The Impact of a Sensory-Based Art Intervention in 6th to 8th-Grade Boys with Attention Deficit Hyperactivity Disorder

by

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Psychology

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ABSTRACT

One neuropsychology theory proposes children with ADHD experience deficits in executive function, which can result in negligent and disruptive behaviors. The purpose of this qualitative case study is to examine the reduction of inattention and hyperactive-impulsive behaviors in three 6th to 8th-grade boys with ADHD, borrowing from the Expressive Therapies Continuum, a neurobiological hierarchal theoretical model. Recruited participants attended a sensory-based art intervention held bi-weekly for five weeks. Additionally, parental behavioral checklists were filled out by one parent of each participant before the study and immediately following to determine changes in observed behaviors. Twelve 10-minute naturalistic observations were conducted on each participant at various times and by multiple observers throughout the intervention to illustrate changes in conduct as a result of engaging in the Expressive Therapies Continuum intervention. The study gives limited support to the hypothesis that a sensory-based art intervention informed by the Expressive Therapies Continuum would decrease inattention and hyperactivity-impulsivity behaviors in three non-medicated boys with ADHD. This pilot study illustrates sensory-based artistic activities may increase executive function, promising improved academic and social outcomes for children diagnosed with ADHD.

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Acknowledgments

This thesis culminates two years of intensive coursework in Depth Psychology and a piloted experiential case study examining the effects of an art intervention on 6th to 8th-grade boys with unique learning challenges. This venture has required formidable effort, innate curiosity, an excellent roadmap, and a smattering of beautiful souls who made this journey personally and professionally consequential.

First and foremost, my immense love and gratitude to my husband Dale, and our children Juel and Beau. Between the years of 2015-2017, I commuted to Sonoma State University which involved an overnight stay each week. During these difficult two years, my family took on additional responsibilities, and made many sacrifices, so that I could fulfill my school commitments. Even when I was home, there were papers to write, research to conduct and presentations to give: I was frequently unavailable even when I was present, yet my family continued to provide the space and time I required to finish this thesis and attain my Master's.

My mother Barbara is one of the most significant influences in my life. She instilled in me a zest for life, high excellence standards, love of scientific inquiry and a very hefty dose of sassiness which has carried me through many challenges. Mom, every Friday night as I traveled home from school, you "talked me safely" back to Sacramento, regardless of the time it took me to get home. I treasured those conversations, as well as your genuine interest in what I was learning. Thank you for being you. Ky, my brother and Kasey, my sister-in-law, you are my dear friends, and I deeply appreciate your stable and loving presence in my life. I am immensely proud of the incredible parents you are, and the courage to be the necessary voice for your children, so that they can thrive and grow.

Dr. Laurel McCabe, my Chair, and professor; your encouragement to study a topic that holds such professional and personal significance has been of tremendous consequence. Your deftness in research methods and thoughtful reflections on every aspect of the study permitted the important acquisition of first-hand empirical research which I will carry forth in future research studies. For this, I am genuinely appreciative. Linda Chapman and Renee Conrad; I am so thankful for your time and artistic materials, your vast expertise in art therapy and neuroscience, and your willingness to openly share what you know. I am deeply honored you each agreed to be my readers.

The coined term, 'it takes a village to raise a child,' describes the collaborative efforts of faculty members at the Pursuing Academic Choices Together academy where the study was held. Many of the staff graciously donated their time, resources and permitted the ongoing naturalistic observations to take place in their classes throughout the 5-week intervention. I'm grateful to the school's administrator, Tracy Chatters, for the use of the art room each week and her tremendous support prior and throughout the study. To the devoted teachers and advisors who volunteered their time so the ten interventions could take place after regular school hours: Kathy Arsenault, Erica Cornwell, Donice Van Gilst, Dani Sigurdson, and Judy Romero: your spirited generosity ensured the study proceeded as planned. Moreover, Kathy, Judy, and Erica frequently assisted during the interventions that needed an additional set of hands; I so appreciated your contributions.

An important method utilized in the study were the naturalistic observations of the participants during varied classroom instruction. Recruited observers conscientiously conducted these observations with thoughtful precision, many observing multiple boys each week in

addition to hectic personal and work schedules. Your contributions to the validity and reliability of the study in this way are so appreciated.

An extraordinary thank you to the three boys who participated in the study. Every Monday and Wednesday you showed up, eager to help set up the intervention materials with enthusiastic fervor, oohing and ahhing about the new art projects. Even if there were artistic mediums like painting birdhouses that did not seem as enticing, you still dove into the new project with a great attitude, albeit the rolling of eyes and elbow jabs to the fellow participants (yes, I caught that). Each of you was indeed a joy to teach! To the families who participated in the study, I am cognizant of the incredible time sacrifices and energy expended so your child could participate in the study. I cannot express enough my gratitude for the long drives during rush hour traffic to get to every art intervention on time.

Susan, you provided a haven and a home away from home for the two years I stayed at Sonoma State each week completing my coursework. I am immensely blessed to have had such an opportunity, and cherish our friendship that developed as a result.

James Spall, thank you for assisting me with various aspects of the data analysis, your statistical expertise gave life to the data collected in the study.

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Chapter 1

How Did I Get Here?

