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ADHD and Multiple Intelligences: Does a Pattern Exist?

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2015

Abstract

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by

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MSW, Wayne State University, 1989

BSW, Western Michigan University, 1985

Dissertation Submitted in Partial Fulfillment

of the Requirements for the Degree of

Doctor of Philosophy

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Abstract

Attention Deficit Hyperactivity Disorder (ADHD) has typically been treated with a deficits-based response while most research has ignored any intelligence differences between the subtypes, despite differing symptomology. This quantitative study explored whether or not a distinct pattern of intelligences existed within each of the subtypes or presentations of ADHD: inattentive (IT), hyperactive (HT), and combined (CT). Using Gardner's multiple intelligences theory, data were collected via an online, self-administered survey from a sample of 132 participants, over 18 years of age, with IT, HT, and CT ADHD. The goal was to identify the most predominant of 8 different strengths or intelligences. Predominant intelligence types were measured through the completion of the online Multiple Intelligences Developmental Assessment Scale (MIDAS). Discriminant function analysis was used to interpret differences and combinations among predictors through identification of interdependency and pattern delineation. Study results failed to identify a distinct pattern of a relationship between the types of intelligence and ADHD subtypes. Further research is needed in the area of identifying the strengths of individuals diagnosed with ADHD in an effort to shift treatment and intervention responses to a more strengths-based perspective, possibly impacting individual, academic, and social success for those with ADHD.

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Dedication

The work in this study is dedicated to my son, Michael, who was my inspiration for the idea that while we all struggle at times, our strengths are what motivate us to continue to grow, to inspire others, and to aspire to greatness in ourselves in an effort to make a difference in the lives of others. Michael is on his way to finding his greatness through his amazing strengths. We have a choice to define ourselves through our strengths or through our challenges each and every day. My wish for you, Michael, is that you always choose your strengths.

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To my partners in research, thank you for your commitment to helping add to the literature in a strengths based perspective when considering ADHD: Melmed Center, ADHD Success Network, Inc., Attention Deficit Disorder Association, Maricopa Community Colleges District, Walden Participant Pool, Dr. Shef Gandhi, and Dr. Branton Shearer.

Finally, and most importantly, a most sincere and heartfelt thank you to my family: to Michael, Lauren, and Andrew who endured the many triumphs and frustrations along the way, and provided support and encouragement, always. Thank you to the rest of my family for always cheering me on, and to all my friends who would ask how "the paper" was going, even though it would be a longer answer than they probably wanted to hear. And to my love, Rob, who has been my biggest cheerleader through the last year and a half of this journey. Your support and encouragement lifted me up. I thank God every day for placing you in my life.

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Chapter 1: Introduction to the Study

Introduction

Approximately 5% of school aged children are diagnosed with Attention Deficit Hyperactivity Disorder (ADHD) and subsequently experience social, emotional, executive function, academic, learning, and psychiatric difficulties on a large scale (Biederman et al., 2007; Mattox & Harder, 2007; Salmeron, 2009; Taylor, Saylor, Twyman, & Macias, 2010; Zambo, 2008). Many of these difficulties, along with some additional new ones like planning ability, vocational stability, and driving, can follow individuals with ADHD into adulthood (Biederman et al., 2007; Nigg, 2005; Young, Morris, Toone, & Tyson, 2007). Feeling and being successful in school has been shown to be associated with successful adults (Vermeulen & Schmidt, 2008).

Children with ADHD have been treated with a deficits-based response of interventions, focusing on what makes them unsuccessful in school, in relationships, and in social situations, rather than identifying and teaching to their strengths. In addition, the three subtypes of ADHD, inattentive (IT), hyperactive (HT), and combined (CT) while identified with some differing symptoms, are rarely treated with differentiated interventions (Collings, 2003). Utilizing Gardner's multiple intelligences (MI) theory, in this study, I explored whether there is a pattern of strengths, just as there is a pattern of deficits among individuals with ADHD, thus shifting to a more strengths-based perspective when applying study results to interventions, possibly impacting individual, academic, and social success.

The No Child Left Behind Act (NCLB) of 2001 strives to bridge the achievement gap of all districts, schools, and students, regardless of ethnicity, gender, disability, or socioeconomic status. Standardized state tests were developed and implemented by each state's education department to monitor adequate yearly progress (AYP) of districts, schools, and students, a requirement of NCLB with stipulations for improvement following failure to adequately progress. Since 2001, educators are charged with preparing students to be successful in the world past high school, and one of the steps is to pass the state standardized test. At issue for many educators is that AYP is connected to the passing of the state achievement test, as is teacher performance.

Teachers often feel they must teach to the test rather than address the needs of their students to help them, their school site, and themselves as teachers pass the requirements of the test. These state standardized tests utilize only logical and linguistic brain thinking in assessing student knowledge, restricting curriculum delivery, and knowledge acquisition for students with differing MI strengths. If all categories of MI were to be included in the assessment of state standards in the achievement tests, AYP may be impacted in a different way. Teachers would be able to focus more on their students' strengths in acquiring knowledge, not the current limited two categories of knowledge acquisition (Beam, 2009).

Gardner (1983) posited, through his MI theory, that people possess eight different types of intelligences, not just these two highlighted in state standardized tests and often in traditional classrooms: bodily-kinesthetic, interpersonal, intrapersonal, musical, naturalist, spatial, logical-mathematical, and verbal-linguistic. He theorized that

intelligence is fluid and not fixed, that each of us possesses predominant intelligences, while others are awaiting development based on the help of our identified predominant intelligence strengths, environment, personal interest, academic opportunities, and parental encouragement (Gardner, 1983).

Students may feel ill equipped to complete an assignment. While it is important that learners are able to think critically, doing so without using the strengths they possess makes it a difficult task, more difficult than it needs to be. Instead, a student with ADHD identified with a predominant musical intelligence could be given the same assignment to identify an era in history that intrigues them, write a song or rap depicting some of the same critical thinking requirements of the ten page paper, and perform it for the class. Research results of MI as a tool for academic improvement have indicated its effectiveness in several areas including GPA, math and reading skills, motivation and student engagement, self-concept, academic stress, academic self-efficacy, and overall academic achievement (Beichner, 2011; Drakeford, 2010; Glenn, 2010; Gowen, 2010; Harriman, 2010; Roberts, 2010; Schirduan, 2000). Only one study, discussed in chapter 2, addresses the use of MI with students exhibiting ADHD symptoms, thus a gap in the research exists (Schirduan, 2000).

Providing an opportunity for students with ADHD to feel successful in the classroom and impact academic performance is an important task to achieve if no child is to be left behind. The rate of high school dropouts among students with ADHD has been identified in Huang-Pollack and Karalunas (2010) as 30% (p.174), and, if they are not academically and interpersonally engaged, these dropout rates may continue. By

examining each subtype of ADHD for patterns of MI, an opportunity exists to look at this set of challenges with a different perspective, one based on strengths. The use of MI as an assessment and application tool in the classroom could add to the repertoire of interventions available to assist students who struggle with ADHD through MI curriculum development geared toward a student's identified top two or three predominant intelligences.

ADHD was often viewed as simply a behavior problem in its early diagnostic days. Over the span of decades, researchers have discovered it is more related to brain function and impacts cognition as well as behavior (Voeller, 2004). Diagnostic criteria for ADHD from the *Diagnostic and Statistical Manual of Mental Disorders-5* (DSM-5; American Psychiatric Association [APA], 2013), included a persistent pattern of inattention and/or hyperactivity-impulsivity that interferes with functioning or development as characterized by six or more of a list of symptoms for children and five or more of the same list for adults and adolescents (see definition of terms section for full list of symptoms). Symptoms can range from difficulty in organizing tasks and activities, forgetfulness in attending to daily activities, and distractibility in response to stimuli; they also include often fidgeting or tapping hands or feet, talking excessively, and interrupting or intruding on others. Several symptoms must have been present prior to age 12 years and in more than two settings.

There also must be clear evidence the symptoms interfere with the quality of social, academic, or occupational functioning. Ruling out other disorders is achieved if the symptoms are not better explained by another mental disorder. Individuals can be in

partial remission when full criteria were previously met, less than the full criteria were met for the past six months, and impairment in social, academic, or occupational functioning still result from the remaining symptoms. An individual can be diagnosed with mild, moderate, or severe ADHD depending on the level of functional impairment as a result of symptoms (APA, 2013, pp. 59-61).

Background of the Study

A strong link between ADHD and academic underachievement exists in current literature, though few treatment outcome studies target academic outcomes specifically, rather it is behavioral symptoms that are the focus (Raggi & Chronis, 2006). Treatment options for students with ADHD through 2015 include stimulant medication and behavioral interventions involving parent training and school-based interventions. In a review of 16 research studies, Miranda et al. (2006) found school based treatments for ADHD are only effective in the short term for behavioral improvements and academic performance; the authors added that most effective interventions include a multimodal approach utilizing medical management of concurrent medication and behavioral treatment involving parent, child, and school interventions. Academic improvements over time and across content areas were shown to be limited using traditional behavioral interventions.

Recent research in the area of MI indicates efficacy in curriculum adaptation implementation with academic growth outcomes in mathematics, reading, academic motivation, and overall GPA for general education students (Douglas, Burton, & Reese-Durham, 2008; Glenn, 2010; Gowen, 2010). Working specifically with an ADHD student

population, Schirduan (2000) examined academic success through curriculum adaptation using MI and found students scored average achievement levels, an improvement over previous achievement levels. Other studies examining the academic performance of ADHD student populations in more traditional educational settings often implement stimulant medication and behavior modification interventions however, indicate much smaller effects on the academic outcomes than those interventions focused primarily on adapting instruction or materials (Raggi & Chronis, 2006).

Problem Statement

While many strategies and interventions exist to address the deficit symptoms of students with ADHD, few address and capitalize on the students' strengths. A deficit-based treatment response highlights the challenges a student experiences and can be effective in treating symptoms, but is often limited to short term behavior improvement without impacting long term academic growth (Miranda, Jarque, & Tarraga, 2006). Other specific strategies aimed at content instead of behavior, such as peer tutoring, computer-aided instruction, and academic consultation have been identified to improve academic performance. Improvements, however, are not generalized, rather are only in those targeted content areas (Langberg, Epstein, Urbanowicz, Simon, & Graham, 2008). In addition, the psychosocial difficulties experienced by students with ADHD often result in negative peer interactions, creating a negative self-concept for the student. Add the current treatment models focused on short term behavior changes without long lasting, generalized academic or social improvements, and students with ADHD are likely to contribute negatively to the AYP statistics for school improvement.

In a qualitative study, Drakeford (2010) examined the use of MI in Howard

Gardner's School (HGS) to identify how the school has met the needs of its students.

While the students are identified as gifted and talented, many of the students also have

learning disabilities. HGS has been able to provide differentiated curriculum and

instruction based on the needs of the student, meeting their individual learning needs. A

prominent theme emerged from the data, one of empowerment and self-actualization of

the students with the help of a MI profile and feedback (Drakeford). Students learned

what they needed individually to process information and utilize their strengths as well as

compensate for their weaknesses. As they began to learn in areas they were told they

could not, many experienced an improvement in self-confidence and began to advocate

for their learning needs when they failed to understand something, taking more personal

responsibility for their learning.

Most current literature and treatment practices, however, fail to address the

unique needs of each of the subtypes of ADHD in terms of differentiated treatment. Most

identified strategies are developed without a direct link to the subtype and its symptoms a

student with ADHD experiences. In addition, treatment options often look at only half of

the big picture: the students' deficits, not their strengths.

The use of MI in assessing and implementing curricular adaptations takes a

strengths based perspective with the possibility of a generalized impact on academic

outcomes and self-concept for students. A gap in the current research exists in terms of

differentiation between each of the subtypes of ADHD when identifying treatment needs.

In this study, I aimed to fill that gap by exploring a pattern of Gardner's MI theory of

predominant intelligences among the differing subtypes of ADHD. This creates an

opportunity to address treatment needs with a strengths based, differentiated perspective,

possibly changing the perception of ADHD to a more strengths model of practice for

practitioners as well as individuals with ADHD.

Purpose of the Study

The purpose of this quantitative study was to examine the relationship between

the dependent variables of ADHD inattentive, hyperactive, and combined subtypes and

the independent variables−Gardner's MI categories, bodily-kinesthetic, interpersonal,

intrapersonal, musical, naturalist, spatial, logical-mathematical, and verbal-linguistic, to

identify whether there is a distinctive pattern of intelligences among students with

differing subtypes of ADHD. Having an understanding of this relationship can provide

opportunities to teach with a student's strengths in mind through MI curricular

adaptations, possibly impacting student engagement and academic performance for this

high risk population. Today's educational system strives to help every child reach

academic success through the NCLB Act. Focusing on the learning needs of the child is

the foundation for this legislation as well as for this study.

Nature of the Study

I implemented a nonexperimental, quantitative survey design to examine the

relationship between ADHD subtypes and identified predominant multiple intelligences

using the MIDAS (Multiple Intelligences Developmental Assessment Survey). I collected

survey data at one point in time, did not manipulate any variables, and explored the

prevalence of MI category differences among ADHD subtypes. I examined individuals

with (dependent variables) IT, HT, and CT ADHD in an online self-administered survey identifying the most predominant of (independent variables) eight different strengths or intelligences through the use of Multiple Intelligences Theory. Predominant intelligence type was measured after 67 participants with CT ADHD and 65 participants with IT ADHD completed the online MIDAS (Appendix A).

Participants were adults diagnosed with ADHD, over age 18 who sought out support with addressing their diagnosis through an online support site or an agency providing support services for individuals diagnosed with ADHD. The original data collection plan to include participants attending college and receiving disability services through the Disability Resource Center (DRC) of their college campus was adjusted when data collection was excessively and unavoidably delayed. Further details about the setting, participants, instrumentation, data collection procedures, and other research design elements are provided in Chapter 3.

Research Question and Hypotheses

The research question addressed the relationship between the subtypes of ADHD and Gardner's MI. Data was collected through the Multiple Intelligences Developmental Assessment Scales, Revised (MIDAS). Results of the MIDAS provided participants with continuum scores of identified MI.

Research Question: Can each subtype of ADHD (inattentive, hyperactive, combined) be predicted based upon the subscale scores presented from Gardner's MI?

$H_0 1$: ADHD subtypes cannot be predicted based upon Gardner's MI scores.

$H_A 1$: ADHD subtypes can be predicted based upon Gardner's MI scores.

Theoretical Base

This study was grounded by Gardner's (1983) multiple intelligences theory. Gardner originally defined *multiple intelligences* as "the ability to solve problems or to create products that are valued within one or more cultural settings" (p. 33). He refined his definition in his later writings to read, "a biopsychological potential to process information that can be activated in a cultural setting to solve problems or create product that are of value in a culture" (Gardner, 1999, p. 34). Gardner developed his theory following his work with a group of colleagues exploring the nature and realization of human potential. He challenged the popular belief that intelligence is singular by arguing his theory identified eight faculties which are relatively independent of each other.

