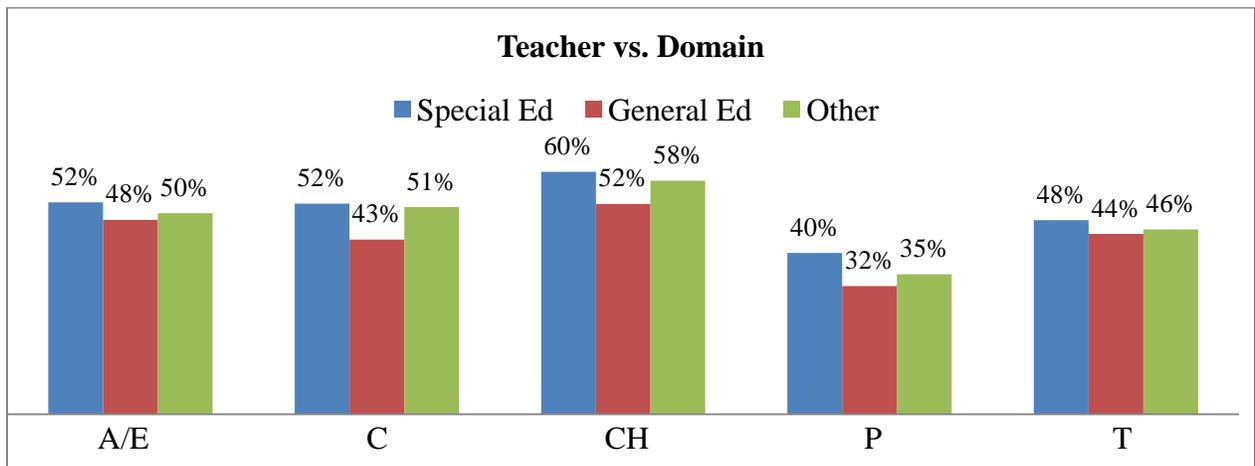
*Knowledge by Teacher*



Even when examining individual domains (See Figure 5), special education teachers rank first among the groups of teachers in correctly answering statements in every domain, followed by other multi-age teachers, followed by general education teachers. Although there are differences in the amount of knowledge each category of teachers has in the separate domains, special education teachers have a better knowledge base regarding ADHD both categorically and overall.

**Figure 5**

*Knowledge by Teacher Group in Each Domain*



*Note – A/E: assessment and evaluation, C: causes, CH: characteristics, P: prevalence, T: treatment.*

## **Qualitative Results**

Towards the end of the survey, five optional open-ended questions were asked as a way to gather feedback on the survey and allow for the expression of any questions, concerns, and opinions they may have about the disorder. Seventy one percent of the participants answered the first four questions of the qualitative portion of the study while only 33% answered the last question on the survey.

The first question asked participants to explain whether or not they felt adequately prepared to meet the needs of students with ADHD within the classroom. Thirty-five percent felt prepared to meet the needs of their students with ADHD; however, 50% did not feel prepared to meet those needs. The other 15% of the responses were deemed inconclusive based on their answers. They either did not answer the question asked, or response was too vague to determine whether or not they felt prepared.

The next question asked teachers to list specific resources and intervention strategies they use when meeting the needs of students with ADHD. Eleven percent shared such resources as the internet, books, and borrowing materials from other teachers. Participants who listed resources also stated they sought out others for advice in determining the best strategies to implement for their students. The intervention strategies shared by the participants included behavior management techniques (36%), peer tutoring (9%), and Response to Intervention (6%). Thirty-eight percent of the responses were deemed inconclusive based on vague answers or not answering the question asked.

Question three in the qualitative portion asked participants what they specifically would like to know when teaching a student with ADHD. Twenty-nine percent wanted to be informed about specific strategies to use in the areas of behavior (19%) and classroom environment (10%). Twenty-three percent wanted to know what has worked and not worked for the student from the student's perspective (12%) and others who have worked with the student (11%). Five percent would like more information pertaining to the diagnostic process and 1% would like to know if they are accommodating the student. Again, as with question two, 38% of the responses were inconclusive based on vague answers or simply not answering the given question.