Piloting an experiential case study for my Master's thesis has been a labor of love. Studying the effects of a sensory-based art intervention on behaviors of Attention Deficit Hyperactivity Disorder (ADHD) in children holds a deep personal meaning because of my long-standing history with this population. Raising two teenagers who were diagnosed in elementary school with the disorder, I understand the peculiar social challenges and academic struggles children with this disorder face. So, how did I get here?

When both my children entered traditional elementary school, it quickly became apparent that both processed information differently from each other and their peers. Moreover, functioning in the frequently chaotic environment(s) proved difficult, as focusing difficulties and hyperactivity behaviors began to surface. During the early elementary school years, I volunteered in each of my children's classrooms, hoping my presence would magically help them exhibit less impulsive and distracting behaviors. Although I treasured these opportunities, watching my children struggle with reading, writing and arithmetic concepts that came naturally to other students was distressing, and I self-evaluated my abilities as a parent. Convinced that if I worked more diligently with my children they would be successful learners, I spent countless hours every evening assisting each child with their homework. Overwhelmed by my already hectic life, I became frustrated and perplexed that concepts each child understood the evening before were suddenly a novelty; it was as if they had never been exposed to, or taught, the material. And, despite all my efforts, each child was falling behind their peers in varying degrees.

After countless meetings with each child's teacher to discuss how their disruptive behaviors and focusing deficiencies were further perpetuating learning delays, both children were assessed and subsequently diagnosed with ADHD. Immediately after the diagnosis, it was urged that the children be placed on medication therapy to counteract the myriad of symptoms; I resisted, however, believing this was only addressing the symptoms and not the cause of the disorder. Hence, I began examining plausible etiologies, as well as the brain's ability to rewire itself when exposed to varying stimuli. Consequently, I returned to higher education with aspirations to gain a better understanding of the brain systems affected by ADHD, but more importantly, strategies to mitigate the symptoms.

After numerous mainstream academic interventions, when the children were in 3rd and 5th grades, I finally relented and placed each child on medication therapy. Each morning while administering the medication I felt guilty because both children complained of debilitating stomach pains, increased anxiety, and fatigue. Although they were focusing better and were less hyperactive in school, whenever I looked in their eyes, my once animated and joyful children seemed to be masked. Consequently, I began investigating alternative educational opportunities that did not require continued medication. In March 2012, my children transitioned to the Pursuing Academic Choices Together homeschooling academy, in Natomas, California. The academic counselors assigned to our family assisted me in creating a specialized curriculum tailored to each of the children's academic needs and personal interests. By the fourth week of homeschooling, both children were taken off their medication because of the relaxed and more predictable learning environment, which increased their abilities to focus for longer periods of time. The hyperactivity and psychosomatic symptoms disappeared, and the effervescence I had

so missed, returned. Moreover, because I was able to work with each child on their academic challenges, they began to display immediate academic improvements in the areas that had once been so challenging. Consequently, after years of feeling like I was alone in advocating for my children, teachers and administrators from the Pursuing Academic Choices Together program proved to be their biggest supporters, all the while recommending curricula that supported each child's unique learning styles, instead of focusing on their deficiencies.

Today, both of my children continue to make impressive strides in their academic abilities. Moreover, they are well-rounded and self-confident individuals who are a joy to be with, and have dynamic personalities. Although my children's first years of elementary school were daunting and overwhelming, the journey has instilled a passion in me for studying brain development in children, researching likely etiologies of ADHD, and developing innovative interventions to reduce the negative behaviors associated with the disorder.

Given my education attainments of a bachelor's in early childhood development, a soon-to-be master's in psychology, and knowledge of neuroscience, administrators from the Pursuing Academic Choices Together academy requested I utilize my skills and dedication to develop and teach a class for 5th to 8th-graders in the Spring of 2016. The piloted course focused on the basic anatomy of the brain, the systems involved with learning, practical strategies students could employ when they felt stressed or inattentive, as well as further developing a solid sense of self (differentiating oneself as being separate from others with private feelings, emotions, hopes and dreams (Levine, 2010)). Concurrent to teaching the class, my graduate coursework examined sensory-based approaches to learning and the proposed implications on neurodevelopment. The compelling subject matter propelled my desire to investigate further the

impact of sensory-based activities on children challenged with comorbid inattentiveness and hyperactivity. Thereby, during the last 45 minutes of each class, students engaged in sensory-based projects directly related to the lesson (Appendix A), which permitted, I suggest, a deeper understanding of the subject matter. Moreover, the students displaying the greatest inattentive and hyperactive behaviors experienced prolonged mental concentration during the academic portions of each class. The 5-week pilot workshop was so well received by the students, parents, and administrators that it was taught again as a Fall 2016 semester class. Therefore, having observed first-hand the positive effects the creative process on children with behavior and learning challenges, this thesis examines the impact of a sensory-based intervention on boys with ADHD, and the subsequent learning and social outcomes.

In the next chapter I discuss the case study: an overview of ADHD and the Expressive Therapies Continuum, research questions and implications and possible drawbacks of the study. Organization of the thesis is also discussed.