Gardner has spent over 30 years examining intelligence and cognition, defining and refining his theory through the systematic exploration of neuropsychology, biology, sociology, anthropology, and the arts and humanities, looking for relationships or connections of human faculties along the way (Gardner, 1999). Identifying areas of intelligence occurred only through a set of criteria in four different disciplinary roots that must be met to qualify. In the biological sciences, the potential of isolation by brain damage and an evolutionary history and plausibility must be present. The logical analysis criteria included an identifiable core operation or set of operations, as with musical intelligence, and a propensity for encoding in a symbol system. In the developmental psychology realm, Gardner included the existence of individuals with unusual profiles of intelligence, such as individuals with autism, along with a distinct developmental history and subsequent advancement of expert skill and performance in a specific intelligence.

And finally, traditional psychological research included criteria demonstrating support from both experimental psychological tasks and psychometric findings. Gardner felt these set of criteria represent a "reasonable set of factors to be considered in the study of human cognition" (p. 41). While the use of the words *multiple intelligences* draws criticism from a wide range of professionals in the fields of education and psychology, it is not the intention of this study to debate its validity as a concept, but rather, to explore the possibility of its use in helping individuals identify strengths in their learning capabilities, thus, modifying their deficit based perception of ADHD to a strengths-based perspective.

Definition of Terms

The content of this study, I use the following terms when describing background, methods, and findings.

Academic outcomes: The academic results that occur related to ADHD, including academic retention, special education placement, academic underachievement, and school dropout (Langberg, Epstein, Urbanowicz, Simon, & Graham, 2008).

Academic self-efficacy: Related to Bandura's self-efficacy theory, academic self-efficacy refers to a person's belief she they can successfully achieve a certain level on an academic task or attain a specific academic goal (Bandura, 1997, p.1206).

ADHD hyperactive subtype (HT): A persistent pattern of hyperactivity-impulsivity that interferes with functioning or development as characterized by six or more (for children) and five or more (for adolescents and adults) of the following symptoms: often fidgets with or taps hands or feet or squirms in seat, often leaves seat in

situations when remaining seated is expected, often runs about or climbs in situation

where it is inappropriate or feeling restless in adolescents or adults, often unable to play

or engage in leisure activities quietly, often uncomfortable being still for extended time,

often talks excessively, often blurts out an answer before a question has been completed,

often has difficulty waiting his or her turn, and often interrupts or intrudes on others

(APA, 2013, p. 60).

ADHD inattentive subtype (IT): A persistent pattern of inattention that interferes

with functioning or development as characterized by six or more (for children) or five or

more (for adolescents and adults) of the following symptoms: failure to give close

attention to details, difficulty sustaining attention in tasks or play activities, does not

seem to listen when spoken to directly, often does not follow through on instructions and

fails to finish tasks, often has difficulty organizing tasks and activities, often avoids,

dislikes, or is reluctant to engage in tasks that require sustained mental effort, often loses

things necessary for tasks or activities, is often easily distracted by extraneous stimuli,

and is often forgetful in daily activities (APA, 2013, p. 59).

ADHD combined subtype (CT): A persistent pattern of inattention and

hyperactivity-impulsivity that interferes with functioning or development as characterized

by six or more symptoms combined in HT and IT subtype categories in children and five

or more symptoms combined in HT and IT subtype categories in older adolescents and

adults. Further criteria for diagnosis is explained in chapter 3 (APA, 2013, p. 60).

At-risk: Refers to individuals who are at risk for school failure or drop-out.

Differentiated instruction: Differentiated instruction is a student-centered method of instruction which is developed to encourage student growth and utilizes whole class, small group, and individualized instruction (Beam, 2009, p. 3).

Executive functions: Refers to how the brain manages cognitive functions, including prioritizing, integrating, and regulating response inhibition, vigilance, working memory, and planning (Brown, 2006).

Individual education plan (IEP): An IEP is the educational plan developed for the individual needs of a student as required by special education law and includes the student's strengths, challenges, learning goals, accommodations, and at age 16 and beyond, includes a plan for transition after high school.

Learning styles theory: This theory, originally explored by Adler in the early 1900's, stresses the variations in the process of learning and specifically describes how an individual inputs and outputs information (LaFountain, Garner, & Miedema, 2003).

Multiple intelligences theory: This theory was developed by Gardner following his research in human intellectual competencies with prodigies, gifted, brain damaged, and developmentally delayed individuals, normal children and adults, culturally diverse individuals, and experts in various occupations. He asserts that there are eight intellectual competencies he has found to be relatively autonomous among a wide range of individuals which include linguistic, logical-mathematical, musical, bodily-kinesthetic, spatial, interpersonal, intrapersonal, and naturalist (Gardner, 1999, p. 41-44).

Self-concept: Self-concept refers to the evaluation and belief we have about who we are based on past behaviors, attitudes, and experiences (Schirduan, 2000).

Self-efficacy: According to self-efficacy theory, self-efficacy is a person's confidence in his ability to organize, execute, and regulate performance in order to solve a problem or accomplish a task at a designated level of skill and ability (Bandura, 1997, p. 1206).

Strengths-based perspective: This manner of addressing a disorder like ADHD involves a focus on identifying the strengths of an individual and utilizing those strengths in devising an intervention plan to address the individual's challenges.

Assumptions

In this study, I assumed that the participants could successfully complete the MIDAS, answered the assessment questions honestly and accurately, and that they understood each question asked. It was also assumed that the participants had an accurate self-reported diagnosis of ADHD indicated on their study participation form (Appendix B). A final assumption was that I used the best possible assessment tool to most accurately identify predominant MI categories.

Limitations

Several threats existed that could have affected internal validity of participant responses including an inaccurate self-perception of competency versus interest in an intelligence being assessed. As a self-report assessment, student responses could impact validity. I instructed participants to answer survey questions based on competency openly and honestly using a survey tool that has been tested for internal validity. In addition, participants may have had commingled disorders or symptoms with or without diagnosis that could have impacted responses. Measures were taken to control for this on the initial

study participation form by ruling out commingling disorders or symptoms. Pre-survey participant data attempted to identify additional symptoms not related to ADHD on the study participation form. Further, as adults in the study, participants may have already developed an MI category based on environment when another, more predominant intelligence could have been present without cultivation in their earlier years, thus little awareness of the intelligence strength may exist now, affecting their responses in the survey. Preassessment survey participant data collection addressed childhood interests in any of the MI categories.

External validity, referring to the ability to generalize results, includes population and ecological validity when performing quantitative research (Howell, 2010). Population external validity was addressed by including all adults with ADHD interested in the study to participate. The highest possible participation rates were attempted through an incentive for participants to receive a full, personalized MI report following study completion. Ecological external validity, that is, physical surroundings, time of day or year, pretest or posttest sensitization, and effects of an experimenter or treatment were identified as possible threats however, are contraindicated for this study. Bias was addressed through my acknowledging an attachment to the theory of MI due to its potential to better identify and understand the strengths of individuals with ADHD. Alternative theoretical perspectives were not examined in this study, though could provide for future research opportunities.

Scope and Delimitations

Individuals with ADHD have dealt with the challenges of the disorder from a deficits perspective as long as there has been a diagnosis, with little emphasis on the individuals' strengths when developing treatment strategies. Internal validity of this study was considered by the rigor in which multiple intelligence is measured in the MIDAS survey, reinforcing the MIDAS as a reliable tool for this study. Internal consistency of items within each scale of the MIDAS was examined and found to have an overall Alpha coefficient reported at .86 (Shearer, 2007).

I conducted this study with adults seeking support either in an online setting or an agency setting located in a large metropolitan area of a southwestern state of the United States. A delimitation of this study was that participants were all currently seeking assistance and may have been relatively successful in addressing their disorder through their connection to their online or agency support source. Individuals with ADHD under the age of 18 were not included in this study therefore study results should not be used to represent an ADHD population that does not share these participants' characteristics. In addition, self-efficacy was not measured, thus responses were taken at face value, addressing the external validity of this study.

Significance of the Study

Current research in the area of ADHD and multiple intelligences is minimal. Several studies have identified MI as an effective tool for the classroom, while other studies identify effective strategies for addressing ADHD, though few focus on a strengths-based perspective of treatment. There is only one study that combines the two

topics (Schirduan, 2000), thus a gap in the research exists. Schirduan, focused on ADHD as a whole while looking for patterns of MI, whereas this study separates the subtypes and suggests there are MI pattern differences between them.

If a distinct pattern of MI exists among individuals within each ADHD subtype, professional application for the results of this study could provide a more strengths-based treatment response to the challenges of ADHD, impacting student success by utilizing differentiated MI techniques in the classroom more regularly. Studies supporting the effective use of MI among individuals with ADHD are limited and this study could provide a window for further studies in the area. In addition, individuals with ADHD who participate in this study can learn more about their preferred learning strengths, possibly impacting their individual academic success.

The positive social change that could exist from this study is a shift in the perception of a deficits focus to a more strengths-based focus when considering a treatment response to ADHD. Instead of simply identifying an individual's challenges, the identification and encouragement of an individual's strengths could promote his development and self-worth, as well as the possibility of creating a more positive perception of individuals with ADHD among society in general. A strong relationship has been already been identified between self-efficacy and MI instructional practices (Beichner, 2011). As a result of this study, further curriculum development and application in the area of strengths based differentiated instruction for those with ADHD could impact the academic success of those who struggle with ADHD symptoms,

possibly reducing the high dropout rate and getting closer to the goal to leave no child behind.

Summary and Transition

In this study, I examined the predominant intelligences of individuals with ADHD within the three subtypes: inattentive, hyperactive, and combined. A discriminant function analysis provided an understanding of the dimensions along which the groups of ADHD subtypes differ by interpreting a possible pattern of differences among the predictors. I collected and analyzed data utilizing a quantitative approach with the intent to highlight the strengths of individuals with ADHD within each subtype, reframing the ADHD perspective to one of skill abundance rather than one of deficits.

The research in this study could provide an opportunity for more differentiated instruction for students with ADHD, possibly impacting academic success and school completion rates (Beam, 2009), approaching the goal of the NCLB. By using the predominant MI strengths of a student through instruction, learners could enjoy, take more ownership of their knowledge acquisition, and benefit from the feeling of success. The shift from a deficits-based treatment response to a strengths-based treatment response may also impact self-determination and could be assessed in follow-up contact with participants through further research.

In Chapter 2 of this study, I review the existing literature, discussing self-determination, self-efficacy, multiple intelligence, current treatment responses for ADHD, the background for and other studies utilizing the research tool, MIDAS, and recent studies examining the efficacy of the use of multiple intelligence theory in

academic instruction. Chapter 3 includes more detail of the methodology, focusing on the

study setting and participant sample, validity and reliability of the MIDAS, data

collection, and analysis. Patterns of the data collected and study findings are explained in

Chapter 4. In Chapter 5, conclusions and recommendation for further research are

discussed.

Chapter 2: Literature Review

Introduction

Children with ADHD deal with many issues related to their disorder, including a focus on what deficits they experience rather than what strengths they possess. Multiple intelligences theory stresses the content and products of learning in terms of eight different intellectual competancies: linguistic; musical; interpersonal; intrapersonal; naturalist; bodily/kinesthetic; spatial; and logical/mathematical (Gardner, 2004, p. 41). Historically, academic curriculum in the public school setting has focused on linguistic and logistic/mathematical intelligence, leaving students outside of these intelligences struggling to learn and often feeling inadequate as learners (Shirduan, 2000).

Understanding how one learns best and incorporating the diversity of learners' competancies in instruction can increase students' personal learning responsibility in the classroom, thus improving academic outcomes (LaFountain et al., 2003). Students with ADHD often experience the skills they have difficulty performing being emphasized by parents and teachers in a variety of ways (Segal, 2001; Singh, 2003), and may often label themselves incompetent, when in fact, they are likely to have a number of strengths of which they may not even be aware (Schirduan, 2000). This feeling of incompetence can permeate a person's psyche, leaving them to play out the expectation of incompetence through academic failure, social isolation, and parent-child conflict (Edbom, Granlund, Lichtenstein, & Larrson, 2008; Mattox & Harder, 2007; Nigg et al., 2002; and Shaw-Zirt, Popali-Lehane, Chaplin, & Bergman, 2005).

Research in the area of ADHD indicates an impact on executive and regulatory brain functions and self-concept, often affecting school performance, childhood social functioning, self-efficacy, academic outcomes, and adult occupational and social functioning (Mattox & Harder, 2007; Nigg et al., 2005; Salmeron, 2009; Voeller, 2004, Zambo, 2008). The social implications of a deficits-based response to ADHD are demonstrated through a study examining responses to social success and failure by children with ADHD (Hoza, Waschbusch, Pelham, Molina, & Milich, 2000). Researchers were surprised by their findings, indicating participants with ADHD rated their performance more favorably than the control group, attributing their success and failure to task ease and chance. These participants, however, were not taking personal responsibility for their success or failure, rather placing it on outside factors. This pattern of behavior is often led by the individual's perception of an uncontrollable influence of his deficit symptoms, leaving him feeling like he *cannot help it* (Toner, O'Donoghue, & Houghton, 2006). This feeling of a lack of control can give license for high risk behaviors, greatly impacting social functioning for the individual with ADHD (Edbom et al., 2008; Mattox & Harder, 2007; Nigg et al., 2002, Shaw-Zirt et al., 2005). The implementation of multiple intelligences in the classroom provides an opportunity for students to want to take responsibility for their learning and education.

Research in the area of ADHD is vast, encompassing current medications, treatments and interventions, social impacts, family and peer relationships, academic achievement and outcomes, parenting styles, high risk behaviors, and self-efficacy (Beiderman et al., 2004; Hoza et al., 2005; Kakouros, Maniadaki, & Karaba, 2005; Lee &

Hinshaw, 2004; McLaughlin & Harrison, 2006; Podolski & Nigg, 2001; Randazzo

Dockray, & Susman, 2008; Reschly & Christenson, 2006; Rojo, Ruiz, Dominguez, Calaf,

& Livianos, 2006; St.Clair-Thompson & Gathercole, 2006; Tripp, Schaughency,

Langlands & Mouat, 2007; Young et al., 2007). Research relevant to this study in the

areas of academic achievement outcomes, current treatment and interventions, self-

efficacy, and social impacts of individuals with ADHD are the focus of this literature

review. However, little research and few treatment responses address the strengths of

individuals with ADHD, leaving a wide gap for exploration. Gardner's theory of Multiple

Intelligences (MI) provides a starting point to identify strengths so educators can then

take it a step further to present curricula based on those strengths.

While some researchers have evidence of positive outcomes with the use of MI

theory in the classroom, the literature is not extensive. Building a body of current

literature may improve the possibility that MI will be utilized more widely and

consistently in the classroom. In addition, responses to intervention are often lumped

together for all of the subtypes of ADHD, even though they have been shown to be

identified with differing symptoms (Collings & Kwasman, 2006; Couvadelli, 2006;

Hinshaw, Carte, Fan, Jassy, & Owens, 2007; Randazzo et al., 2008; Zambo, 2008). A

more differentiated response is needed if we are going to meet the needs of individuals

diagnosed with differing symptoms and subtypes of ADHD. Identifying a pattern of

multiple intelligences among individuals with ADHD could reduce instructional time by

teaching to a student's strengths while improving academic and social outcomes with the

use of MI in the classroom.