The fourth question asked participants what they think their responsibilities are, if any, as a teacher in meeting the needs of a student with ADHD. Only 36% of teachers shared some of their own responsibilities. The other 64% gave inconclusive responses, either by not answering the question being asked or just stating who (some other person) was responsible for the student.

Finally, the last item on the survey allowed the participants to share any suggestions or comments with the researcher. Some suggestions were question specific, such as, some demographic question choices were too limited, some questions were worded in a way that was hard to answer, some questions were intriguing enough to immediately look up once finished, and lots of interest in the questions concerning medication. Most of the comments and suggestions referred to wanting more information on ADHD and expressing the realization of how little one knows or misconceptions about ADHD. One notable comment stated the need to advocate for professional development and specialized training on ADHD. Others expressed the need to require more undergraduate and graduate courses, as well as field experience opportunities for all teachers, indicating that teachers feel apathetic due to their lack in

knowledge and ‘know how’ related to ADHD which may help with teacher frustration and possibly stop young teachers from leaving the profession.

There were some suggestions and comments degrading the authenticity of ADHD as a plausible disorder, and stating they “know their comments will be viewed as unpopular and politically incorrect, but it is the truth.” Some referred to the disorder as “an excuse for allowing students to get by both in academics and behavior. Students need to be prepared to meet the expectations of society. Society expects results not the excuse of a diagnosis.”

## **Discussion**

### **Implications for Practice**

The results of the study reveal teachers are most knowledgeable in the areas of assessment/evaluation, causes, and characteristics related to ADHD. While it is important for a teacher to have a basic knowledge in these areas, the role of a teacher is recognizing the prevalence of the disorder and the design and implementation of treatments in the form of educational interventions to be implemented to address the child’s behavior, environment and academics. Results of this study indicate the areas of prevalence and treatment as areas where teachers have the least knowledge. The **ACCEPT** ADHD questionnaire is a valuable tool to determine overall and specific teacher knowledge. Teachers need to be aware of the information they know to be accurate or inaccurate, and where they may need to seek professional development opportunities.

### **Recommendations**

Results from the study indicate teachers in the state of Ohio would benefit from professional development targeting all domains: assessment/evaluation, causes, characteristics, prevalence, and treatment. The study determined teachers not only have misconceptions and

misinformation about ADHD, but they also lack information. Even though participants' scores in all domains would be considered unacceptable, teachers appear to have strengths in assessment/evaluation (49%), causes (46%), and characteristics (55%); however, they exhibit weaknesses in prevalence (34%) and treatment (45%).

Teachers need to have the ability to recognize characteristics often associated with someone who may have ADHD. They also should have a knowledge base regarding the causes, as well as the assessment and evaluation process so they can provide the documentation necessary for a proper diagnosis. The weaknesses in teachers' knowledge portrayed in the study seem unnerving considering the major role teachers play for a student with ADHD. Teachers need to recognize the prevalence of the disorder, as well as have the responsibility to design and implement appropriate educational supports in academics, environment, and behavioral interventions. These interventions serve as a part of a comprehensive treatment program for the student. With no known cure for ADHD, teachers are a critical component in teaching a student the tools necessary to reach their fullest potential. Opportunities for teachers to assess their knowledge and receive adequate training in the areas specific to their weaknesses is a must. Administrators can address this need by providing professional development designed to utilize the [ACCEPT](#) ADHD questionnaire.

Prior to professional development, [ACCEPT](#) ADHD should be administered to assess teacher strengths and weaknesses. The pretest allows teachers to identify their specific weaknesses in their knowledge of ADHD and allows for specialized sessions within the professional development. This may help with information overload that can occur when a large amount of information is being provided in a short amount of time. A three session format

would allow the instructor to focus on what a teacher really needs to know and not attempt to share all the information there is on ADHD.