Chapter 2

Case Study Context and Implications

Overview of Case Study

The purpose of this case study is to examine the effects of a sensory-based art intervention on *inattention* and *hyperactivity-impulsivity* (Quinn, 2009) behaviors in three non-medicated 6th to 8th-grade boys with *Attention Deficit Hyperactivity Disorder* (ADHD) (Diagnostic and Statistical Manual of Mental Disorders, 2013, p. 32). The art intervention approach is informed by the *Expressive Therapies Continuum* (Hinz, 2009), a theoretical model that suggests that engagement in sensory-based activities moves information processing epigenetically from the brainstem to the limbic system to the neocortex, resulting in hemispheric synchronization for whole-brain functioning, and increased executive function.

A growing body of research proposes that children with ADHD have a deficiency in *executive function* (Grosswald, 2013; Henley, 1998; Willcutt, Doyle, Nigg, Faraone & Pennington, 2005), resulting in symptoms of hyperactivity and inattention. I hypothesized that weekly art sessions borrowing aspects of the Expressive Therapy Continuum would stimulate the lowest structures of the brain, in the brainstem, allowing information processing to move up the hierarchal levels to the highest structure, the *prefrontal cortex* (Chapman, 2014). The anticipated result is increased executive functioning, which may lead to a decrease in ADHD symptoms of inattention and hyperactivity-impulsivity, and better academic and social outcomes.

Attention Deficit Hyperactivity Disorder

ADHD is defined by the Diagnostic and Statistical Manual of Mental Disorders (DSM-5) (American Psychiatric Association, 2013, p. 32) as a neurodevelopmental disorder with

inattention and hyperactivity-impulsivity symptoms, which occur either concurrently or in isolation, and are inconsistent with an individual's chronological age or development (Henley, 1998). Moreover, the inability to effectively collaborate with peers results in performance issues in social or educational settings. Due to the nature of the disorder, symptoms, as well as sub-type (DSM-5, 2013), can change over time as the child grows and develops (American Psychiatric Association, 2013). The behaviors of inattention and hyperactivity-impulsivity manifest in children with ADHD as fidgetiness, inability to pay attention to the task at hand, difficulties in organizational skills, excessive talking, and difficulty remaining seated during appropriate situations (American Psychiatric Association, 2013), which can often lead to missed academic instruction.

Expressive Therapy Continuum

The Expressive Therapies Continuum (Kagin & Lusebrink, 1978; Hinz, 2009) is a theoretical framework which posits the *left and right hemispheres* (Fannin & Williams; 2012, Hinz, 2009) must work synchronously for an individual to achieve whole-brain functioning: if there is a deficiency in the ability to process information, the individual experiences cognitive delays. Four levels within the Expressive Therapies Continuum reflect how information is processed. The *kinesthetic/sensory* is the foundational or first level, followed by the *perceptual or affective level*, the *cognitive or symbolic level*, and the *creative level* (Hinz, 2009) representing whole-brain synthesis (see Figure 1). The Expressive Therapies Continuum (Hinz, 2009) suggests that the use of different artistic media during art sessions assists in the movement of information processing from the higher to lower brain structures; or in some cases, from lower to higher structures.

Expressive Therapies Continuum	Levels of the Expressive Therapies Continuum
Creative	Fourth Level - Whole Brain Synthesis
Cognitive/Symbolic	Third Level
Perceptual/Affective	Second Level
Sensory/Kinesthetic	Foundational Level

Figure 1. The four levels of the Expressive Therapies Continuum.

Research suggests (Grosswald, 2013; Henley, 1998; Willcutt et al., 2005) that children with the diagnosis of ADHD have a deficiency in executive function, which is one of the functions of the *neocortex*, the highest brain structure, resulting in inattentive and hyperactive-impulsive behaviors. Willecutt et al. further proposes that children diagnosed with ADHD would experience a reduction in these behaviors as information moves up the brain hierarchy to the neocortex.

I had first-hand experience with the transformational and healing abilities the Expressive Therapies Continuum can have on an individual. Four years ago my 11 year-old son was involved in a car accident which led to debilitating anxiety and physiological symptoms that impaired his ability to successfully self-regulate. After seeking out a licensed play therapist who utilizes this conceptual framework for work with my son, he began to show improvement after the fourth session, and by the twelfth and final session, all anxiety and physiological symptoms had abated. Even with daily exposure to the accident site and the possible triggering stimuli, my son is still free of negative affect (B. Kammer, personal communication, September 5, 2016). Observing such dynamic healing in my son with a therapist that utilizes the Expressive Therapies Continuum model in her healing practice, propelled the desire to conduct a case study for

children with neurobiologically based learning difficulties. After years of witnessing children with ADHD struggling in mainstream education, I wanted to use my unique life experiences of raising two children with the disorder, and my formal educational background, to contribute in some meaningful way. Moreover, my interest in neuroscience, and the brain's ability to rewire itself when certain stimuli are presented (such as sensory-based art activities), fueled the passion to create and implement a sensory-based art intervention.

A glossary of terms (Appendix B) defines Expressive Therapies Continuum, and neurobiological terminology used throughout the thesis.

Research Questions

My hypothesis is that as a result of an Expressive Therapies Continuum intervention, three non-medicated 6th to 8th-grade boys with a medical diagnosis of ADHD will experience increased executive function, resulting in lowered inattention and hyperactive-impulsive behaviors. This hypothesis informs my research questions:

1) Will non-medicated 6th to 8th-grade boys with ADHD inattention difficulties have a reduction of behaviors after an Expressive Therapies Continuum intervention? How much?