Strategy for Literature Review

I conducted the search for literature in scholarly databases which included professional journals, government documented data, primary author books, nonprofit agency websites, published manuals, and data documents. Journal literature was obtained from a number of databases, including PsycINFO, SocINDEX, Academic Search Premier, PsycARTICLES, ERIC, and Mental Measurements Yearbook. The literature that I used was most often less than 10 years old, though some are older for historical purposes. Search terms included the following: *attention deficit hyperactivity disorder, multiple intelligences, differentiated instruction, strengths, self-efficacy, self-concept, instructional practices, neuropsychology, academic outcomes, learning styles, intelligence, creativity, assessment,* and *treatment.*

The strengths-based perspective of MI was the basis for this research, with the possibility of effectively changing the deficits-based response for individuals with ADHD, altering the way parents, educators, and individuals with ADHD relate to the challenges experienced. The theory of multiple intelligences speaks to the idea that human capacity for intelligence is multiple and fluid, not singular and fixed, regardless of our challenges. My hypothesis that a pattern of multiple intelligences exists among individuals with ADHD builds upon the existing theory of MI through a neuropsychological connection, one that acknowledges the specific challenges of executive functions and inhibitory control of the prefrontal cortex, though is independent of other individual capacities.

The literature that I reviewed in this chapter identifies practices in education in general, as well as with students dealing with ADHD, highlighting the differences among the subtypes and the challenges many experience. The theoretical base for this research included Gardner's multiple intelligences theory and the concept of self-efficacy, as described by Bandura's social learning theory. The background and efficacy of MI is discussed, including the neuropsychological connection, the importance of building the scientifically based research body of literature, learning styles and MI, and the function of MI in a traditional academic setting. Finally, standards based differentiated instruction using MI is discussed.

Current Practices in Education

Typically, public schools assess cognitive abilities through annual group state achievement tests, IQ measures, and college entrance exams such as the Scholastic Aptitude Test (SAT). A student referred for a potential learning problem is often assessed using some of these tools, such as Wechsler Intelligence Scale for Children, Fourth Edition, (WISC-IV), a standard IQ measurement. The WISC-IV is a common assessment tool for intelligence quotient measurement. One limitation found for individuals with ADHD who are assessed only with IQ composite measures and basic achievement skills is a lack of evaluation of higher-level executive functions, a common deficit for those with ADHD (Delis et al., 2007). This practice fails to identify students with normal verbal skills who also have difficulty with higher level executive functions, such as concept formation, problem solving, and abstract thinking.

In addition, college admission exams tend to focus on a student's weaknesses rather than her strengths, leaving the student who thinks creatively but has difficulty with rote-verbal skills with fewer doors opened to higher education. Either way, there may be a disservice occurring to a wide variety of students in terms of successful academic opportunity (Kezar, 2001). Clearly, individuals cannot all be good at everything, and conversely, also cannot do poorly at everything. Strengths exist in people, regardless of an individual's deficits. Sometimes identifying those strengths can be a struggle. Altering the perception of ADHD from deficits to abundance is an even bigger struggle.

When considering the strengths of an individual with ADHD, assessment tools to identifying a student's characteristics often seem focused on the neuropsychological deficits, not the individual's strengths. While it is imperative the deficits are addressed and assistance is provided, identifying and building on strengths may be an opportunity to alter an individual's perception of self, possibly improving self-concept and self-efficacy. In a study by Edbom et al., (2008), researchers used a person-oriented approach to examine the relationship between ADHD symptoms and self-esteem, concluding that, the more symptoms identified, the higher incidence of specific problem profiles of self-esteem, specifically in the areas of skills and talents and psychological well-being. The question remains whether a more strengths-based perspective of ADHD might alter the results of studies like this one.

Like myself, Schirduan (2000) was interested in a more strengths-based perspective of ADHD, however differs by not separating the subtypes based on symptoms and MI predominance. Schirduan examined intelligences, self-concept, and

achievement of students with ADHD, identifying predominant intelligences and suggesting that these strengths can be used as an entry point to an area of difficulty for students struggling with symptoms associated with ADHD as well as for educators to plan effective instruction. As a follow up, Schirduan and Case (2004) examined the previous study's learning outcomes and self-concept of students with ADHD at 17 U.S. nationwide schools using MI theory based curriculum (SUMIT sites) with the intention to highlight mindful curriculum leadership. Using a mixed method study, these researchers examined the predominant intelligences using the Multiple Intelligences Development Assessment Scale (MIDAS), self-concept using the Piers-Harris Children's Self-Concept Scale (PHCSCS), and achievement of 87 students with ADHD in Grades 2 through 7 using the Teacher Perception of Achievement Level in Students with ADHD Survey. The results suggested that more than half of the students with ADHD self-identified as having predominantly naturalist and spatial intelligence (52.6% combined), (Schirduan & Case, 2004, p.90) supporting the hypothesis that there may be a correlation between ADHD subtypes and a pattern of MI predominance. In addition, they found a relationship between intellectual and school status and self-concept of students with ADHD in SUMIT sites, supporting previous study findings regarding positive outcomes with the implementation of MI instruction in curriculum.

One limitation about this study, however is the tool used to measure self-concept. An older edition of the assessment was used instead of the latest edition, one that has undergone some revision to include a reduction in test questions from 80 to 60, two new validity scales to detect inconsistent responding and response bias, but more importantly,

the scale has been standardized with a national sample instead of the use of an older rural sample collected in the 1960's (Kelly & Oswald, 2012). There is also a limitation in terms of the underrepresentation of Hispanic/Latino and western region youth now present in the newly standardized version. Cultural differences may have an impact on the research results and it is unclear in the literature what regions were included in the study. Consequently, these changes could have an impact on the measure of self-concept results. These limitations are issues that can impact the progression of acceptance of MI as a viable assessment and educational tool in the evidence based world of research. Including the use of a tool that does not under represent the Hispanic/Latino population and a whole region of the country in its sampling and implementing another updated study showing comparable results could improve the outlook for the consistent use of MI across subject areas in curricula.

ADHD

ADHD, a common neurobehavioral condition, has been diagnosed in approximately 3-7% of the school-aged population in the United States and can have far reaching effects on the life of a child (Salmeron, 2009). Not only can the disorder impact the academic success of a student, but also peer relations, family relations, social skills, self-concept, self-determination, and comorbidity with a number of mental health disorders (Mattox & Harder, 2007). As many as 75% of young people diagnosed are boys, most often diagnosed at the age of 8 or 9, and as many as 60% continue on in adulthood to display symptoms of ADHD (Salmeron, 2009). The risk of academic

failure, association with a deviant peer group, and an increased risk of substance abuse are all areas for concern (Furman, 2005; Mattox & Harder, 2007, Voeller, 2004).

Subtypes and Their Differences

Diagnostic criteria to identify an individual with ADHD are found in the *DSM-5* (APA, 2013)*.* There are three subtypes of ADHD highlighted in the fifth edition: hyperactive (HT), inattentive (IT), and combined (CT) types. Much of the literature does not differentiate between the subtypes, though the symptoms and interventions can vary. The *DSM-5* outlines five criteria for a diagnosis of ADHD identified as: (a) number and severity of symptoms, (b) age of onset prior to 12 years, (c) setting where impairment occurs, (d) clear evidence of impairment, and (e) exclusion of other causes (APA, 2013, pp. 59-66).

In addition to these criteria, an individual must exhibit at least six symptoms of inattention, hyperactivity, and/or impulsivity. Symptoms of inattention include: difficulty paying attention to detail, easily distracted, inability to sustain attention on activities or tasks, inability to finish schoolwork or paperwork, frequent shifts from one uncompleted activity to another, procrastination, unorganized work habits, forgetfulness, failure to complete tasks, frequent shifts in conversations, and not following details or rules of activities in social situations. Symptoms of hyperactivity include: fidgeting or squirming when seated, getting up frequently to walk or run around, running or climbing excessively when inappropriate or restlessness in teens, talking excessively, being always on the go, and having difficulty engaging in quiet leisure activities. Finally, symptoms of impulsivity include: impatience, difficulty delaying responses, blurting out answers

before questions have been completed, difficulty awaiting one's turn, frequently

interrupting or intruding on others inappropriately in social settings, and initiating

conversations at inappropriate times. The symptoms must exist for at least 6 months,

occur in at least two settings, and occur to a degree that is inappropriate and disruptive to

the individual's developmental level in terms of academic, social, and occupational

functioning. Current severity of symptoms are specified as mild, moderate, or severe, and

individuals may be considered in partial remission when fewer than the full criteria are

met for the past six months though symptoms still impede academic, social, or

occupational functioning (APA, 2013, pp. 59-61).

Differences between ADHD subtypes have been studied by several researchers,

providing an opportunity to consider the possibility that differentiated interventions are

warranted. Collings (2003) found differences in sustained attention deficits, specifically

performance declines and vigilance deficits between IT and CT ADHD subtypes were

examined using the continuous performance task (CPT). Collings also reported that

performance of the participants from ADHD CT group deteriorated more quickly than the

IT type or the control group, while the IT subtype group participants did not show

evidence of vigilance deficits. Bauermeister et al. (2005) examined the differences among

IT and CT ADHD, and found results suggesting the subtypes represent distinct disorders.

While both groups showed internalizing behaviors, impairments on academic

achievement measures, and difficulties during math and vigilance tasks at varying

degrees, the IT group presented with a later onset of symptoms, were less assertive and

more self-controlled in social situations, had fewer externalizing behaviors, less family stress, and higher adaptive functioning skills.

Schmitz et al. (2002) explored neuropsychological performance among 30 untreated Brazilian adolescents with ADHD and 60 control group participants using a battery of tests, including the Stoop Test (ST), Digit Span, Word Span, and Wisconsin Card-Sorting Test (WCST). Cognitive differences among all three of the subtypes were found: ADHD HT performed better than IT and CT on all measures, and IT performed better than CT on Digit Span, ST, and WCST measures. Differences between the subtypes appears to be due to specific deficits of selective attention with IT and more broad deficits of executive function with CT. While the researchers concluded HT participants did not differ significantly from the control group on any measures assessed, study limitations, including a small sample size in the ADHD groups limiting statistical power and not assessing for comorbid conditions, may have impacted these results. Despite the limitations of this study, all of these differences confirm the study hypothesis there is support for the diagnostic distinction among the subtypes of ADHD.

In addition to clear differences found between subtypes in these studies, another group of researchers examined links between personality traits and clinical symptoms of ADHD (Nigg et al., 2002). Nigg et al. (2002) sought replication across self and spouse reports of the Big Five dimensions of personality and compared these with symptoms of ADHD through three assessment approaches: (a) the widely recognized *DSM-IV*, (b) the Wender-Utah Rating Scale for recalled childhood symptoms, and (c) Achenbach's multifactorial approach for concurrent adult symptoms (Nigg et al., 2002). Findings

suggested symptoms of hyperactivity-impulsivity were associated with low agreeableness

while symptoms of inattention-disorganization were related to low conscientiousness and

neuroticism. The theoretical connection is supported through all of these findings,

begging the question, if deficits and negative character traits can be categorically

identified among subtypes, then strengths may be also.

Debate continues among researchers and diagnosticians as to whether categorical

or dimensional diagnosis serves the needs of the patient better (Voeller, 2004). A

dimensional tact places individuals on a continuum of symptoms in the newest revision

of the *DSM*, whereas the fourth edition's categorical method identifies a specific number

of symptoms. Consequently, individuals with five symptoms instead of six would not

qualify for a diagnosis of ADHD according to the *DSM-IV*. A dimensional route may

open the door for a more individualized diagnosis, with the possibility of a continuum of

deficits as well as one of strengths, offering an opportunity for more individualized,

strength-based interventions. The newly updated *DSM-5* (APA, 2013) still maintains

categories of ADHD with continuums of symptoms, however, treatment responses in the

field have typically been undifferentiated.

Researchers have identified several pathways for ADHD related behaviors including a

biological basis, genetics, traumatic brain injury, nutrition, and high blood lead levels

(Levy, Hay, & Bennett, 2006; Mattox & Harder, 2007, Nigg, Nikolas, Knottnerus,

Cavanagh, & Friderici, 2010). It is unclear how a person is predisposed to a diagnosis of

ADHD; however, researchers have identified predictive neuropsychological weaknesses

in the family members of children with ADHD through neurogenetic models (Nigg,

Blaskey, Stawicki, & Sachek, 2004). The familial connection appears to be less

prominent in childhood hyperactive subtype than either of the other subtypes (Levy et al.,

2006).

Challenges

Many challenges exist for individuals with ADHD. Research has shown there are

often behavioral problems accompanying an ADHD diagnosis, including emotional,

conduct, anxiety, or communication disorders, as well as learning disabilities (Mathers,

2005; Tabassam & Grainger, 2002). These challenges, in combination with an

individual's ADHD symptoms, often impact social and interpersonal relationships, as

well as academic performance.

Children as young as preschool age exhibit symptoms of ADHD and in a study by

Kakouros et al. (2005), researchers identified aggressive behavior as being positively

correlated with ADHD among preschool study participants. Peer relationships become

impaired and when compared to control group comparison children, those with ADHD

are less well liked and more often in the rejected social status category (Hoza, Mrug,

Gerdes, Hinshaw, Bukowski, Gold, et al, 2005). Family interactions are often impacted as

well and have been found to have less effective communication than those of families

whose child does not have ADHD (Tripp, Schaughency, Langlands & Mouat, 2007).

Stress responses in adolescents with ADHD have been found to impact a decrease

in cortisol levels following a stressor, resulting in poor behavioral response (Randazzo et

al., 2008). This lowered cortisol level in combination with evidence-based documentation

of executive function deficits (EFD's) can put children with ADHD at higher risk for

poor academic functioning (Biederman et al., 2004). In a longitudinal population-based epidemiological study by Barbaresi, Katusic, Colligan, Weaver, and Jacobsen (2004), researchers found higher rates of school absenteeism and school dropout among youth with ADHD as compared to non-ADHD youth. In addition, the youth with ADHD had significantly lower standardized reading achievement scores as compared to non-ADHD youth. As young people deal with all of these academic stressors another issue may arise as well: bullying. Youth with ADHD are identified as a target for bullying at significantly higher rates than their non-ADHD peers (Taylor et al., 2010). In addition, due to poor behavior inhibition, they are more likely to have psychological difficulties associated with their bullying experiences as victims, perpetrators, or both.