The focus for session one would be to provide teachers with the knowledge and tools needed to observe and accurately document information on a student exhibiting ADHD behaviors. Session one needs to debunk the myths and reflect the truths about ADHD, as well as provide a general knowledge base. Information should define the disorder, explain the assessment and evaluation process, state the known causes, if any, and list the associated characteristics exhibited by both boys and girls. The goal for session one would be for teachers to be able to provide administrators, doctors, and parents with observation-based documentation, which is necessary for a proper diagnosis.

Sessions two and three should focus on the role a teacher plays after the diagnosis; prevalence and treatment. A session focused on prevalence needs to clarify how the behaviors exhibited differ by gender, culture, grade level, etc. Having an understanding of behavior differences when designing and implementing appropriate educational supports can lead the student to success. The treatment session needs to explain how one size will never fit all. Academic, environment, and behavioral interventions should be designed for each individual student. Instead of providing a “bag of tricks,” teachers should be shown how to design individualized interventions by using the bag, as well as the student and past intervention successes and misses. Teachers meeting the goal in these sessions should be able to integrate the comprehensive knowledge gained with appropriate interventions and supports.

A few months after the professional development, allowing for practice and processing of the new information, **ACCEPT** ADHD should be administered again to assess teacher strengths and weaknesses. The posttest allows teachers to see the impact of their new found strengths and

acknowledge remaining areas of weakness. Administrators can use the results to determine the success of the professional development by session and as a whole. Results can also be used to provide mini sessions for those who still need to strengthen specific areas.

If administrators are reluctant to provide teachers with professional development opportunities, teachers can still utilize **ACCEPT** ADHD. Teachers can take the questionnaire, get the results, and see their strengths and weaknesses then use the results to educate themselves. After some hard work and practice, they can retake **ACCEPT** ADHD to check for improvement and areas for further development.

### **Suggestions for Future Research**

This study assessed overall teacher knowledge and compared teachers as a whole and by area in the domains of: assessment/evaluation, causes, characteristics, prevalence, and treatment. Further research could compare other demographics to determine other reasons for teachers' lack of knowledge. The **ACCEPT** ADHD questionnaire can be updated to support newer research and used to see if teachers are not only knowledgeable but are keeping up with the research. Additionally, studies addressing the reliability and validity of the tool should be conducted. Finally, research can be conducted to determine whether or not **ACCEPT** ADHD can successfully be used in designing and implementing a professional development course specifically for Attention Deficit Hyperactivity Disorder.

### **Limitations**

Even with a sample size of 629, there were a large number of unreturned surveys (61%). Also, only 32% responded from Regions 1 – 8, the complete northern half of Ohio and the majority of the surveys received (36%) came from Regions 11, 13, and 16; which encompass Ohio's major universities, i.e., Ohio University, Ohio State University, and Cincinnati (See

Appendix D). Since ADHD is well researched and still has unknown qualities to its existence, the amount of conflicting research available to support the constructs included in the questionnaire was problematic. Although empirical research was used to provide support for all the questions included in the survey, there was evidence in other studies which could potentially debunk such supporting evidence.

### **Conclusion**

Current and past studies have time and time again supported the fact that teachers lack adequate knowledge of Attention Deficit Hyperactivity Disorder. This is disturbing especially with the high degree of responsibility placed upon teachers in the diagnosis and implementation of strategies, coupled with the increase in the number students diagnosed with ADHD, and public school budgets being slashed. Teachers need to advocate for further professional development and take it upon themselves to be educated. With the new diagnostic criteria set to be implemented in two years, this is the time for teachers to take the initiative to help themselves and their students because knowledge influences how they practice; so the more they know, the better teachers they will become and better outcomes they can ensure for their students with and without ADHD.