2) Will non-medicated 6th to 8th-grade boys with ADHD experience less hyperactivity-impulsivity behaviors as a result of an Expressive Therapies Continuum intervention? How much?

3) Will non-medicated 6th to 8th-grade boys with ADHD experience greater social outcomes?

Implications of the Case Study

Impaired executive function is examined in this thesis as a plausible etiology of ADHD, and is the theoretical basis of the framework used in the intervention. Research presenting other etiological theories, such as stress (heightened cortisol levels damaging healthy brain tissue), genetic imprinting for ADHD, and hemispheric dominance, to name only a few, have been excluded from the literature.

The results from this case study are consequential because they add to the body of research (Chapman, 2014; Czamanski-Cohen, 2016; Diamond, 2012; Henley, 1998; Lusebrink, 2004; Lusebrink, 2010; Noblin & Conrad, 2004; Sawyer, 2012) about the impact of art interventions on children with learning difficulties. There is little empirical research that examines aspects of the Expressive Therapies Continuum in populations with ADHD, as well as the neurodevelopmental implications on learning and social outcomes.

This pilot study is expected to have a positive effect on the participants due to its foundation in neuroscience (Chapman, 2014; Diamond, 2012; Lusebrink, 2004) and strong experiential approach to sensory-based artistic activity. Given that each activity presented during the intervention can be replicated at home, participants can return to artistic media they found enjoyable, thus strengthening the brain's ability to process information more effectively. Future studies might include expanding the art intervention to children with sensory processing disorders (Hinz, 2009), autism spectrum disorders (Melillo, 2009) and those children who have behaviors that prevent them from fully participating in academic and social settings.

Potential Drawbacks of the Study

There are possible drawbacks of this pilot study. First, due to the low sample size, the contextual complexities and severity of each participant's ADHD presentation, as well as their environment, results are expected to vary from child to child. Second, considering the unique homeschooling environment the participants are drawn from, replicating the results in another ADHD population may not be feasible. A third drawback could be a participant's low interest in the art media presented each week.

Organization of the Thesis

Chapter 3 includes a literature overview of ADHD, as well as the behaviors that are typically exhibited. An introduction to impaired executive function as the proposed etiology of ADHD is discussed, as well as various interventions utilized in therapies for reducing inattentive and hyperactive-impulsive behaviors. A review of Expressive Therapies Continuum literature examines the prevalence of expressive art interventions in both traditional and alternative therapies, as well as its effectiveness in reducing symptoms and behaviors associated with ADHD.

Chapter 4 discusses the methods utilized in this case study, which include measures used for gathering data about the participants, as well as the pre- and post-intervention procedures. The means of recruiting participants are described as well as the creation and implementation of the 10-session art intervention. Condensed field notes illustrate the structured group activities during each session and the free art time preferences of each participant. The 10-minute observations conducted throughout the study on each participant are described, as well as how the observers were recruited and trained. Finally, the data analysis describes how each outcome

is broken down to determine the effectiveness of the art intervention in reducing negative behaviors.

Chapter 5 presents the results of the pilot study. Chapter 6 discusses the findings and implications of the research. Chapter 7 explores future research endeavors.

In the next chapter, I discuss a review of the literature on ADHD and the Expressive Therapies Continuum; the role of neuroscience and the neocortex on learning outcomes in learners challenged with impaired executive function is discussed: the positive effects on the neocortex when sensory-based interventions are employed. This Expressive Therapies Continuum intervention is an experiential case study studying the effects sensory-based art activities upon three non-medicated 6th to 8th-grade boys diagnosed with ADHD.

Chapter 3

Literature Review

The purpose of this case study is to examine the effects of a sensory-based art intervention on inattention and hyperactivity-impulsivity behaviors in three non-medicated 6th to 8th-grade boys with ADHD. Using an art intervention approach informed by the Expressive Therapies Continuum, this theoretical model suggests that engagement in sensory-based activities moves information processing epigenetically to the neocortex, resulting in hemispheric synchronization for whole-brain functioning, and increased executive function.

The literature review introduces the contextual constructs of ADHD, and discusses impaired executive function as a plausible etiology of the disorder. The subsequent section examines the Expressive Therapies Continuum as a neurobiological framework for investigating the effects of sensory-based art activities, and its proposed benefits.