ADHD does not, however, always end in adolescence. Symptoms of ADHD can continue into adulthood, impacting planning ability resulting from failure to inhibit responses in problem solving situations (Young et al., 2007). This impact to daily functioning can affect occupational relationships and stability (Nigg et al., 2005). In addition, intellectual functioning, processing speed, and motor speed are slightly reduced; there are EFD's and verbal long-term memory impairments as well (Young et al.). There is conflicting literature indicating whether self-concept for children with ADHD is always lower than their non-ADHD counterparts. In fact, Hoza, Pelham, Dobbs, Owens, and Pillow (2002) found in their study the participants with comorbid aggression and low-achievement with ADHD overestimated their competence as compared to teacher reports. Conversely, Tabassam and Grainger (2002) examined self-concept, self-efficacy beliefs, and attributional style of 44 students with learning disability (LD) and 44 students

with comorbid ADHD (LD/ADHD) as compared to 86 typically achieving peers. The authors found lower scores for students with LD and LD/ADHD in each variable examined, including academic self-concept as compared to the control group of 86. Limitations in this study do exist, however, by not including a fourth group of students who have ADHD without LD (Tabassam & Grainger, 2002). Additional research in this area is essential to differentiate between ADHD comorbidity and single diagnoses in learning challenges, possibly clarifying the role of ADHD comorbidity on the self-perception of children with LD.

Diamantopoulou, Henricsson, and Rydell (2005) examined children's peer relations in terms of gender, prosociality, symptoms of ADHD, and self-perceptions and found the self-perceptions of children with high levels of ADHD symptoms was not related to peer dislike, rather it was the low level of prosociality, ADHD symptoms, conduct, and internalizing problems that contributed to peer dislike. This may provide an avenue for treatment intervention.

Travell and Visser (2006) examined experiences and perspectives of teens with ADHD and their parents and questioned the value and validity of diagnosing children and teens with ADHD all together arguing the long term psychological effects outweigh the short term benefits of treatment with medication. Seventeen participants ranging in age from 11 to 16, diagnosed with ADHD and treated with medication, along with their parents were interviewed at school and at home, with a focus on examining outcomes from their points of view. Study results suggest diagnosis and medication treatment often occur without the attempt of prior effective, non-intrusive, multi-modal early

interventions. The researchers stressed challenging behaviors should be addressed from a broad theoretical perspective, considering a number of factors, including biological, social, cultural, and psychological. Labeling with a diagnosis and treating with medication could limit the broader perspective tact, as well as the consideration of a strengths-based treatment direction to improve outcomes. Even though the existing research reveals some variations in results when addressing the self-concept of individuals with ADHD, the study by Hoza et al., (2002), provides an avenue to capitalize on study findings that a natural tendency exists for participants to view themselves in a more positive light. Utilizing this more positive self-concept could lay the groundwork for integrating a more strengths-based perspective in treatment.

Theoretical Bases

Multiple Intelligences Theory

Howard Gardner posited we limit ourselves and our children by denying opportunities in our educational system to further develop other types of intelligences aside from the typical academic mathematical and linguistic realms (Gardner, 1983). Initially, the first standardized test developed by Binet in 1905 was used to assess students who might have special academic needs requiring assistance. The test was and still is used to measure intelligence, however limits itself to traditional academic subjects like reading and arithmetic. Multiple intelligence theory, a set of eight distinct intelligences, was born out of a concern for these limitations, posing the question "how are you smart?" instead of "how smart are you?" (Beichner, 2011, p. 18). The MIDAS, an assessment tool developed by Shearer (1987), identifies predominant intelligences an

individual possesses. The diversity of student strengths is addressed with MI theory and challenges educators to consider this in an effort to reach as many students as possible when preparing lessons for the classroom.

Gardner's Intelligences

Gardner initially identified seven avenues of intelligences in his 1983 publication, *Frames of Mind,* and adds one more in his updated descriptions (Gardner, 1999):

- Verbal/linguistic intelligence: refers to sensitivity to written and spoken language, the capacity to learn and speak other languages, and to use language to achieve goals, such as with lawyers and poets.

- Logical-mathematical intelligence: refers to the capacity to analyze and solve problems logically, complete mathematical operations, and scientifically investigate issues, such as with mathematicians, scientists, and empirical researchers.

- Musical intelligence: refers to having skill in the areas of musical patterns, composition, and performance, such as with songwriters.

- Bodily-kinesthetic intelligence: involves using the body to solve problems or create a product, such as with athletes, dancers, craftspersons, surgeons, and actors.

- Spatial/visual intelligence: entails the potential to recognize, navigate, and manipulate patterns of large spaces, as a pilot would, or more confined spaces, as an architect, sculptor, chess player, or surgeon would.

- Interpersonal intelligence: refers to the capacity to work effectively with others, understanding the intentions, motivations, and desires of other people, such as with salespeople, political and religious leaders, clinicians, teachers, and actors.

- Intrapersonal intelligence: denotes the capacity to understand oneself, including one's own desires, fears, and capacities, and to use such information effectively to regulate one's own life.

- Naturalist intelligence: is described as someone who is highly attuned to the natural world of plants and animals, natural geography, and natural objects such as rocks, clouds, and stars (p. 41-43).

Two more intelligences were identified by Gardner out of a concern for leaving out the capacities of spiritual leaders and theorists who think on a broader scale than most: spiritual intelligence and existential intelligence (Gardner, 1999). These two realms of intelligence have not gone through the same rigorous and extensive brain research as the other eight, and Gardner admits the strength of the evidence for these varies; however, he simply opens the door for more possibilities (Gardner, 1999).

- Spiritualist intelligence: involves concerns with cosmic issues, achievement of a state of being, and spiritual effect on others.

- Existential intelligence: refers to a concern with issues such as the significance of life, the meaning of death, the ultimate fate of the physical and the psychological worlds, and such profound experiences as love of another person or total immersion in a work of art. It involves the capacity to identify where one fits in the larger picture of life (p. 41).

Self-Efficacy

   Bandura, Barbaranelli, Caprava, and Pastorelli (1996) described self-efficacy in terms of the development of cognitive ability, that is, academic motivation, interest, and achievement are directly related to one's beliefs about her abilities to be in control of how she learns and whether she masters difficult subject matters. The Tabassam and Grainger study (2002) examined self-efficacy beliefs of students with learning disabilities and students with comorbid learning disabilities and ADHD as compared to typically achieving peers; researchers also found students with comorbid ADHD reported significantly lower scores on academic self-efficacy than the typically achieving peers. While learning disabilities are out of the scope of this study, comorbidity between these two disabilities is high, with a range of 40%-80% prevalence (Tabassam & Grainger, 2002, p. 241).

   According to Beichner (2011), self-efficacy has a strong relationship with MI instructional practices. The author used a cross-sectional quantitative survey design with a between-group analysis to compare self-efficacy among 5 groups of fifth grade students totaling 125 children, ages 9-11, in classes where the instructional practices address students' dominant intelligences. Results indicated the self-efficacy of students with the most MI instruction was significantly higher than that of students in classrooms where MI instruction was minimal or non-existent, providing a platform for the consistent use of MI instruction across content categories. There are, however, several limitations to this study, including the depth of the student-teacher relationship, language barriers for the 50% of participants who were English Language Learner students, and pointing to

teacher practices alone for student self-efficacy. Other variables may have impacted results, such as after school tutoring, prior knowledge, or parent-child relationship support.

Background and Efficacy of MI

Neuropsychological Connection

When Gardner first began researching and developing his theory of MI he was particularly interested in how individuals with brain damage developed artistic capacities, leading him to incorporate a variety of other abilities in his research (Gardner, 1999). Focusing on specific locations of brain injury, Gardner identified individual capacities affected, such as language, while other capacities are not impacted, inferring each capacity is independent. He concluded in this early stage of theory development that individuals have a range of abilities and while loosely connected, one does not predict another. Rather, each capacity is just that; capable of development, though dependent on the values and opportunities of a particular culture as well as personal decisions made by individuals, parents, teachers, and other influential people in a person's life.

Several studies examining the neuropsychological basis for the differences between the subtypes of ADHD support differences in a few areas and are inconclusive in others. In a literature review by Baeyens, Roeyers, and Vande Walle (2006) researchers contrasted a number of measurement levels, including neurophysiological/neurochemical, genetic, neuropsychological, and clinical psychiatric diagnostic measures, finding only the last measure identifying clear differences among subtypes in cognitive, social, academic, and behavioral functioning. In a study assessing differences in working

memory functioning through magnetic resonance imaging (MRI) between 16 IT, 17 CT and 18 normal control adults, Schweitzer, Hanford, and Medoff (2006) indicate the data does not support an absolute difference between the subtypes, rather a dimensional interpretation of working memory deficits is evident. A study by Solanto et al. (2009) challenges those research findings indicating differences do not exist. This study utilized functional MRI of inhibitory control, finding preliminary support that phenotypic differences between CT and IT subtypes are associated with the activation of different regions in the brain previously associated in the pathophysiology of ADHD and thought to relate to attentional and executive processes. These contradictory studies create questions for researchers to continue to explore.

Scientifically Based Research

Since the changes in education made through the NCLB legislation, schools are now held accountable for promoting academic growth, no matter what the ethnicity, socioeconomic status conditions, challenges, disabilities, or weaknesses of a district, community, or individual (Smith, 2003). This task is based on standards, and the push for meeting state standards or risking funding cuts often forces teachers to "teach to the test." States have developed tests that measure academic growth, however, these are limited in measuring all students accurately due to a single method of measurement. In addition, scientifically based research (SBR) has become the recognized model for assessing effectiveness of a program or practice in education, and until a program or practice has undergone substantial SBR, it is not considered for funding support from federal or state resources. School districts have moved away from trying the next popular thing to

identifying evidence-based methods in an effort to improve state standard test scores. The traditional academic culture dictates direct instruction with some room for differentiated instruction, often limited to linguistic and logical strategies (Stanford, 2003).

Gardner's theory of MI utilizes six more avenues of instruction to actively involve student learning. While research in this area is growing, until a large enough body of evidence-based research literature supports the use of multiple intelligence instructional practices, this method of instruction will be on the back burner for widespread implementation, limiting the potential for academic growth and success for students. As the researcher of this proposed study my aim is to add to the body of current research.

Learning Styles and Multiple Intelligences

Learning styles theory appears closely related to MI theory; they both strive to understand human differences and identify the best ways to educate based on those differences (LaFountain et al., 2003). MI theory is concerned with the content and products of learning while learning styles theory focuses on the process of learning (LaFountain et al., 2003). Aborn (2006) stated there is no research identifying a limit to human potential, thus, intelligence is not fixed: even the most unsuccessful learner can grow based on his individual strengths. Many educators are able to combine the important aspects of both theories to create a supportive learning environment for each of their students, regardless of their challenges.

Wu and Alrabah (2009) surveyed learning styles and MI of 250 college freshmen level students from Taiwanese and Kuwaiti cultures with an interest in confirming its consistency in order to develop appropriate teaching techniques for each group.

Combining two standardized survey instruments (Style Analysis Survey and Multiple

Intelligence Inventory for Teachers) representing learning styles and MI into one survey,

researchers assessed 138 Taiwanese and 112 Kuwaiti students and compared total points

for each of the intelligences and learning styles for each student. They concluded that the

internal consistency for both groups' scores on learning styles and multiple intelligences

was high and suggest this provides an opportunity to develop teaching strategies most

appropriate to the needs and strengths of the identified cultures. While the research helps

to support the idea that learning styles and multiple intelligences are closely related,

combining the two assessments into one and altering the language even slightly to

accommodate comprehension of cultural language differences can impact the

assessment's reliability. It is also concerning to lump students into the most matched

learning style or intelligence based on their culture. In the United States, there are a

multitude of cultures within the American culture, and suggesting this melting pot of

cultures would all fall under the same category of learning styles and intelligences is

simply a repeat of the current educational system focused on two educational content

strengths: linguistics and logistics. A more differentiated approach honoring individual

differences and not cultural differences singularly is needed if we are to leave no child

behind.

The Function of MI in a Traditional Academic Culture

The theory of MI has been identified by some as a philosophy of education, a way

of thinking about how people learn, not a set of specific techniques or strategies

(Stanford, 2003). It has also been criticized in the past on its empirical and pedagogical

grounds. Since its development, there have been several studies done on the theory's merits and application. Gardner (1999) contends the theory's application provides a platform for student development of dominant intelligences and improvement in those less dominant, improving academic performance overall. In addition, noted improvements have occurred in standardized achievement scores, parent participation, performance of students with learning difficulties, and student behavior (Douglas et al., 2008). Unfortunately, a limited amount of literature is available for review, though the lack provides a clear gap in the research for exploration of how MI assessment and instruction can impact students struggling with the differing subtypes and symptoms of ADHD in an academic or social setting.

The United States Department of Education (DOE) has developed a website highlighting evidence-based practice strategies and programs supported for implementation by the department. One of those programs included is the National Guard Youth Challenge Program developed to promote positive youth through leadership, job skills, and service to the community (DOE, 2010). This 22-week residential program offers education and training for youth ages 16 to 18 who have dropped out or been expelled from high school and utilizes MI in the educational component of the program. A review of this program using a randomized controlled trial with 1,196 participants surveyed identified a statistically significant positive difference of 22% improvement for completing school between the program group and the control group (DOE, 2010). It is unclear however, what components of the program impacted the outcomes for participants. While a more specific study should be done to determine if the application

of MI is related to improved outcomes for completing school for this at-risk population, other studies have supported positive outcomes, such as increased academic achievement, improved career and transition planning success, improved math and reading skills, and reduction of academic stress.

Ozdemir, Guneysu, and Tekkaya (2006) investigated whether the implementation of MI instruction as compared to the traditionally designed science instruction resulted in a difference in understanding of science concepts after a specific science unit was presented to the two groups of 70 total fourth grade science students. Results of this pre and post test study design support the application of MI instruction over traditional methods, suggesting students' learning is enhanced through better content acquisition and knowledge with this more student-centered method. In addition, after the treatment, the experimental group participants were found to have variations in the intelligences as compared to the dominant logical-mathematical intelligence identified pre-treatment. These results support Gardner's contention that MI instruction is a process that provides an opportunity for intelligence to grow rather than stay fixed (Gardner, 1999).

Douglas et al. (2008) examined the effects of the MI teaching strategy on the academic achievement of eighth grade math students, researchers compared two distinct instructional methods: MI and Direct Instruction (DI). An experimental group of 28 participants and a control group of 29 participants, both with fairly equal distribution of males and females, were administered pre-test and post-test of the same material presented in the MI and DI groups. Participants in the DI group were taught the lesson objectives through practice problems, notes on the board or overhead, teacher directed

lectures, teacher developed worksheets, and the student workbook, while participants in the MI group were taught the same lesson objectives through creating rhymes to remember mathematical concepts, completing logical problems, building or constructing a model, inventing a board game, performing a class presentation, and providing feedback about what they are interested in learning (Douglas, et al., 2008). Results indicate the two groups differed significantly in their performance on the post mathematics assessment, showing a considerable increase for participants in the MI group and supporting the hypothesis that utilizing MI strategies in the classroom improves academic performance. It is unclear, however, what variables were controlled for in this study, presenting some questions about its degree of validity.

Harriman (2010) examined the effects of MI teaching strategies on achievement in mathematics and reading as compared to DI teaching strategies among 645 second through fifth graders and found little difference between the two. In this triangulated mixed methods study design, the researcher utilized the MIDAS tool to assess MI and several school district generated assessments to identify achievement levels. Several variables may have impacted the results including inconsistent attendance of several teachers due to maternity leave, a high concentration of students with special education needs, and teacher abilities and understanding of MI. While this study initially appears to have a negative connotation for the use of MI in the classroom, in fact, both MI and DI were effective in improving achievement in mathematics and reading, the research just did not show a significant difference between them. There are two issues of concern in this study: the teachers were not trained in using MI making it unclear whether the

implementation was an accurate representation of MI strategies, and the teachers were often teaching based on the result of their own MIDAS assessment results, not based on the MI needs of the students. This study highlights the importance of the need for appropriate training in MI teaching strategies implementation as well as the need for appropriate application of assessment results.