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## Appendix A

### Diagnostic Criteria for ADHD as set by APA

#### Attention-Deficit/Hyperactivity Disorder

A. Either (1) or (2):

(1) six (or more) of the following symptoms of **inattention** have persisted for at least 6 months to a degree that is maladaptive and inconsistent with developmental level:

#### **Inattention**

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

(2) six (or more) of the following symptoms of **hyperactivity/impulsivity** have persisted for at least 6 months to a degree that is maladaptive and inconsistent with developmental level:

#### **Hyperactivity**

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

### **Impulsivity**

- (g) often blurts out answers before questions have been completed
  - (h) often has difficulty awaiting turn
  - (i) often interrupts or intrudes on others (e.g., butts into conversations or games)
- B. Some hyperactive-impulsive or inattentive symptoms that caused impairment were present before age 7 years.
- C. Some impairment from the symptoms is present in two or more settings (e.g., at school [or work] and at home).
- D. There must be clear evidence of clinically significant impairment in social, academic, or occupational functioning.
- E. The symptoms do not occur exclusively during the course of a Pervasive Developmental Disorder, Schizophrenia, or other Psychotic Disorder and are not better accounted for by another mental disorder (e.g., Mood Disorder, Anxiety Disorder, Dissociative Disorder, or a Personality Disorder).