Overview of ADHD

ADHD is the leading childhood neurobiological disorder worldwide. Eleven percent (6.4 million) of children between the ages of 4 and 17 in the U.S. have been diagnosed since 2011, and the prevalence of boys receiving the diagnosis over girls is a rate of nearly three to one (Centers for Disease and Prevention Control, 2016). According to Holland & Riley (2014), there has been a 42% increase in ADHD diagnosis since 2014. ADHD is defined by the DSM-5 (American Psychiatric Association, 2013) as a neurodevelopmental disorder with inattention and hyperactivity-impulsivity symptoms, which occur either concurrently or as isolated behaviors, and are inconsistent with an individual's chronological age or development (Henley, 1998). Due to the nature of the disorder, symptoms, as well as the sub-type, can change over time as the

child grows and develops (American Psychological Association, 2013). According to the American Psychiatric Association (2013), there are three major sub-types of ADHD: inattentive, hyperactive-impulsive, or a combination of the inattentive and hyperactive-impulsive presentations. Henley (1998) posits that ADHD is a spectrum disorder, and Neufield & Takacs (2006) suggest that each ADHD diagnosis is intrinsic to the individual, with unique comorbid issues which can manifest as neurocognitve delays in written and oral language, and at times, arithmetic difficulties. Consequently, students may find specific academic content such as reading or memorizing facts more challenging to learn than another. Moreover, due to hyperactivity and impulsivity behaviors, the inability of children with ADHD to effectively collaborate with peers and educators results in interpersonal issues in social or educational settings. As such, Noblin & Conrad (2004) posit that many children with ADHD are given attention for their disruptive and inattentive behaviors rather than their abilities, often to the detriment of their social and academic development.

Symptoms and Behaviors of ADHD

The symptoms of inattention and hyperactivity-impulsivity manifest in children with ADHD in a myriad of different ways, depending on the severity of the presentation and the unique biological and neuropsychological makeup of the child. Many of the behaviors can manifest as fidgetiness, the inability to pay attention during appropriate situations, a lack of organizational skills, and excessive talking (American Psychological Association, 2013). Chapman (2014) posits that children with the hyperactivity-impulsivity presentation are often easily distractible and unable to sit for any length of time without fidgeting and changing position. Van der Oord et al. (2012) posit that maintaining attention over prolonged periods of

time is difficult for children with ADHD, which consequently results in impulsive and hyperactive behaviors.

Quinn (2009), a doctor diagnosed with the disorder at a young age, explains that other academic difficulties can manifest under the broader behaviors of hyperactivity, impulsivity, and inattention. The behaviors can be exhibited in isolation or in any combination. Disorganization is the inability to manage one's time efficiently, such as continuously starting and stopping long-term projects, and not being able to decide what to do next. Hyperactivity can be exhibited in excessive body movements, especially without a purpose, such as fidgeting or playing with hands and feet, doodling with pencils, and general restlessness. Starting homework without reading the instructions first, frequently misplacing things and making absentminded mistakes on homework assignments are labeled as carelessness. Doing or saying something without first thinking about the consequences is categorized as impulsivity. Attention that is easily drawn away from the task at hand, having a short attention span, and having difficulties following directions are considered distractibility or inattentiveness.

Educators, psychologists, and neuroscientists recognize that children with ADHD struggle both academically and socially (Melillo, 2009), frequently exhibiting delays that directly impact their ability to integrate what they are learning, either in a structured academic environment or social settings. Chapman (2014) suggests that children with ADHD might experience delays in other areas, such as gross and fine motor, perceptual and tactile skills, which can further exacerbate symptoms in an already overwhelmed child.

Tools for Diagnosing ADHD

According to the National Institute for Children's Healthy Quality (2015), a leading diagnostic tool utilized by healthcare professionals in diagnosing ADHD is the Vanderbilt Assessment Scale. Becker et al. (2012) posit that this evaluation tool is a sound instrument in the diagnosis of children with ADHD, possessing good internal consistency and validity. This evaluation instrument is provided to parents, teachers and adults who frequently interact with the child being observed. Providing the assessments to multiple individuals assists the mental health professional in evaluating whether all adults interacting with the child witness repetitive patterns of behavior. While the questionnaires are subjective, receiving feedback from several individuals about the observed behaviors provides multiple perspectives, allowing for a more objective and reliable diagnosis. Neufeld & Takacs (2006) propose that interpreting each child's unique difficulties by utilizing evaluation instruments versus lumping them in with myriads of others with similar behaviors, permits addressing the child from a more holistic perspective.

The Human Brain's Hierarchic Structure

The human brain is made up of a hierarchical system of three brain structures: the brainstem, the limbic system and the neocortex. The brainstem is the lowest of the brain structures, and is directly connected to the spinal cord. This brain system is responsible for all autonomic activities such as heartbeat, respiration, as well as controlling motor function, and coordination of auditory and visual functions (Chapman, 2014).

The limbic system sits above the brainstem and includes the hippocampus, thalamus, amygdala, hypothalamus and anterior cingulate. This brain system is primarily responsible for deciphering and processing emotion, reflexes and instinctual survival tendencies (Malchiodi,

2003), with the amygdala controlling the fight/flight or approach/avoid response (Chapman, 2014; Fannin & Williams, 2012). The hippocampus is vital for learning and memorization, and is necessary for implicit memories to be stored in explicit, or long-term memory, for retrieval later on (Chapman, 2014; Lusebrink, 2010). The thalamus is responsible for all sensory perception except for smell, and indirectly and directly links the amygdala to the neocortex through other brain structures (Lusbrink, 2010). The anterior cingulate assists one in exercising emotional self-control and assists in problem solving (Lusebrink, 2010), while the hypothalamus is the brain structure crucial for maintaining physiological internal stability, when the stress response is activated (Chapman, 2014).