Another avenue exists in applying MI to improve academic outcomes for students, and especially those with ADHD. Exploring the application of MI theory to reduce student academic stress through dance in a triangulated mixed method design, Roberts (2010) studied whether it was possible to simultaneously decrease stress and enhance academic experiences with 10 high school students, ages 15-18. Using a Lowenstein Stress Thermometer reading and post dance class interviews, Roberts measured the participants stress level pre and post dance class. Results indicated all of the participants experienced a decrease in academic stress following the dance class. A study by Keogh, Bond, and Flaxman (2006) supports this study's implied outcome that when stressors are reduced, student motivation and academic performance improves. Students with ADHD have been identified as experiencing high levels of academic stress (DeSantis, Noar, & Webb, 2010). By reducing this stress through MI bodily-kinesthetic movement during the school day, students with ADHD experiencing academic stress may have a better opportunity to access subject content throughout the learning day.

In a recent dissertation by Beichner (2011), the researcher was interested in the academic self-efficacy of a sample group of 5th graders as it related to the implementation of multiple intelligences in the classroom. Using the Multidimensional Self-Concept

Scale to measure self-efficacy and analyze the differences between three groups; two dominant MI, one dominant MI, and no MI implemented into the instructional day, the researcher found a higher level of self-efficacy among the two MI group participants. Finding a consistent way to reach students academically can have an impact on learning. When the theory is based in research and integrated into the traditional academic culture, the transition to a MI philosophy of education could be smoother and longer lasting than past educational strategy fads. Some educators are using differentiated assessments and processes, like class-generated rubrics and cooperative learning groups in combination with traditional academic standards as a response to school improvement, specifically, positive learning outcomes of students.

Standards-Based Differentiated Instruction: Using MI in the Classroom

MI theory is considered one form of differentiated instruction. Beam (2009) suggested using differentiated instruction is not simply a different lesson plan for each student, educators must know their students before they can delve into new material and should be in the practice of assessing individual learning styles and MI strengths at the onset of the teacher-student relationship. Differentiated instruction is a student- centered method of instruction that is developed to encourage student growth and utilizes whole class, small group, and individualized instruction. Assessing students to determine their areas of strength, or predominant MI, provides a platform for educators to begin instruction and can be done easily in the classroom using a simple 30 question true-false test based on Gardner's MI model, *multiple intelligence test* (see Appendix A). A more extensive 80 question assessment can be done for students with learning difficulties due

to a disability or the sometimes challenging behaviors of ADHD using Gardner's MIDAS assessment tool. Parents and the students themselves are asked a battery of questions to identify the predominant intelligences (Shearer, 2006). An adult version of the assessment is also available and can be helpful for adult learners as well.

Balancing strategies is an important piece to the MI puzzle. Using a thematic approach with concept development offers different intelligence strengths and weaknesses to flourish or improve. Compared to typical instruction using the popular logical method of solving fraction problems written on the board, as occurs in so many classrooms in the United States, the MI strategies involve more connection to the lesson required of the student.

Using the example in the study by Schirduan and Case (2004) to balance instructional strategies, over half of the students with ADHD assessed for Multiple Intelligences fell under the naturalist and spatial intelligences. A teacher in a classroom with several students identified with ADHD might incorporate a naturalist perspective in their lesson in an attempt to reach those students academically. If the lesson were related to the topic of fractions, elementary age students could explore the core of an apple or an orange (Stanford, 2003). This strategy becomes more interactive and personal. Shifting the intelligence emphasis from subject to subject throughout the day offers opportunities for students to experience their strengths at least once during the day and improve on the others as the day progresses, keeping them more connected to learning in the process.

Summary

My review of literature indicates students with ADHD have many challenges however, have also had success in the areas of self-efficacy, academic achievement, and social interactions with the use of MI in the classroom. A deficits-based response to addressing the challenges of ADHD is the direction many educators and parents have taken in dealing with the issues associated with ADHD, but another direction exists. The differentiated instruction indicative of MI offers students an opportunity to grow in areas of strength, otherwise not acknowledged in the traditional academic setting. Acknowledging that there is a neuropsychological connection between ADHD and MI provides a platform for identifying a pattern of multiple intelligences, and thus, a more strengths based treatment response. The use of MI in the classroom has been shown to improve achievement in a variety of subject matters and students with ADHD should be given an opportunity to rise above their deficits by using their strengths to access standards based curriculum. Teaching to the strengths of a student with ADHD could have a far reaching impact on their emotional and academic well-being, possibly changing the course of their lives and transitioning to a more strengths based treatment response to ADHD in general.

Chapter 3: Research Method

Introduction

In 2002, President Bush signed into law The NCLB, which required accountability for the academic achievement of all children. It was designed to close the achievement gap between the disabled, disadvantaged, and minority students and their peers through several measures, including an emphasis on proven teaching methods (Smith, 2003). A number of researchers have identified the multiple intelligences theory modality as a proven teaching method for academic success (Beam, 2009; Beichner, 2011; Douglas et. al, 2008; Ozdemir, Guneysu, & Tekkaya, 2006; Schirduan, 2000; Schirduan & Case, 2004; Shearer, 2004; Wu & Alrabah, 2009). However, the standard for curriculum delivery in the United States focuses on only two of the identified intelligences outlined in the theory; linguistic and logical-mathematical intelligences. Academic success is more likely for those students whose predominant intelligence corresponds, but more research is needed regarding the students with differing predominant intelligences.

Extensive research has been done involving students with ADHD, though very few researchers have examined their strengths, with the exception of Portrie-Bethke, Hill, and Bethke (2009), Ek et al. (2007), Schirduan (2000), and Zentall (1993). The purpose of this research was to address the gap in the literature from a strengths-based perspective in addressing ADHD by identifying a pattern of predominant multiple intelligences. This may provide an avenue for academic success among students with ADHD by allowing

them to reframe their disorder from a deficits-based response to a strengths-based response.

The hypothesis that I tested in this research was that there is a distinct and differing pattern of multiple intelligences among individuals within the three subtypes of ADHD, that the subtypes of ADHD can be predicted based upon the subscale scores of the MIDAS. In this study, I examined the frequency of predominant MI categories for the three separate groups in an effort to identify proven teaching strategies to aid in the academic success of this population. This chapter includes a description of the (a) research design, (b) methodology, (c) data collection, (d) instrumentation, (f) data-analysis methods, (f) and threats to validity used to answer the research questions posed in the first chapter.

Research Question: Can each subtype of ADHD (inattentive, hyperactive, combined) be predicted based upon the subscale scores presented from Gardner's MI?

$H_0 1$: ADHD subtypes cannot be predicted based upon Gardner's MI scores.

$H_A 1$: ADHD subtypes can be predicted based upon Gardner's MI scores.

Research Design and Approach

To test the hypothesis that a distinct pattern of a relationship exists between MI and the subtypes of ADHD and to address the research question regarding MI category prediction, the relationship between ADHD subtypes and MI predominant category I explored frequencies and patterns using a multivariate discriminant function analysis. The discriminant function analysis is the appropriate statistical analysis when the goal of research is to classify observations into two or more groups based upon one or more

continuous variables (Tabachnick & Fidell, 2012). Some advantages to this study's survey and research design were the usefulness in interpretation of differences and combinations among the predictors by identifying interdependency and pattern delineation, rapid turnaround in data collection, and economy of the design.

In this nonexperimental, self-administered questionnaire survey design I considered dependent variables to include three subtypes of ADHD: inattentive, hyperactive, and combined. Independent variables included eight categories of multiple intelligences: artistic, bodily-kinesthetic, verbal-linguistic, logical-mathematical, interpersonal, intrapersonal, naturalist, and spatial. All independent variables were treated as continuous data. The maximum number of discriminant functions that can be presented are based upon either the number of predictors or the degrees of freedom for the groups; whichever is smaller of the two. In this instance the maximum number of functions was two, as there were three groups in the model. Standard discriminant function analysis was used; all variables were entered into the model at the same time. The discriminant function analysis was presented with the F statistic. If the observed F exceeded the critical F at the calculated degrees of freedom, the test can be assumed significant (Tabachnick & Fidell, 2012).

Prior to conducting the analysis, I assessed the data for outliers and to be certain the assumptions of normality, homogeneity of variance/covariance, and absence of multicollinearity were met. Outliers were assessed with Mahalanobis Distance Matrix to determine if an outlier pattern existed; cases greater than 3.29 standard deviations from the mean would be removed. The assumption of normality was assessed for each group,

however, as long as the sample size has a minimum of 20 participants, the analysis is robust to violations (Tabachnick & Fidell, 2012). Homogeneity of variance assumes all groups have equal error variances and will be assessed with tests of equality. Homogeneity of covariance is the multivariate equivalent of homogeneity of variance and was assessed using Box's M. Absence of multicollinearity assumes the predictor variables are not too related and was assessed with tolerance values.

<div align="center">**Setting and Sample**</div>

I recruited the sample population for this study through online postings of study details to organizations supporting individuals diagnosed with ADHD and placement of study flyers in the lobby of a local agency supporting individuals diagnosed with ADHD. Study participants had been diagnosed with ADHD previous to the latest revision of *DSM* diagnostic criteria. The selection process for participants is a convenience sample of individuals over 18 years of age who volunteered to be part of the study and have been diagnosed with ADHD IT, HT, or CT. Participants completed a questionnaire to include identification of their diagnosed subtype.

I assumed that participants would provide an accurate diagnosis. The original plan for study participation was to recruit college students from the Disability Resource Center (DRC) of Mesa Community College. This campus had been chosen for data collection due to the large population of students (1,400; Gilbert, 2011, p. 98) using the services provided by the DRC as indicated by the 2011 usage report. Alternative sources of data included four additional community college campuses within the Maricopa Community Colleges system, adult students of Western Maricopa Education Center, adult students of

the Lifetime Development Institute, and adult clients of the Melmed Center, within the major metropolitan city in the southwest in the event any problems occurred with the original source of data collection. Changes to the data collection source were made due to an extensive and unavoidable delay in IRB approval from the originally identified site for data collection.

I used G*Power (Faul, Erdfelder, Buchner, & Lang, 2013) to calculate the appropriate minimum sample size to achieve empirical validity. In G*Power, sample size for a discriminant function analysis is calculated using the MANOVA. For a discriminant function with three groups and eight independent variables, using a medium effect size, a generally accepted power of .80 (Howell, 2010), and an alpha of .05, the minimum sample size required to achieve empirical validity is calculated to be 171 participants. Thus, a minimum of 57 participants per group were gathered. Previous research by Schirduan (2000) in which a similar study was performed justifies the use of medium effect size. Medium effect size was used and study results were reliable and validated.

Data Collection and Analysis

I made contact with the college for permission to engage students from the DRC in the study through a letter of request sent to the college's community relations director (Appendix D). Extensive and unavoidable delays in approval from the College District's IRB resulted in the alternate plan for data collection. I collected data after participant recruitment through providing an information flyer identifying criteria for participation about the study available on the online websites supporting individuals diagnosed with ADHD and in the lobby of Melmed Center. My request for adult participants with an

ADHD diagnosis were asked to voluntarily sign into a participant pool and answer qualifying questions in an effort to control for coexisting mental health diagnosis and medication use, as well as identifying ADHD subtype.

Inclusion criteria included ADHD diagnosis prior to 2012 and specific subtype identified. Those participants unable to identify their diagnosed ADHD subtype were excluded from the study. Once criteria were met, informed consent was obtained through survey completion. Demographic data was collected through Survey Monkey with a link provided to the Online MIDAS System (OLS) for web administration. Participants were instructed the full registration and assessment time would take approximately 45-60 minutes to complete, and anonymity was provided through survey number assignment. Upon completion of the MI assessment, participants were offered an opportunity to participate in a debriefing of the study, including an opportunity to discuss the final aggregated results with the researcher. A website was also developed for participants to view study results. No other incentive to participate will be offered.

Data was entered into SPSS 21.0 (IBM, 2012) for analysis. Participants' characteristics are presented with descriptive statistics. Frequencies and percentages present categorical variables, such as gender and the subtypes of ADHD. Means and standard deviations present scores highest level of education, age, and scores on the subscales of Gardner's MI.

Instrumentation and Materials

The instrumentation that I used in this study was the MIDAS for adults developed by Shearer (2005; Appendix A). The questionnaire measures eight of Gardner's

intelligences asking questions about a person's preferences, abilities, habits, accomplishments, experiences, and training in a wide range of domains. It provides information regarding a person's propensities not generally available from standard intelligence tests. This version, one of several for different age levels, is a 119-item self-report designed to provide information to increase awareness of one's intellectual and creative profile by providing a reasonable estimate of a person's intellectual disposition in each of the intelligences. Problem-solving abilities are identified as practical, logical, or social through identification of leadership, general logic, and technical intellectual style scales.

The assessment goes further by identifying 24-29 varieties of skills associated with each intelligence, providing useful learning strategies, as well as a qualitative profile summary for review and guided self-reflection. MI assessment administration time is typically 20-35 minutes and the test can be scored through using the Online MIDAS System for web administration. Scores are presented as percentages with subscales embedded in each MI category; musical, kinesthetic, logical-mathematical, spatial, linguistic, interpersonal, intrapersonal, and naturalist. College age individuals are able to utilize the high profile scores to identify their best developed abilities and thus, a potentially well-fitting college major (Hiltonsmith, 2012).

Shearer's (2005) development of the MIDAS was based on a structured interview instrument used with adolescents and adults undergoing cognitive rehabilitation to assess the categories of multiple intelligences by Way and Shearer (1990). The structured interview instrument was later adapted by Shearer as a self-report assessment tool called

the MIDAS to provide a clearer personal understanding of one's intellectual profile in a variety of areas, with the goal of expanding one's achievement potential rather than labeling a specific learning style.

MIDAS scale scores are calculated through an analysis of percentage scores on the eight main scales and the multiple subscales relative to criterion data. A sample question from the MIDAS: "Are you good at growing plants or raising a garden?" Responses provide multiple choice items listed and include *I don't know* or *does not apply* as an answer option. The MIDAS OLS provides the use of SPSS for data analysis and I used this tool to analyze the data collected in this study. Data cleaning and screening is built into the OLS analysis system, thus, incomplete assessments were removed from analysis.

Internal consistency supporting the tool's reliability was the focus of five studies during the tool's evaluation of psychometric properties (Shearer, 2007). One study in particular compared results of the MIDAS with the Stanford-Binet in the area of logical-mathematical and linguistic skills. MIDAS results were consistent with the Stanford-Binet indicating temporal stability between 0.76 to 0.92 and inter-rater reliability ranging from 0.78 to 0.89 (Hiltonsmith, 2012). Strong support for a lack of cultural bias was also found. Evidence for the validity of content, construct, concurrent, and predictive factors were supported in five studies highlighted in the assessment manual (Shearer, 2007).