Appendix B

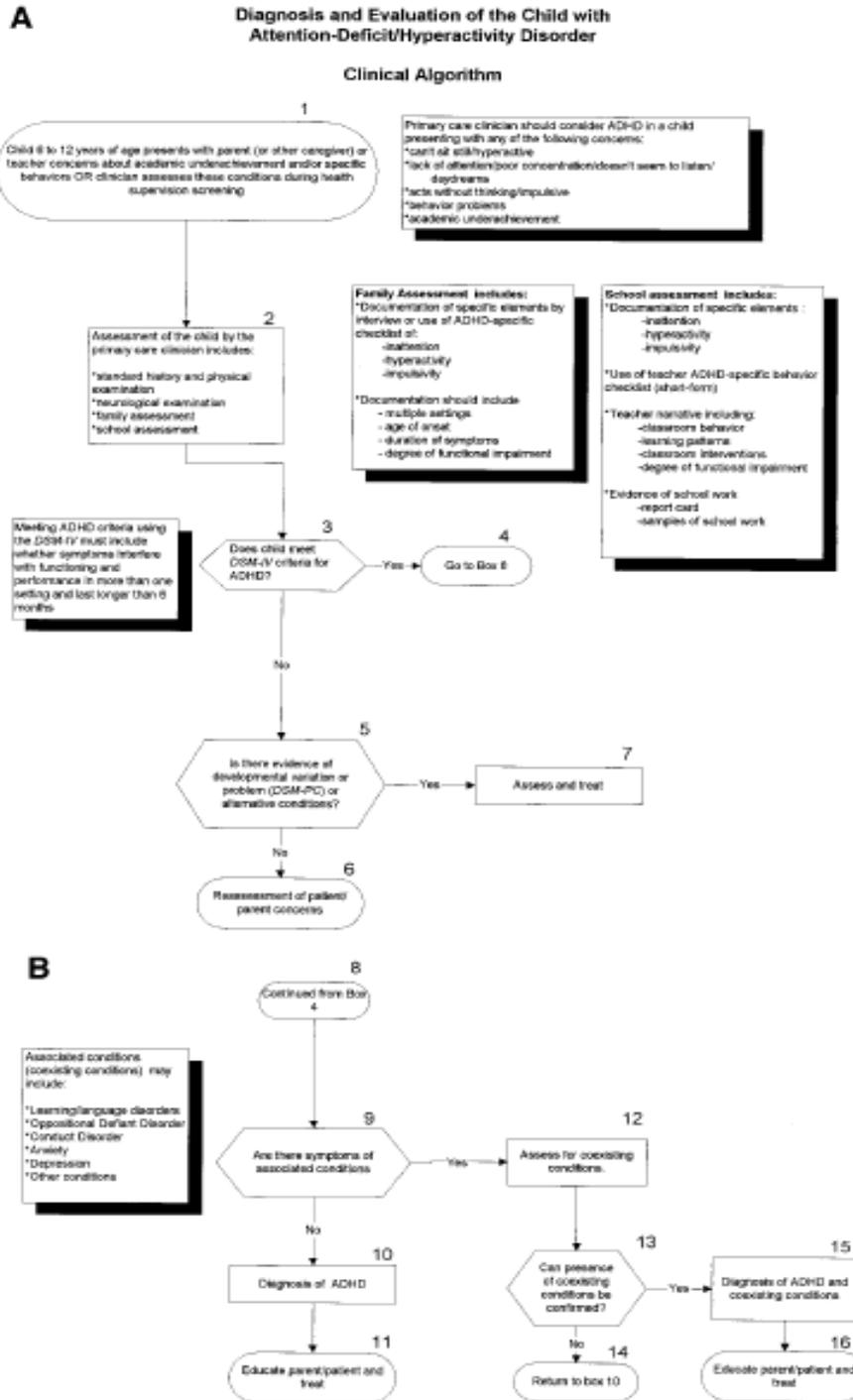


Fig 1. Clinical algorithm.

## Appendix C

Greetings Fellow Educator,

My name is Jodi Funk and I am a graduate student at Ohio University in the Special Education program. I am conducting a research project as part of my program requirements and would like your help.

The purpose of the research is to answer the question: are current Ohio teachers adequately prepared to meet the needs of students with ADHD? Currently, the research is limited which is disturbing considering the increase of children being diagnosed, placed in inclusion settings, and the under and over diagnosis of girls and minorities, respectively. Teachers play a critical role in the treatment of ADHD and it is vital they are equipped with the proper tools to implement strategies to help children with ADHD. With the APA about to release the DSM-V with new criteria for diagnosing ADHD, I predict an increase in children diagnosed with the disorder; therefore, if we can determine teachers' knowledge now and given strategies to implement, then when the possible increase occurs, they will feel confident in their ability to promote better academic outcomes for the students.

You are being asked to participate in research. For you to be able to decide whether you want to participate in this project, you should understand what the project is about, as well as the possible risks and benefits in order to make an informed decision. This process is known as informed consent. This form describes the purpose, procedures, possible benefits, and risks. It also explains how your personal information will be used and protected. Once you have read this form and your questions about the study are answered, you will be asked to click on the link below to go directly to the survey. By clicking on the survey link, you are providing your consent to participate.

If you agree to participate, click on the link within this email you are providing your consent to participate in this study. Once you click on the link, you will be taken to a survey site that where your responses will be collected anonymously and reported in aggregate, so no one will be able to associate responses with any individual participant. You should not participate in this study if you have not been a public school teacher for the state of Ohio within the last 12 months. Your participation in the study will last approximately 10 minutes. No risks or discomforts are anticipated.

This study is important to society because with the crowded classrooms, high stakes testing, an increase of inclusion, and more students being diagnosed with ADHD in today's schools, it is critical teachers are adequately informed and prepared to educate all children regardless of disability. The better we prepare our educators, the more confident they feel with their own teaching which will promote better academic outcomes for all students' not just students with ADHD. Individually, you may benefit from becoming self aware on what you may or may not know concerning attention deficit hyperactivity disorder by participating in this study.

Your study information will be kept confidential. Additionally, while every effort will be made to keep your study-related information confidential, there may be circumstances where this information must be shared with: \* Federal agencies, for example the Office of Human Research Protections, whose responsibility is to protect human subjects in research; \* Representatives of Ohio University (OU), including the Institutional Review Board, a committee that oversees the research at OU;

If you have any questions regarding this study, please contact *Jodi Funk* at [jn229696@ohiou.edu](mailto:jn229696@ohiou.edu).

If you have any questions regarding your rights as a research participant, please contact Jo Ellen Sherow, Director of Research Compliance, Ohio University, (740)593-0664.

By clicking on the link below, you are agreeing that:

- you have read this consent form (or it has been read to you) and have been given the opportunity to ask questions and have them answered
- you have been informed of potential risks and they have been explained to your satisfaction.
- you understand Ohio University has no funds set aside for any injuries you might receive as a result of participating in this study
- you are 18 years of age or older
- your participation in this research is completely voluntary
- you may leave the study at any time. If you decide to stop participating in the study, there will be no penalty to you and you will not lose any benefits to which you are otherwise entitled.