The highest brain system is the neocortex. It is made up of the left and right hemispheres, which are bridged by the corpus callosum, a fibrous band of nerve tissue that permits communication between the two hemispheres. The neocortex is the seat of executive function, where higher order thinking takes place, such as reasoning, understanding cause and effect, problem solving, maintaining attention, discernment and learning. Chapman (2014) suggests that neocortex functioning can be strengthened through psychotherapeutic interventions, such as play therapy, or artistic interventions, when the brainstem is activated through sensory-based activities.

Executive Functions and Their Role in Learning

Executive functions are the neurocognitive processes that permit the translation of incoming information within working memory, while assessing the situation for the best possible solution and maintaining an appropriate problem solving set to attain a future goal (Willcutt et al. 2005, p. 1). According to Grosswald (2013), the neocortex is the most evolutionarily developed

part of the brain, and is responsible for working memory, the ability to reason and the control of impulses. Furthermore, Diamond (2012) posits executive functions assist with "inhibition, exerting self-control, maintaining discipline, cognitive flexibility, and keeping focused attention, as well as making sense of any linguistic information that is read or heard" (p. 336). Executive functions play an essential role in the integration of novel information and are an important component to successfully navigating academic and social situations in which one is expected to remain flexible, disciplined and use sound judgment. As such, Willcutt et al. (2005) conducted a meta-analysis of 83 previous studies that researched the theory of impaired executive function as a cause of ADHD. The analysis included neuroimaging components, and concluded that most of the tasks performed in the studies activated neural networks that include the neocortex. Furthermore, there were significant differences between groups with ADHD and those without the disorder on multiple executive function tasks.

Working memory and information retrieval difficulties. The limbic system is largely responsible for the processing of emotions, and has an important function in the formation of memories (Chapman, 2014; Lusebrink, 2004, 2010). Working memory makes sense of things that happen over time, such as the understanding of cause and effect, and how different scenarios can influence the desired outcome. Bruner (1964) posits that the most important thing about memory is the "retrieval of what is relevant in some useful form, which is dependent on how past experiences are…processed" (p. 2). Chapman (2014; Lusebrink, 2004, 2010) further posit that the hippocampus, a part of the limbic system, is a crucial component of one's ability to integrate short term memory into explicit memory through the processing of emotions. The hippocampus is necessary for processing novel information, transferring that material into long term memory,

and can affect the ability to recall memories and form new ones. Disruptions in typical brain development, which may impact the hippocampus, can result in critical developmental milestones missed, preventing the child from easily accessing content in the future. For example, if a child learning to read experiences a disruption during optimal reading development (such as a brain injury or a speech impediment) and the hippocampus is not able to successfully transfer the learned material into long term memory, trying to retrieve the meaning of a word later in childhood becomes laborious and frustrating. Equally important in the limbic system, that interacts with the neocortex, is the *amygdala*. Fannin & Williams (2012) suggest this brain system is responsible for the fight or flight response and the processing of emotions in order of significance, and is connected to multiple brain systems, including the hippocampus and the neocortex, "where important directions are processed, which directly affects decision making" (p. 17). Given my personal and professional experience, children with ADHD may experience difficulties with retention and retrieval, regardless of the amount of diligent efforts to access the information.

Myelination. An essential biological component of the successful integration of new content is *myelination*, a process in which myelin forms around a neuron or brain cell, permitting communication between neurons to move more quickly. Myelin is made up of insulating fatty sheaths that grow thicker with increased interaction between a particular set of neurons, such as when one practices a musical instrument, or memorizes multiplication facts. The myelin sheaths become thicker and stronger with prolonged use (or daily practice such as playing the violin), with transmissions hopping from node to node. According to Grosswald (2013), myelination increases the speed of information processing and connects the neocortex to parts of the brain

responsible for lower functions such as sensory, movement and emotion. Moreover, increased processing speeds in early childhood are vital to the performance of working memory (Chevalier et al., 2015). If myelin sheaths are damaged, however, transmission of nerve impulses are lowered or blocked and can short-circuit, making processing speeds slower and more sporadic.

Neuroscience and the neocortex. Fuster (2000) posits that *neuronal networks,* the network of cells located within the brain, specifically those of the neocortex, are "highly specific, playing a crucial role in the organization of behavior, speech, and logical reasoning" (p. 72). Moreover, "neurons that fire together wire together" via Hebb's axiom (Siegel, 1999), suggests that brain cells are designed to perform specific functions, such as recalling memories or memorizing multiplication facts. Fuster (2000) posits further that a neocortex experiencing weak neural connections cannot successfully mediate between a specific stimulus, and the expected behavioral response to it, especially if there is a prolonged time lapse. An example is a child who has memorized multiplication facts on a Wednesday in class, has no further exposure to the related material, and on the following Wednesday class cannot recall what was taught. Because of the long time lapse, the weak neuronal connections could not make the necessary connections for the child to successfully integrate the multiplication facts. For children experiencing ongoing difficulty remembering specific academic content, numerous attempts may be made before the neurons wire together that handle this function. Lusebrink (2004) suggests that the neocortex performs the integrative functions of working memory, attention and inhibition, all which rely on strong neuronal network connections in order to successfully navigate executive function tasks.

Given the importance of executive functions and the frustrating implications for many children diagnosed with ADHD, examining a theory that addresses impaired executive function is vital to this study.