Construct validity studies on the MIDAS have confirmed five of the eight scales as unique constructs with two large U.S. samples of 1409 cases with reliability coefficients scale ranging from 0.85-0.90 (Wiswell, Hardy & Reio, 2001). Seven of the

eight scales were confirmed in a Bahasa Malaysian translation factor analytic study with 644 participants (Yoong, 2001). This study also revealed concurrent validity results with significant correlations between three of the MIDAS scales and three achievement areas. In a Spanish translation with 429 Chilean high school students, researchers confirmed seven of eight scales as well. (Pizarro, 2003). Wu (2007) found initial reliability and validity studies of the Chinese MIDAS translation strongly corresponded with the original English version. And finally, Kim (2007) found significant patterns of correlations in criterion group validity studies of a Korean translation of MIDAS scales with student groups. These studies provide evidence-based research supporting the MIDAS tool's validity and reliability.

Protection of Human Participants

As a means of participant rights and protection, I obtained permission for this study by the Institutional Review Board of Walden University. In addition, I sought and obtained permission from the IRB of Maricopa Community Colleges to recruit study participants, though since the process was delayed, data was not collected from this source. An informed consent form (see Appendix C) explaining the voluntary nature of the study, a dedication to confidentiality, and the minimal risk involved for participating was provided online to participants prior to data collection. Protecting the rights and welfare of vulnerable populations as individuals with mild cognitive impairment, participant safeguards implemented included reasonable expectations of privacy, recruitment strategies free of pressure, and voluntary participation. Flyers were posted online and provided in the waiting room to allow volunteers to initiate contact about the

study with ample time to consider participation. In addition, a simplified study summary was available for those requesting clarification of study parameters (see Appendix G). I took measures to assure anonymity and confidentiality when dealing with data by assigning a number to each participant through the MIDAS online system. No names were identifiable; rather, numbers were used to match students with assessment results. Online data has been kept in a secure location with password protection and any lists that have had name-number correlation will be destroyed after 12 months. Data will be stored indefinitely as stipulated by Walden University through password protection.

Ethical Considerations

I carefully considered the risks of this study. While no anticipated harmful effects existed, participants may have felt some fatigue or anxiety following assessment completion. As individuals with a mild cognitive impairment, participants are members of a vulnerable population, thus I positioned safeguards in place to protect their rights and welfare. Volunteer study participants completing the online survey assessment were offered a summary of the study results following the completion of data collection and analysis. Participants refusing participation or withdrawing from the study were not contacted further. No eligible participants were excluded from the study. Any stress related or negatively invoked feeling as a result of completing the assessment were addressed during a study debriefing offered at the completion of the study during which participants were provided with a summary of study results and options for support on the "How Are You Smart Study" website (howareyousmartstudy.com, 2015) which was active through June 2015.

Summary

Enlisting a focus on a strengths-based perspective, I examined the pattern of predominant intelligences, based on Gardner's *multiple intelligences theory*, among individuals within the three subtypes of ADHD: inattentive, hyperactive, and combined. I collected and analyzed data using quantitative methods and a discriminant function analysis study design. Patterns of data, findings, and study conclusions will be explained in Chapter 4.

Chapter 4: Results

Introduction

In this chapter, I present the findings from the survey of 132 participants, measured on both continuous and categorical variables. Data collection began in June of 2014 and continued through mid-February 2015. Initially, recruitment of participants was slow with only fifteen collected from June through November, 2014. New sources of data collection were presented to the IRB and approved, and participation grew. Results, analysis, and interpretation of the research findings are provided. The theoretical framework of this study, Multiple Intelligences Theory, maintains individuals have strengths in a number of areas.

The original proposed setting for data collection was on the local Community College campuses within Metro-Phoenix. Due to extensive, unavoidable delays in IRB approval within the Maricopa Community College District, I presented alternative sources of data collection to Walden IRB and was approved, including the Walden Participant Pool, ADHD Success Network, Inc., and Attention Deficit Disorder Association website. Data was collected from these sources, as well as Melmed Center in Phoenix from June 2014 through February 2015. Study information was provided with the flyer and web link to the initial qualifying survey. Upon qualification of study participation, participants received an e-mail from me with the final web link to complete the MDAS Survey. Participants were all 18 years or older, had a wide range of completed education levels, and provided self-reported ADHD subtype diagnoses.

Initially, my study plan was to include all three ADHD subtypes, including hyperactive presentation, however, data collected prevented a valid analysis of this subtype due to the low number (nine) of participants gathered in this category. This wide difference in data collected within the hyperactive category compared to inattentive and combined subtypes is representative of the adult ADHD population, supporting existing data (Goodman, 2009) indicating only an estimated 3% (p. 40) of those adults diagnosed are diagnosed with Predominantly Hyperactive ADHD subtype.

Research Question: Can each subtype of ADHD (inattentive, hyperactive, and combined) be predicted based upon the subscale scores presented from Gardner's MI?

$H_0 1$: ADHD subtypes cannot be predicted based upon Gardner's MI scores.

$H_A 1$: ADHD subtypes can be predicted based upon Gardner's MI scores.

To address the research question I conducted a multivariate discriminant function analysis to determine whether there were significant relationships between types of intelligences and ADHD subtypes (inattentive and combined) generated from Gardner's Multiple Intelligences instrument. I used a MANOVA as a follow up analysis to determine whether there were significant differences in intelligence scores between ADHD subtypes. Hyperactive subtype was decidedly excluded from the analysis due to the low number (nine) of participants within that group, resulting in low validity of data collected within that category of ADHD.

Independent variables in this study included each of the eight categories of multiple intelligences: musical, logical mathematical, naturalist, spatial, verbal-linguistic, kinesthetic, interpersonal, and intrapersonal. Dependent variables included the ADHD

presentations: IT, HT, and CT. Participants of this study were measured on both continuous and categorical variables.

A demographics survey addressing basic information was completed among participants prior to completion of the MIDAS Assessment. There were also questions related to medication use, related symptoms, and co-morbid diagnoses in an effort to gain a fuller picture of each participant's experience with ADHD. These findings will be discussed further in Chapter 5.

Demographic variables gathered included gender, ethnicity, religion, income, and the highest education completed by father and mother. The majority of participants were female (104, 79%). This is an unusually high representation of this gender as compared to actual occurrences of ADHD diagnosis within the female population, and will be discussed further in Chapter 5.

The most common ethnicity represented in the study was Caucasian (108, 82%), followed by Hispanic or Latino (10, 8%). Christianity (41, 31%) was the dominant religion in the sample, and most respondents were in the $0 - $24,999 income range (36, 27%). High school degree or equivalent was the most common category for both father (32, 24%) and mother (31, 24%). A majority of participants indicated they took medication (91, 69%). Most participants who indicated they had psychiatric behavioral diagnoses were either diagnosed with depression (35, 27%) or anxiety (26, 20%). For the dependent variable, ADHD subtype, there were 67 respondents in the combined presentation category and 65 respondents in the inattentive presentation category, as well

as the 9 in the hyperactive presentation category. Detailed frequencies and percentages

are outlined in Table 1.

Table 1

Frequencies and Percentages of Demographic Variables

Demographic	*n*	*%*
Gender		
Male	28	21
Female	104	79
Ethnicity		
White/Caucasian	108	82
Black or African American	5	4
Hispanic or Latino	10	8
Asian or Pacific Islander	2	2
American Indian or Alaskan Native	2	2
Other (please specify)	1	1
Other/multiracial	1	1
Prefer not to answer	3	2
Religion		
Buddhism	4	3
Catholicism	29	22
Christianity	41	31
Inter/Non-denominational	5	4
Judaism	3	2
No religion	29	22
Other (please specify)	10	8
Protestantism	11	8
Income range		
$0–$24,999	36	27
$25,000–$49,999	17	13
$50,000–$74,999	22	17
$75,000–$99,999	22	17
$100,000–$124,999	8	6
$125,000–$149,999	9	7
$150,000–$174,999	5	4
$175,000–$199,999	3	2
$200,000 and up	7	5
Mother's highest educational level completed		
Associate degree	8	6
Bachelor degree	29	22
Graduate degree	23	17
High school degree or equivalent (e.g., GED)	31	24
Less than high school degree	21	16

Demographic	*n*	*%*
Some college but no degree	12	9
Father's highest educational level completed		
Associate degree	13	10
Bachelor degree	24	18
Graduate degree	19	14
High school degree or equivalent (e.g., GED)	32	24
Less than high school degree	15	11
Some college but no degree	22	17
Taking medication		
Yes	91	69
No	38	29
No response	3	2
Psychiatric behavioral diagnoses		
Anxiety disorder	26	20
Bipolar disorder	4	3
Depression	35	27
Post-traumatic stress disorder	5	4
Other	13	10
None	48	36
No response	1	1
ADHD subtype		
Combined subtype	67	51
Inattentive subtype	65	49

Note. Due to rounding error, not all percentages may sum to 100.

Descriptive Statistics for Continuous Variables for MI Scores

The independent variables in this study, or MI subscale scores, were measured on

a scale and identified as continuous variables. The results of the analysis are as follows:

musical composite scores ranged from 1.13 to 4.88 ($M = 2.71$, $SD = 0.77$), while the

range for kinesthetic scores were 1.37 to 4.20 ($M = 2.60$, $SD = 0.62$). Lower range scores

were found in interpersonal ($M = 3.32$, $SD = 0.58$) and intrapersonal ($M = 3.04$, $SD =$

0.56) composite scores. Logical mathematical ($M = 2.90$, $SD = 0.80$) and linguistic ($M =$

3.38, $SD = 0.78$) were in the mid-range. Naturalist composite scores contained the highest

range at 1.07 to 5.00 ($M = 3.12$, $SD = 0.89$). Finally, scores ranging from 1.00 to 4.75 (M

$= 2.97$, $SD = 0.90$) were found in the spatial category. Means and standard deviations of

continuous variables can be found in Table 2.

Table 2

Means and Standard Deviations of Continuous Variables

Composite scores	Min.	Max.	M	SD
Musical	1.13	4.88	2.71	0.77
Kinesthetic	1.37	4.20	2.60	0.62
Logical mathematical	1.17	4.75	2.90	0.80
Interpersonal	1.82	4.61	3.32	0.58
Intrapersonal	1.64	4.60	3.04	0.56
Naturalist	1.07	5.00	3.12	0.89
Spatial	1.00	4.75	2.97	0.90
Linguistic	1.35	4.85	3.38	0.78

Reliability

Cronbach's alpha tests of reliability and internal consistency were conducted in

previously published research on multiple intelligence (MI) subscales; one test per scale

(Shearer, 1992). The Cronbach's alpha provides mean correlation between each pair of

items and the number of items in a scale (Brace, Kemp, & Snelgar, 2006). The alpha

values were interpreted for reliability using the guidelines suggested by George and

Mallery (2010) where values larger than $\alpha > .9$ equated to *excellent*, $>.8$ equated to *good*,

$>.7$ equated to *acceptable*, $>.6$ equated to *questionable*, $>.5$ equated to *poor*, and $\leq .5$

equated to *unacceptable*. Results for musical, logical mathematical, naturalist, spatial,

and linguistic categories indicated good reliability. Results for interpersonal and

intrapersonal categories indicate acceptable reliability. Results for kinesthetic category

indicated questionable reliability. Reliability statistics for the eight composite scores from

the student data are presented in Table 3.

Table 3

Cronbach's Alpha Reliability Statistics for the Eight Composite Scores from Participant Data

Scale	No. of items	α
Musical	13	.83
Kinesthetic	11	.63
Logical mathematical	15	.84
Interpersonal	19	.79
Intrapersonal	22	.75
Naturalist	15	.88
Spatial	14	.87
Linguistic	19	.88

Assumptions

Prior to conducting the discriminant function analysis, I assessed the assumptions

of normality, homogeneity of variance, homogeneity of covariance, and absence of

multicollinearity. Data cleansing was conducted through detection of errors using

descriptive statistics. A range of minimum and maximum values were examined.

I assessed the continuous variables for univariate outliers using z-scores and multivariate outliers using Mahalanobis distances. Values outside the range -3.29 to 3.29 are considered univariate outliers (Tabachnick & Fidell, 2012). No multivariate outliers were present in the data utilizing Mahalanobis distances. There were no cases of univariate or multivariate outliers. No observations were missing in the variables considered in this study.

I assessed normality of the eight subscales with Kolmogorov Smirnov (KS) tests. The results of the KS test were statistically significant (at $\alpha = .05$) for Musical and Logical Mathematical subscales; thus, the assumption of normality was not met for these variables. The results of the KS test were not statistically significant (at $\alpha = .05$) for kinesthetic, interpersonal, intrapersonal, naturalist, spatial, and linguistic subscales; thus, the assumption was met for these variables. Although the assumption of normality was not met for two of the variables, the discriminant analysis is robust for violations of the normality assumption as long as there are a minimum of 20 participants (Tabachnick & Fidell, 2012).

I assessed homogeneity of variance with Levene's test. Levene's test indicated significance only for intrapersonal composite scores; thus, the assumption of equal variances was not met for this variable. The assumption was met for musical, kinesthetic, logical mathematical, interpersonal, naturalist, spatial, and linguistic subscales. Due to the assumption not being met for one of the variables, further interpretations of the data for the Intrapersonal subscale must be made with caution.

I assessed the assumption for homogeneity of covariance with Box's M test. Results of Box's M test did not indicate significance (at α = .001); thus, the assumption was met. The absence of multicollinearity assumption was assessed with Variance Inflation Factors (VIFs). VIF values greater than 10 indicate the presence of multicollinearity and a violation of the assumption (Stevens, 2009). The subscales were not closely associated as the highest VIF value was 3.91; therefore, the assumption was met.

Test of Equality of Group Means

Means and standard deviations were calculated for the subscales within combined and inattentive presentation ADHD. This test of equality of group means was a component of the discriminant analysis and required a minimum of 20 in the sample size, thus, the hyperactive presentation ADHD was removed from the analysis prior to this calculation during data cleansing due to the low sample size (nine). The descriptive statistics for MI subscales by ADHD subtype are presented in Table 4. The means of the subscales were tested for differences between the combined presentation and inattentive presentation using an individual ANOVA test. The MI categories were tested individually by presentation as part of the preliminary steps of the discriminant analysis for differences in MI subscales. There were no significant differences for any of the subscales between these groups. Responses to the Midas Instrument did not differ based on ADHD subtype. The descriptive statistics, *F* statistic, and *p*-value are presented in Table 4.