**Follow this link to the Survey:** [Take the Survey](#)

Or copy and paste the URL below into your internet browser: <http://ohed.qualtrics.com/>

[WRQualtricsSurvey Engine?Q\\_SS=egtKyZ0hgN3gJkE\\_389YFEgzAuQdUIS&\\_ =1](http://ohed.qualtrics.com/WRQualtricsSurveyEngine?Q_SS=egtKyZ0hgN3gJkE_389YFEgzAuQdUIS&_ =1)

### Appendix D

Ohio's State Support Team Regions

## State Support Teams



## Appendix E

### ACCEPT Questionnaire

1. With ADHD being diagnosed usually during elementary school, a student should have the disorder under control by the time they reach high school.
2. There is no longer a gender gap in diagnosis and referrals since teachers know how to differentiate the symptoms a boy may show versus a girl.
3. Students with or without ADHD have the same range of I.Q. scores.
4. School personnel can diagnose a child with ADHD.
5. Nutritional treatments and dietary changes such as removing white sugar and caffeine, are an effective treatment for ADHD
6. Medication eliminates social adjustment difficulties and school performance deficits of students with ADHD.
7. I teach students with ADHD the organizational, time-management, and self-monitoring skills needed to be successful in my classroom.
8. Following the rules is a defining trait of students with ADHD.
9. Children with high IQ scores and assessed as gifted can also be diagnosed with ADHD.
10. Children diagnosed with ADHD have difficulties establishing social bonds with others.
11. Attention Deficit Hyperactivity Disorder only affects a child biologically and academically.
12. Attention Deficit Hyperactivity Disorder only affects the biological and educational components of a child.
13. Parents who are more educated than parents with a high school diploma are more likely to medicate their children.
14. A diagnosis of ADHD has been shown to cause other disabilities in children.

15. The school's role in treatment is to provide environmental, behavioral, and instructional interventions to the child.
16. Aggression is a common characteristic shown by students with ADHD.
17. After years of research, there is now a known cause for ADHD.
18. Children in single-mother families are more likely to be diagnosed with ADHD when compared to a two-parent household.
19. Diagnosis of ADHD can be confirmed if stimulant medication improves the child's attention.
20. Girls with ADHD experience long term negative outcomes throughout their lives.
21. Impulsivity, hyperactivity, and inattentiveness are the three characteristics needed, whether alone or in combination, to be diagnosed with a particular type of ADHD.
22. Ohio's average for school age children diagnosed with ADHD is less than the national average.
23. Stimulant medication only results in temporary improvements in attention and reduction impulsive behavior and hyperactivity.
24. Teachers are the best route in the management of ADHD.
25. To keep a worldwide consistency, a student with ADHD coming into your classroom from a different country would have been diagnosed using the same criteria as stated in the DSM-IV.
26. With ADHD being the most-researched and best known of the childhood behavior disorders, teachers can implement the same interventions to children diagnosed with the same type of ADHD.
27. Verbal impulsivity is a defining feature of ADHD behavior in girls.
28. ADHD is a valid diagnosed disability for students.

29. Students only need to medicate their symptoms during school hours.
30. ADHD is a genetic disorder exacerbated through environmental influences.
31. Non-stimulant medication causes agitation or sleeplessness.
32. Knowledge of ADHD influences classroom practices which in turn influences student performance.
33. I am responsible for accommodating a student with ADHD in my classroom.
34. Evaluating the child's functioning within the family and school may lead in understanding the key factors that may relate to the development of the disorder.
35. Children with ADHD move around a lot because it helps them stay alert enough to complete challenging tasks.
36. Checklists are a valid reliable way to diagnose ADHD.
37. Attention Deficit Disorder (ADD) is the correct diagnosis for a child exhibiting inattentive type characteristics
38. ADHD is relevant only in the United States and Western Europe.
39. ADHD can be caused by poor parenting, bad teachers, refined sugar, and/or too much television.
40. A student diagnosed with Attention Deficit Hyperactivity Disorder is frequently diagnosed with another disability.
41. ADHD is caused from children not doing what they need to do to control their own behavior.
42. All students with ADHD exhibit externalizing behaviors (i.e., talking out, fidgeting, "on the go")
43. Behavioral and social interventions for ADHD should just focus on the individual student.