Impaired Executive Function As Proposed Etiology of ADHD

In their meta-analysis article, Willcutt et al. (2005) investigated the theory of deficient executive functions as the cause of ADHD. They conclude that executive function weaknesses are significant to the etiology of ADHD, and that executive function difficulties appear to be one of the several important factors that comprise the overall neuropsychology of the disorder. Grosswald (2013) posits that structural impairment of the neocortex is associated with weakness in executive function, which can lead to the symptoms of hyperactivity-impulsivity and inattention, as defined by the American Psychological Association. Safran (2003) suggests that cognitive processing problems interfere with performance in children with ADHD. Henley (1998) posits ADHD is a neurodevelopmental disorder. Fisher, Allen & Rose (1996) further propose that children with learning disabilities, specifically ADHD, have neurological and cognitive difficulties that interfere with academic achievement. According to Bruner (1964), cognitive growth occurs from the outside in and inside out, one continually influencing the other as tasks are engaged in and mastered. Moreover, growth depends upon the proficiency of techniques (such as playing a musical instrument, learning how to walk, becoming fluent in a foreign language, mastering multiplication facts, etc.), and cannot be fully understood without achieving adeptness with what is being learned. Bruner further suggests that any "implement system if it is to be effective, must produce an appropriate internal response that assists in organizing various perceptions about what is being taught" (p. 2). For example, when new art

media was introduced during the intervention, each participant had an internal response that affected the way in which the new medium was approached, which ultimately transformed the way in which the child viewed themselves and their artistic abilities.

Interventions Can Increase Executive Functions

Diamond (2012) proposes that children experiencing the weakest executive functions are the ones who benefit the greatest from an intervention or program, as it can narrow the disparities earlier rather than later in life. Furthermore, encouraging children to master recently learned skill sets is imperative for consistent executive function improvement. Diamond (2012) further suggests that Vygotsky's zone of proximal development, in which adults scaffold children in mastering challenging tasks, can also help to increase executive function. Children who learn and then master a skill, often with the help of an adult (such as first learning the chords on a guitar and then playing a song), develop neural pathways for the given skill set, that become stronger and more permanent with continued practice. Consequently, when children become more proficient in the tasks they undertake, whether it is practicing a math formula, playing a musical instrument, learning a new dance, or engaging in new social situations, information processing can begin to move up the brain's hierarchy to the neocortex. The result is increased executive function (Diamond, 2012). Bolwerk, Maihöfner, Mack-Andric, Lang & Dörfler (2014) conducted a non-clinical sampling of 28 post-retirement adults in a 10-week art intervention study to ascertain the differential effects on the neocortex when actively engaged in a sensory-based art class each week for ten weeks, versus viewing museum art for the same duration. Participants in the cognitive art control group (viewed museum art) and the art production group completed a psychological examination and a fMRI measurement before the

intervention, and immediately following. The results of the study were the first to demonstrate "enhanced functional connectivity of the Default Mode Network, between the parietal and frontal cortices" (p. 2) in the group that produced art each week. The group who did not engage in regular sensory artistic activities displayed no such effects. The Default Mode Network is responsible for monitoring one's behavior as well as episodic and autobiographic memory, both of which are involved in the storage and retrieval of short and long-term memory. *Episodic memory* (Bolwerk et al., 2012) is a person's recollection of a specific event and will be different from another's memory of the same experience. *Autobiographic memory* (Bolwerk et al.) is a memory system that involves episodic memory and recalling general schemas of information as well as more conceptual events. This research has exciting implications for future studies examining children who have difficulties memorizing and retrieving relevant data; functional imaging may further illustrate effects on the brain when engaged in sensory-based artistic activities. Pascual-Leone (2006) also asserts the brain undergoes continuous changes in response to modifications in its input afferents and output targets and that "changes in activity across a distributed neural network may be able to establish new patterns of brain activation and sustain function" (p. 317). This research is important for studies examining the effectiveness of creative explorations on brain plasticity, especially those proposing increased executive function as a result. According to Bruner (1964) increase of executive function "is not a smooth process, but rather occurs in spurts as innovations are adopted, and environmental data is assimilated" (p. 13). This statement further suggests that the more exposure children have to stimulating artistic activities, the higher the likelihood of sustaining the integration of what was learned and intellectual growth.

Expressive Therapy Continuum

Expressive Therapies Continuum is an expressive arts discipline based on a neurobiological hierarchy model which parallels the evolutionary processing of information in the human brain (Czamanski-Cohen, 2016). It is a theoretical art therapy model developed by Kagin & Lusebrink (1978) and is based on the work of Bruner (1964), as well as art therapists' and educators' approaches to art therapy (Hinz, 2009). Lusebrink (2010) proposes each level of the Expressive Therapies Continuum utilizes different functions and structures in the human brain that process visual information, and involves both hemispheres interacting in synchronicity for whole-brain synthesis. According to Malchiodi (2003; Hinz, 2009), information processing moves from the lower to higher structures of the brain as the creative experience becomes more complicated, with each level increasing in complexity. Chapman (2014) proposes that the four levels of the Expressive Therapies Continuum parallel the formation of images in the brain, from the lowest structure of the brain, the brainstem, to the highest, the neocortex. She further posits that this theoretical model embraces a mind/body methodology of healing, through the engagement of sensory-based artistic activities that works through the three levels of the brain sequentially: from the brain stem to the limbic system to the neocortex.