Table 4

Descriptive Statistics and Test for Equality of Group Means for MI Subscales by ADHD Subtype

Subscale	ADHD subtype	*M*	*SD*	*F*	*p*
Musical				1.68	.198
	Combined presentation	2.80	0.84		
	Inattentive presentation	2.62	0.69		
Kinesthetic				0.33	.568
	Combined presentation	2.63	0.66		
	Inattentive presentation	2.57	0.59		
Logical mathematical				0.13	.723
	Combined presentation	2.88	0.85		
	Inattentive presentation	2.93	0.75		
Interpersonal				1.78	.185
	Combined presentation	3.39	0.61		
	Inattentive presentation	3.26	0.54		
Intrapersonal				0.01	.909
	Combined presentation	3.05	0.63		
	Inattentive presentation	3.04	0.47		
Naturalist				1.19	.278
	Combined presentation	3.04	0.87		
	Inattentive presentation	3.21	0.91		
Spatial				1.55	.215
	Combined presentation	2.87	0.93		
	Inattentive presentation	3.07	0.87		
Linguistic				1.45	.230
	Combined presentation	3.46	0.77		
	Inattentive presentation	3.30	0.79		

The canonical correlation of group MIDAS subscale scores was $\rho = .233$, indicating that there was no relationship between MI subscales and the ADHD subtypes. The Wilks' Lambda test statistic is a component of the discriminant analysis, which identified whether the dependent variable (ADHD subtypes) could be significantly predicted from the MIDAS subscales and was used to determine the statistical significance of this prediction model. Wilks' Lambda did not indicate significance, $\lambda =$

.946, *p* = .534, suggesting that the MI subscales did not significantly predict ADHD

subtype. A lack of difference in group means combined with the low prediction strength

of the overall model indicated no further interpretation of the model needed to be

conducted. The coefficients and significance of the model are presented in Table 5.

Table 5

Discriminant Analysis Canonical Coefficient, Wilks' Lambda, and Standardized
Predictor Canonical Coefficients

Model	Subscales	ρ	λ	Sig.	Standardized Canonical Coefficients
Overall model		.233	.946	.534	
	Musical				.288
	Kinesthetic				.404
	Logical mathematical				.122
	Interpersonal				.241
	Intrapersonal				.101
	Naturalist				-.422
	Spatial				-.781
	Linguistic				.334

Classification Results

Cross-references were conducted to determine the percent of classifications that

could be correctly predicted and to confirm original analyses were correct and accurate.

A total of 53.7% of participants who were in the combined presentation ADHD subtype

were correctly predicted to that subgroup by their individual MIDAS subscale scores. A

total of 49.2% of participants who were in the inattentive presentation ADHD subtype

were correctly predicted to that subgroup. Using the baseline of 90% for strong

prediction, there is not statistically significant evidence to justify that the MI subscales

can predict ADHD subtype. The classification results of the ADHD subtypes are

presented in Table 6.

Table 6

Classification Results of ADHD Subtypes

			Predicted Group Membership		
		ADHD Diagnosis	Combined Presentation	Inattentive Presentation	Total
Original	Count	Combined presentation	46	21	67
		Inattentive presentation	28	37	65
	%	Combined presentation	68.7	31.3	100
		Inattentive presentation	43.1	56.9	100
Cross-validated	Count	Combined presentation	36	31	67
		Inattentive presentation	33	32	65
	%	Combined presentation	53.7	46.3	100
		Inattentive presentation	50.8	49.2	100

Follow-up Analysis

A multivariate analysis of variance (MANOVA) was conducted to determine if

there are significant differences in MI subscales by ADHD subtype and confirm the

original analyses were correct and accurate. The dependent variables in the analysis were

the MI subscales (musical, kinesthetic, logical mathematical, interpersonal, intrapersonal,

naturalist, spatial, and linguistic). The independent variable in the analysis was the

ADHD subtype (combined presentation and inattentive presentation). Statistical significance was determined at $\alpha = .05$.

Prior to conducting the MANOVA, the assumptions were assessed – normality, homogeneity of variance, and homogeneity of covariance. The results of the KS test were statistically significant (at $\alpha = .05$) for musical and logical mathematical subscales; thus, the assumption of normality was not met for these variables. The results of the KS test were not statistically significant (at $\alpha = .05$) for kinesthetic, interpersonal, intrapersonal, naturalist, spatial, and linguistic subscales; thus, the assumption was met for these variables. Although the assumption of normality was not met for two of the variables, the discriminant analysis is robust for violations of the normality assumption as long as there are a minimum of 20 participants (Tabachnick & Fidell, 2012). Homogeneity of variance was assessed with Levene's test. Levene's test indicated significance only for Intrapersonal composite scores; thus, the assumption of equal variances was not met for this variable. The assumption was met for musical, kinesthetic, logical mathematical, interpersonal, naturalist, spatial, and linguistic subscales. Due to the assumption not being met for one of the variables, further interpretations of the data for the Intrapersonal subscale must be made with caution. The assumption for homogeneity of covariance was assessed with Box's M test. Results of Box's M test did not indicate significance (at $\alpha = .001$); thus, the assumption was met.

Results of the MANOVA did not indicate overall significant differences for MI subscales [$F(8, 123) = 0.881$, $p = .535$, $\eta^2 = .054$). Due to significance not being apparent

for the overall model, the individual MI subscales were not interpreted further. Results of the MANOVA and subsequent ANOVAs are presented in Table 7 and Table 8.

Table 7

MANOVA for MI Subscales Based on ADHD Subtype

Source	$F(8, 123)$	p
ADHD Subtype	0.88	.535

Table 8

ANOVAs for MI Subscales Based on ADHD Subtype

Source	$F(8, 130)$	p
Musical	1.68	.198
Kinesthetic	0.33	.568
Logical-Mathematical	0.13	.723
Interpersonal	1.78	.185
Intrapersonal	0.01	.909
Naturalist	1.19	.278
Spatial	1.55	.215
Linguistic	1.45	.230

Summary

While results of this study failed to reject the null hypothesis, it does support existing research indicating consistency in the highest frequency of MI categories among individuals with ADHD in general in Table 5. These considerations, along with limitations, implications, and recommendations will be discussed in Chapter 5.

Chapter 5: Discussion, Conclusions, and Recommendations

Introduction

The purpose of this study was to examine the relationship between the dependent variables of ADHD; inattentive, hyperactive, and combined subtypes, and the independent variables of Gardner's MI categories; bodily-kinesthetic, interpersonal, intrapersonal, musical, naturalist, spatial, logical-mathematical, and verbal-linguistic. My intent was to identify whether there is a distinctive pattern of intelligences among individuals with differing subtypes of ADHD. Addressing ADHD through a strengths-based perspective has the potential to alter the negative stigma that is often paired with the disorder.

Changes in the proposed setting of data collection occurred as a result of extensively delayed IRB application and approval from one of the original sources of data collection. Initial contact was met with no response for four months, possibly in part due to the College District's academic summer calendar break, followed by IRB approval steps occurring prior to and following a 2-week national holiday break and additional 2-week College calendar break. No specific or intricate ethical concerns were noted in the IRB application process. Consequently, the alternative plan to capture responses of the general public with ADHD rather than college students was implemented.

I used the Walden Participant Pool, as well as two other online sources of support for individuals with ADHD: Attention Deficit Disorder Association website and ADHD Success Network, Inc. for data collection. Participants in the study had self-reported current diagnoses of ADHD and I gathered them through their voluntary online

participation in the study. Participants were all over the age of 18 and provided a glimpse into the strengths of these study participants with ADHD on an international level, from Canada, the United States, and the United Kingdom.

Results for this study did not find a distinct pattern of a relationship between the MI subscale scores and ADHD subtypes. Thus, I failed to reject the null hypothesis. These findings were not statistically significant, and thus no conclusions can be drawn about predicting ADHD subtypes based on MIDAS subscale scores. While there is no pattern of a relationship due to the low prediction strength of the overall model and no differences between group means, there were three independent variables that emerged with the most frequent occurrences in ADHD in general; spatial, naturalist, and kinesthetic.

However, data that includes the kinesthetic category is interpreted with caution due to questionable reliability within this category. The rank ordered frequency occurrences of these categories of strengths in this sample of participants with ADHD in general supported past research findings similar to this study in which these same categories emerged as most frequent overall (Schirduan, 2000). In addition, study findings can lead to a discussion about the changes made to the DSM-5 with regard to diagnostic criteria and procedures related to ADHD.

In an effort to understand some of the experiences of the participants in this study, other demographic data indicated 69% of the participants use prescribed medication to manage their ADHD symptoms. This finding is supported by research identifying adherence rates for ADHD medication range from 36% to 86.6% (McCarthy, 2014, p.

1317). Further, other symptoms experienced included insomnia (42%), mood swings

(41%), and headaches or migraines (25%). These symptoms are typical of adults with

ADHD and can often add to the difficulties they experience in the work place, social

situations, and in relationships (Fedele, Hartung, Canu, & Wilkowski, 2010; Schredl,

Alm, & Sobanski, 2007). Finally, comorbid diagnoses of the participants in this study

included depression (26%) and anxiety disorder (20%) as most prevalent. Goodman

(2009) suggested many ADHD symptoms overlap with other psychiatric disorders. This

leads individuals with ADHD to deal with a multitude of issues.

Interpretation of Findings

The findings in this study confirm support for the recent changes in the DSM-5 in

which ADHD is now diagnosed on a continuum of symptoms resulting in *presentations*

rather than separate subtypes. For a long time, clinicians have supported distinguishing

similar but not identical symptoms through subtyping ADHD. Continued research in the

area of ADHD recently resulted in a change in the diagnostic criteria in the DSM-5 in

which a two-step approach to diagnosis involves confirming an overall diagnosis of

ADHD, and then quantifying the severity of hyperactivity, impulsivity, and inattention

respectively based on a count of symptomology (Nigg, Tannock, & Rohde, 2010).

When I began this research, former diagnostic procedures involving

distinguishing subtypes was instrumental in considering the possibility of a pattern of

multiple intelligences categories among the differing subtypes. Participants involved in

this study were all diagnosed with ADHD based on previous diagnostic criteria of the

DSM-IV version or earlier. The procedures for diagnosis were to categorize ADHD into

subtypes based on a list of symptoms within each category, differentiating them from each other. Much of the recent research leading to the changes in DSM-5 were controversial as the task force examined which direction to go, with some experts asserting the subtype concept is fundamentally flawed, while others believed it is the implementation that is flawed (Nigg, Tannock, & Rohde, 2010).

After analyzing countless studies and considering the need for accurate identification and diagnosis of ADHD in an effort to provide effective treatment, the DSM-5 task force reformulated the ADHD criteria. While some of the research attempted to isolate inattentive subtype with normal hyperactivity and impulsivity, impairments in early stages of attentional control emerged suggesting that the pathophysiological signal was improved by restricting the sample (Carr, Henderson, & Nigg, 2010; Schmitz, Ludwig, & Rohde, 2010). This would lead to support of subtyping, however, further research indicated temporal stability in which diagnosis can lead to one subtype at one point in time and an alternate subtype diagnosis at another point in time (Lahey, Pelham, Loney, Lee & Wilcutt, 2005; Todd, Huang, Todorov, Neuman, Reiersen, Henderson, et al. 2008).

Thus, changes in the prevalence of diagnosis of hyperactive subtype from childhood to adulthood are clearer. Changes in symptom presentation over time from childhood to adulthood have been documented and point to fluidity within the disorder (Goodman, 2009). This fluidity requires the need for some flexibility in symptom identification within the major presentations of ADHD, creating a lack of definitive categories with a continuum of presentations instead. As a result, the implications of the

presented study in which no significant difference was found between the subtypes supports the current diagnostic procedures related to ADHD.

Further, the findings from this study have some consistency with Schirduan (2000) in which the researcher examined predominant intelligences using the theory of multiple intelligences, along with self-concept and achievement level of students with ADHD. Schirduan's study differed in that the analysis did not separate the participants according to ADHD subtypes, rather, analyzed the data as one group of eighty-seven students with ADHD. The findings indicated more than half of the students with ADHD in the study reported they possess the naturalist and spatial intelligences as their predominant intelligences after completing the MIDAS, categories that are not emphasized in the traditional school setting. These findings are similar in this study in which both of these same categories emerged as predominant, along with kinesthetic, contributing some depth to the current literature on MI as it relates to ADHD.

Limitations of the Study

Although I made efforts to collect data with ample participation from individuals within each of the ADHD subtypes, locating individuals with hyperactive subtype was difficult. Data collection for this study within the subtypes was representative of the adult ADHD population in which only 3% (Goodman, 2009, p. 40) of those adults diagnosed with ADHD experience the symptoms of hyperactivity alone.

Furthermore, one clear difference between genders often researched has been the predominantly higher prevalence of hyperactive subtype among boys as compared to girls (Sciutto, Nolfi, & Bluhm, 2004). This vast difference may, in part, explain the

excessively low number of participants gathered in this study with hyperactive subtype ADHD since the sample was far more represented by females (79%). In addition, the rate of hyperactive symptoms has been shown to lessen with age (Goodman, 2009).

The sample in this study was far more representative of women with ADHD than men, presenting with 79% over 21% of men. While the symptomology, impairment, or treatment response differences between genders are minimally related to ADHD among adults, the rate of diagnosis among males to females as children is as high as 9:1 (Babinski, Pelham, Brooke, Molina, Waschbusch, et. al, 2011). Girls are less often referred for assessment as children, but the gender disparity has been reported to decrease in diagnosis of adult ADHD, resulting in more women addressing their own symptomology rather than through parental exploration (Babinski, et al., 2011). Women who were not referred for assessment as children are likely to have more insight into the nature of their problems as self-referred adults.

One possible explanation for the high rate of women represented in this study could be the difference between men and women in their willingness to explore the self-help field for understanding, strategies, or interventions related to ADHD symptoms and impairments. Tsan and Day (2007) found women were more likely to seek out online counseling than men, and men are less likely to seek help using any mode. The two online sources of data collection providing support for individuals with ADHD may have been a primary source of inquiry for women more so than men (ADDA, 2015, ADHD Success Network, Inc., 2015).

Another limitation of this study is identified when considering the study participants self-reported diagnoses. Due to the nature of the source of data collection, there was no way to verify diagnoses. Further, the fluidity of symptoms over time may provide a slightly different picture of ADHD presentation since their original diagnosis, impacting the accuracy of subtype placement within the study.

Recommendations

While this research does not identify a distinct pattern of MI categories and ADHD subtypes among the individuals who participated, there is still a need to develop a more strengths-based treatment perspective of ADHD. The process of this study offers hope for individuals with ADHD. Many participants who came across the details of the study, motivating them to participate, reached out and indicated appreciation for this alternative perspective related to ADHD. A number of participants indicated feeling like they had been looking for something to help them feel more confident and competent in their abilities and found some hope in completing the MIDAS in which they were able to readily identify existing strengths. Past research has focused on the phenomenon of meeting low expectations through the feeling of incompetence, with a heightened concern for academic failure, self-efficacy, and adult occupational and social functioning (Edbom, Granlund, Lichtenstein, & Larrson, 2008; Mattox & Harder, 2007; Nigg et al., 2002; ~~and~~ Shaw-Zirt, Popali-Lehane, Chaplin, & Bergman, 2005). Adults with ADHD have often been found to experience symptoms as a child and continue to experience symptoms on a different level as adults, impacting work performance, socialization, and family life (Goodman, 2009).