44. Children who have problems in school but get along well at home and with friends are not considered to have ADHD.
45. Environmental factors cause ADHD predominately hyperactive type while biological factors are the cause ADHD predominately inattentive type.
46. Girls with untreated ADHD are at risk for low self-esteem, underachievement and problems like depression and anxiety.
47. Once the symptoms have been treated, a student may still have trouble academically due to gaps from their previous learning experiences.
48. The common source of information for parents of children with ADHD is the school system.
49. Under the current guidelines for diagnosing ADHD, a child can be diagnosed as long as the symptoms were apparent before the age of 7.
50. With no single test, ADHD can be difficult to diagnose.

## Appendix F

### Demographic Questionnaire

1. Gender *Male/Female*
2. Age
3. Race Ethnicity *African American/Asian/Bi-racial/Caucasian/Latin American/Native American/Other*
4. Highest Degree Completed *Bachelor's/Master's/Master's +30/PhD.*
5. Years Teaching
6. Ohio County your District Resides (If your district is in more than one county, choose the one for the majority) *88 Counties*
7. Setting you Teach *Virtual Classroom/Traditional Classroom*
8. Type of District you Currently Work *City/Exempted Village/Local*
9. Type of Teacher *Special Education/General Education/Other*
10. Subject Area(s) Currently Teach (Check all that apply)  
*Mathematics/Reading/Science/Language Arts/Social Studies/Other*
11. How many students are you responsible for in a typical day?
12. How many students have you referred for an ADHD evaluation in the past year?  
*#Girls/#Boys*
13. In your school, who is responsible for accommodating the needs of a student with ADHD?  
(Check all that apply) *Special Education Teacher/General Education Teacher/Guidance Counselor/School Psychologists/Myself/Not Sure/Other*

14. Received Training in ADHD (Check all that apply) *Never/Never but heard it mentioned in undergrad/Took specific undergrad class/ADHD specific professional development/Read books on ADHD/Surfing the internet for information*
15. When teaching a child with ADHD in my classroom, I am... (Choose one) *By myself/Co-Teaching/Using an Aide/Not teaching students with ADHD*
16. Do you feel adequately prepared to meet the needs of students with ADHD within your classroom? (Choose one) *Yes/No*
17. Right now, do you feel adequately prepared to meet the needs of students with ADHD within your classroom? (Please explain your answer.)
18. What resources, interventions, and strategies do you use when meeting the needs of a student with ADHD and do you use the same things for all the students you teach with ADHD? (Please explain your answer.)
19. What would you personally like to know when teaching a child with ADHD? (Please explain your answer.)
20. What do you think are your responsibilities, if any, as a teacher in meeting the needs of a student with ADHD? (Please explain your answer.)
21. Any other suggestions or comments would be greatly appreciated.

## Plagiarism Check

The screenshot shows a web browser window with the following elements:

- Browser Tabs:** Firefox, Funk, Jodi - Outlook Web App, Plagiarism Checker - Article Checker ..., Grammarly - Subscribe.
- Address Bar:** www.articlechecker.com/checker.php
- Header:** Article Checker logo with subtext: "Check Search Engine Coverage", "Check Articles and Website Pages For Duplication".
- Advertisement:** WriteCheck™ BETA, POWERED BY TURNITIN, AVOID PLAGIARISM, LEARN MORE.
- Tracking Actions...** Source is TEXTAREA.
- Search Summary:** Item count: 478. Selected Search Engines: Google.
- Expected Report Execution Time (peak):** CURRENT STATUS: 170 seconds to perform for Google.
- Stand by...** A large button graphic that says "Search Complete" with "another?" below it.
- Matched Phrases / Google Results Found:**

Matched Phrases	Google Results Found
Total Matched Phrases / Total Submitted	0% (0/425)
- Footer:** Search Again? Free Check For Plagiarism And Correct Grammar Errors!