Further research is needed to explore the impact of ADHD strengths-based interventions with adults. Accurate identification and diagnosis of ADHD was a motivation to making changes to the DSM in an effort to provide effective treatment, including adults. While the results of this study indicate the three subtypes of ADHD cannot be predicted based on the subscale score of MI, likely due to the newly identified DSM-5 continuum of symptoms, participants in this study were still able to identify individual strengths through their personal profile after completing the MIDAS. If the consistent use of the MIDAS in a college setting were able to help individuals with ADHD identify strengths and develop an effective career plan based on those strengths, the stigma of ADHD may be reduced based on changes in outcomes. The fluidity of the disorder may also suggest a need for a longitudinal study on the changes in strengths and challenges related to ADHD.

Further research in the area of strengths-based intervention with transitioning high school students or early career college students may be beneficial to the work performance outcomes of those with ADHD. Additionally, further research exploring the ways to assist men with seeking needed self-help interventions to manage symptoms and impairments may be beneficial based on the percentage of men responding to this study as compared to the percentage of men diagnosed with ADHD. Finally, a qualitative exploration of the experiences of adults diagnosed with ADHD who complete the MIDAS may provide insight into more effective intervention strategies.

Implications of the Study

The impact for positive social change from this study lies in supporting individuals with ADHD through identifying dominant multiple intelligences categories. The literature involving children with ADHD found improvements in academic functioning, social skills, and interpersonal relationships (Douglas, Burton, & Reese-Durham, 2008; Glenn, 2010; Harriman, 2010; Schirduan & Case, 2004; Shaw-Zirt, Popali-Lehane, Chaplain, & Berman, 2005; Stanford, 2003). Two of the MI categories emerged as most frequent among the sample for this study and more importantly, each participant completing the MIDAS was provided with an individualized profile identifying their most predominant MI categories.

For some respondents in this study, this was the first time they were assessed through identification of their strengths. Instead, they had historically addressed their disorder by dealing with the negative or challenging symptoms of their deficits. Treatment responses have often been focused on what makes individuals with ADHD unsuccessful in school, in relationships, and in social situations rather than identifying and teaching to their strengths. These data suggested a more strengths based perspective when addressing ADHD, with the possibility of changing the negative social perception of a focus on deficits.

A study by Pearson, O'Brien, and Bulsara (2015) explored counseling experiences and possible therapeutic benefits through MI strategies with adults and found the major themes that emerged included positive client responses to use of a multiple intelligences preference survey and a strength based approach to counseling strategies.

Extending the research surrounding MI theory as related to individuals with ADHD may allow for a new personal perspective, one that allows individual strengths to be the focus.

Conclusion

Attention Deficit Hyperactivity Disorder continues to impact a large population of children, adolescents, adults, and their families. As knowledge about the disorder continues to grow through research, interest in identifying long lasting strategies and interventions should be of utmost priority. Differentiation in treating ADHD has had an inconsistent road, while the needs of individuals with ADHD can be very different.

I focused on identifying differences between subtypes, though provided little insight into the differences as related to MI. Consistent with another study (Schirduan, 2000) exploring predominant MI categories for students with ADHD, this study identified two of the same predominant categories in general. This may suggest there are some consistent strengths to address when identifying strategies and interventions for those attempting to manage the impairments inherent in the disorder. Careful consideration should be maintained, however, to continue to differentiate strategies based on individual needs.

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Appendix A: MIDAS Profile Sample

MULTIPLE INTELLIGENCES DEVELOPMENTAL ASSESSMENT SCALES
MIDAS   Version 3.2   Processed 10-08-2003
For ID 2

Sex: M   Grade: 16   Birth Date: 8-5-55
ID number: 2   Code: 2

The following Profile represents areas of strength and limitation as reported by you at this time. This is preliminary information to be confirmed by way of further discussion and exploration.

Scales

Musical   **********

Kinesthetic   ************

Logical-Mathematical   ****************

Spatial   **************

Linguistic   ********************************

Interpersonal   ****************************

Intrapersonal   **************************

Naturalist   *******************

The following Profile represents your intellectual style. These scales indicate if you tend to be more inventive, accurate or social in your problem solving abilities.

Scales

Leadership   ******************************

General Logic   ************************

Innovative   ********************

Completed items: 100%

MIDAS Profile for ID: 2   Page 2

The MIDAS subscales are listed below hierarchically from the highest at the top to the lowest at the bottom of the list. These scales are qualitative indicators of specific areas of strength and preference.

Specific Skill   Category

Written/Reading   Linguistic
Communication   Leadership
Personal Knowledge   Intrapersonal
Expressive   Linguistic
Persuasion   Interpersonal

Rhetorical   Linguistic
Management   Leadership
Sensitivity   Interpersonal
Working with People   Interpersonal
Effectiveness   Intrapersonal

Social   Leadership
Composer   Musical
Plant Care   Naturalist
School Math   Logical-Mathematical
Everyday Problem-Solving   Logical-Mathematical

Spatial Problem-Solving   Intrapersonal
Science   Naturalist
Appreciation   Musical
Everyday Math   Logical-Mathematical
Spatial Awareness   Spatial

Calculations   Intrapersonal
Animal Care   Naturalist
Working with Objects   Spatial
Athletic   Kinesthetic
Logic Games   Logical-Mathematical

Dexterity   Kinesthetic
Art Design   Spatial
Instrument   Musical
Vocal   Musical

MIDAS Profile for ID: 2   Page 3

The following are percentage scores based on the total number of
completed items for the main scales and subscales. Approximate
category ranks are included to aid interpretation. Please refer
to the current manual for interpretative information.

Clusters   Score   Score

Musical   29 Low
    Appreciation   46 Moderate
    Instrument   0 Very Low
    Vocal   0 Very Low
    Composer   63 High

Kinesthetic   31 Low
    Athletic   33 Low
    Dexterity   29 Low

Logical-Mathematical   44 Moderate
    School Math   50 Moderate
    Logic Games   31 Low
    Everyday Math   45 Moderate
    Everyday Problem-Solving   50 Moderate

Spatial   36 Low
    Spatial Awareness   45 Moderate
    Art Design   20 Very Low
    Working with Objects   38 Low

Linguistic   86 Very High
    Expressive   86 Very High
    Rhetorical   81 Very High
    Written/Reading   94 Very High

Interpersonal   76 High
    Persuasion   83 Very High
    Sensitivity   75 High
    Working with People   75 High

Intrapersonal   69 High
    Personal Knowledge   89 Very High
    Calculations   45 Moderate
    Spatial Problem-Solving   50 Moderate
    Effectiveness   70 High

Naturalist   52 Moderate
    Animal Care   40 Low
    Plant Care   58 Moderate
    Science   50 Moderate

Leadership   82 Very High
   Communication   90 Very High
   Management   80 Very High
   Social   70 High

Appendix B: Participant Qualifying Survey

(Demographic participant survey will be completed at SurveyMonkey.com.)
Thank you for your willingness to participate in the study "ADHD Subtypes and Multiple Intelligences: Does a Pattern Exist? A Strengths-Based Perspective of Abundance."
Please answer the following survey questions to determine eligibility for participation in the study. Your answers will be kept confidential.

1. Age: _____

2. Gender: _____ M _____ F

3. Current academic level: Freshman _____ Sophomore _____ Junior _____
   Senior _____ 1st year Master's _____ 2nd year Master's _____ Other _____

4. Have you been diagnosed with Attention Deficit Hyperactivity Disorder (ADHD) by a psychologist/school psychologist, physician or psychiatrist?
   Yes _____ No _____

5. What is your specific ADHD subtype diagnosis? Inattentive type _____
   Hyperactive type _____ Combined type _____

6. How long have you been diagnosed with ADHD? Less than 1 year _____
   1-2 years _____ 3-5 years _____ 6-10 years _____ 11+ years _____

7. Do you take medication to manage your ADHD symptoms? Yes _____ No ____

8. Do you have any other psychiatric or behavioral diagnoses? None _____
   Depression _____ Anxiety Disorder _____ Bi-Polar Disorder _____ Conduct
   Disorder _____ Post-Traumatic Stress Disorder _____ Other _____

9. Do you experience any of the following symptoms on a weekly basis?
   Insomnia _____ tiredness _____ chronic headaches _____ migraine headaches
   _____ mood swings _____ excessive sadness _____

10. Do you have a special talent or skill you participated in as a child but no longer participate in as an adult? Yes _____ No _____

    If yes, please identify _____

Appendix C: Consent to Participate

CONSENT FORM

You are invited to take part in a research study of ADHD and Multiple Intelligence to identify whether a pattern of strengths exists among ADHD subtypes. The researcher is inviting individuals 18 years of age and older with ADHD to be in the study. This form is part of a process called "informed consent" to allow you to understand this study before deciding whether to take part.

This study is being conducted by a researcher named Kathleen Mettler, who is a doctoral student at Walden University.

Background Information:
The purpose of this study is to identify whether a distinct pattern of Multiple Intelligences exist among those individuals with ADHD. The study focuses on the strengths of those dealing with the symptoms of ADHD and suggests the strengths can aid in successful educational or employment situations.

Procedures:
If you agree to be in this study, you will be asked to:
- Complete a survey assessment online that will take approximately 30 minutes.
- Data will be collected through this survey one time only.
- An individualized results report will be provided to participants who complete the survey.

Here are some sample questions:
1. **As a child, did you have a strong liking for music or music classes?**
A= A little.
B= Sometimes.
C= Usually.
D= Often.
E= All the time.
F= I don't know.

2. **Did you ever learn to play an instrument?**
A= No.
B= A little.
C= Fair.
D= Good.
E= Excellent.
F= I don't know.

3. **Can you sing 'in tune'?**
A= A little bit.
B= Fair.
C= Well.
D= Very well.
E= Excellent.

F= I don't know.

Voluntary Nature of the Study:
This study is voluntary. Everyone will respect your decision of whether or not you choose to be in the study. No one at Mesa Community College will treat you differently if you decide not to be in the study. If you decide to join the study now, you can still change your mind later. You may stop at any time.

Risks and Benefits of Being in the Study:
Being in this type of study involves some risk of the minor discomforts that can be encountered in daily life, such as fatigue, stress, or becoming upset with your assessment results. Being in this study would not pose risk to your safety or wellbeing.

Volunteer study participants completing the online survey assessment will be provided individualized feedback and a personalized report offering suggestions for further development of predominant intelligences as well as less predominant intelligences.

Payment:
There is no payment for participation in the study, though participants will be provided with a personalized report of identified Multiple Intelligences strengths based on assessment responses.

Privacy:
Any information you provide will be kept confidential. The researcher will not use your personal information for any purposes outside of this research project. Also, the researcher will not include your name or anything else that could identify you in the study reports. Data will be kept secure by password protection on a flash drive and locked in a lockbox. Data will be kept for a period of at least 5 years, as required by the university.

Contacts and Questions:
You may ask any questions you have now. Or if you have questions later, you may contact the researcher via xxxxx@xxx. xxx. If you want to talk privately about your rights as a participant, you can call Dr. Leilani Endicott. She is the Walden University representative who can discuss this with you. Her phone number is xxx-xxx-xxxx. Walden University's approval number for this study is **05-23-14-9958762** and it expires on **May 22, 2015.**

Please print or save this consent form for your records.

Statement of Consent:

I have read the above information and I feel I understand the study well enough to make a decision about my involvement. By clicking the link below and completing a survey, I understand that I am agreeing to the terms described above.

Appendix D: Participant Pool Request

Maricopa Community Colleges
Attn: Dr. Steven Helfgot

March 30, 2014

Dear Dr. Helfgot,

I am a former employee of Maricopa Community Colleges and was an adjunct instructor at the Mesa campus. I am currently working on the last portion of my doctoral degree in Educational Psychology at Walden University and would like to request your help in accomplishing this milestone educational goal. My research in the area of Attention Deficit Hyperactivity Disorder is something I have a heart for and hope to share with some of MCC's students who deal with the challenges of the disorder every semester.

I have included a summary of my research topic and respectfully request your help in enlisting 157 students of the Disability Resource Centers of MCC to be volunteer study participants. In a nutshell, my research is a strengths-based perspective in addressing ADHD through Howard Gardner's theory of Multiple Intelligences. Too often students who struggle with this disorder have dealt with a deficits-based response to achieving their educational goals. My research hypothesis asserts a pattern of strengths among individuals with ADHD, just as there is a pattern of deficits. Volunteer study participants would complete the Multiple Intelligences Developmental Assessment Survey (MIDAS), an online assessment that provides individualized feedback and a personalized report offering suggestions for further development of predominant intelligences as well as less predominant intelligences. This report can aid students in advocating for their educational needs as students utilizing the services of the DRC within MCC.

I would be happy to sit down with you or any of the MCC personnel needing further clarification about my study. I am in the process of obtaining IRB approval and can provide you with a copy of the evidence-based assessment to be utilized in the study. I look forward to discussing how MCC can be a part of impacting the lives of students with ADHD through my research. I can be reached at xxx-xxx-xxxx.

Sincerely,

Kathleen Mettler, LMSW
PhD Student, Walden University

Appendix E: Study Flyer

Appendix F: Permission from MIDAS developer to use instrument

C. Branton Shearer, Ph.D.
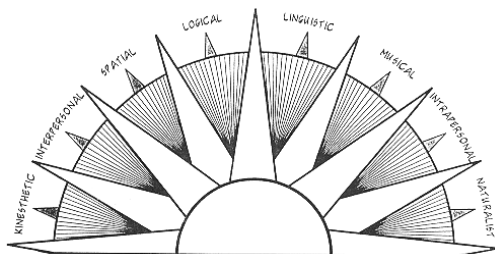
Multiple Intelligences Research and Consulting Inc.
www.MIResearch.org

August, 2013

To Whom It May Concern:

I give my permission for **Kathleen Mettler, Walden University,** to use the MIDAS assessment as part of her graduate research. The full questionnaire may not be reproduced except as necessary for research purposes. Sample questions from the various scales may be included in the appendix of his dissertation.

Please don't hesitate to call or email me if you have questions.

Sincerely,

Branton Shearer, Ph.D.
President,
MI Research and Consulting, Inc.

Appendix G: Frequently Asked Questions – Study Summary

ADHD Subtypes and Multiple Intelligences: Does a Pattern Exist?

1. Q: What is this for?
    A: Your participation is part of a dissertation study exploring whether a pattern of Multiple Intelligences exists among individuals within each of the subtypes of ADHD.

2. Q: What do I have to do to participate?
    A: Go online to complete a survey that assesses your strengths in a variety of areas.

3. Q: Do I need to have ADHD to participate in the study?
    A: Yes, you will need to have been diagnosed with ADHD by a doctor.

4. Q: How long will it take?
    A: Approximately 30-40 minutes.

5. Q: How will my participation make a difference?
    A: Your honest answers to the survey questions will add to the body of research exploring strengths of individuals with ADHD.

6. Q: Will I be able to find out the results of the study?
    A: Yes, there will be a briefing following the completion of the data collection and analysis when you will be able to discuss the general findings with the researcher.

7. Q: Will my results be kept confidential?
    A: Yes, all of the study participant's identities will be protected by password protection only the researcher will have access to.

8. Q: Will I earn college credit for participation?
    A: No, your participation is completely voluntary and not related to any course you are enrolled in now, in the past, or in the future.