Hinz (2009) suggests that the Expressive Therapies Continuum is used in art therapy as a means of understanding the human psyche and the complexities of information processing and imagery as it unfolds through the creative process. She further explains that recovery organizations, such as Alcoholics Anonymous, utilize aspects of this theoretical model as part of their multi-step program, employing art media to evoke therapeutic results.

Levels of the Expressive Therapies Continuum

The four levels of experience within the Expressive Therapies Continuum are the *kinesthetic/sensory*, *perceptual/affective*, *cognitive/symbolic*, and *creative* (see Figure 2), that correspond to the three parts of the brain: the brainstem, limbic system, and the neocortex.

Level's of the Expressive Therapies Continuum	Brain Systems
Creative	Whole-brain synthesis
Cognitive/Symbolic	Neo-cortex
Perceptual/Affective	Limbic System
Kinisthetic/Sensory	Brainstem

Figure 2. Levels of the Expressive Therapies Continuum and brain systems.

At the kinesthetic/sensory level, exploration of an art form is suggested to stimulate the lowest and least developed brain structure, the brainstem (Hinz, 2009). This is where the least complex form of information processing takes place. The brainstem is responsible for all the autonomic survival functions, and is the seat of motor function, as well as vision and auditory faculties (Chapman, 2014). Chapman also posits that once the kinesthetic/sensory area has been activated, information processing automatically begins moving to the higher structures of the brain. According to Lusebrink (2004), engaging in sensory interactions with art media involves touch and movement which acts as a stimulus for promoting new development. Malchiodi (2003) suggests that interacting with art media in an exploratory way, such as bi-lateral scribbling (Chapman, 2014), encompasses the foundational level of the Expressive Therapies Continuum.

The perceptual/affective level is next on the continuum hierarchy. This includes the limbic system, which consists of the hippocampus, amygdala, and hypothalamus, as well as the

basal ganglia and anterior thalami nuclei (Lusebrink, 2010). Chapman (2014) proposes that the limbic system is responsible for memory formation and emotional discernment. Lusebrink (2004) suggests that emotions are conveyed at this level, which can affect the cognitive ability to recall memories as well as the formation of new ones. Chapman further proposes that at this level, emotions that arise through the creative process can be released, and the individual may become aware of affect (positive or negative), which are the automatic responses to a given stimuli, such as art media. Lusebrink (2010) posits that emotional processing during this level takes place in the amygdala, which has direct connection to the neocortex. According to Fanin & Williams (2012), the amygdala, also known as the fear center, detects all other emotions and processes them in order of their significance. The amygdala plays a major role in the perception, and corresponding response to the emotional process that takes place during this level of the continuum. Hinz (2009) further suggests that our perceptions of art created within this level is greatly influenced by cultural ties, the recognition that we are distinctly different from those around us, and that other's perceptions are different from our own.

Cognitive functions are associated with the cognitive/symbolic level of the Expressive Therapies Continuum. This level involves critical thinking constructs such as understanding cause and effect, problem solving, reasoning, planning, and learning. These higher order functions are controlled by the neocortex or neocortex, which is divided into the left and right hemispheres, and are bridged by the corpus callosum, which permits communication between the two hemispheres. As one engages in the creative process, information moves up the brain's hierarchy to the neocortex, where information is then integrated by the two hemispheres, achieving higher cognitive function.

This component of the continuum is vital in demonstrating the effectiveness of the Expressive Therapies Continuum for moving information processing up the brain's hierarchy, so that it can be translated into some useful form. Increased executive function is consequential in any learning environment, especially to children with neurobiologically based learning disabilities, such as ADHD. Children who engage in sensory-based artistic activities, such as the art intervention discussed in this thesis, can experience improved cognitive ability as a result of increased information integration in the two hemispheres.

Lusebrink (2010) proposes that within the cognitive/symbolic level of the continuum, the neocortex generalizes present circumstances (such as engaging in art), which links to previous experience. She further suggests that cognitive integration of art media and the ability to problem solve lead to the formation of various cognitive concepts which are useful in all other areas, such as social and academic settings. Hinz (2009) proposes that the ability to think critically permits individuals to follow sequential steps in achieving a goal, to make decisions and problem-solve, all which entails components of this level of the Expressive Therapies Continuum. It is during this level that the ability to resolve dilemmas also arise. For example, a child tries to reproduce an intricate design seen in a coloring book. It may take several attempts before the child learns what lines to draw that intersect with others in order to get the desired result. Restructuring of the neocortex through psychotherapeutic interventions (such as art therapy) is also suggested to take place at this level of the continuum (L. Chapman, personal communication, October 28, 2016).

The creative level integrates the totality of the functions of, and connections between all, the levels and is suggested to be a synthesis of the kinesthetic/sensory, perceptual/affective and

cognitive/symbolic levels. Moreover, the creative level permits a deeper understanding of one's creative abilities which can lead to a greater sense of wholeness. Hinz (2009) suggests this level embodies all of the levels of the Expressive Therapies Continuum. She further states that during creative exploration, joy is a spontaneous emotion that comes forth as a result of recognizing one's potentiality.

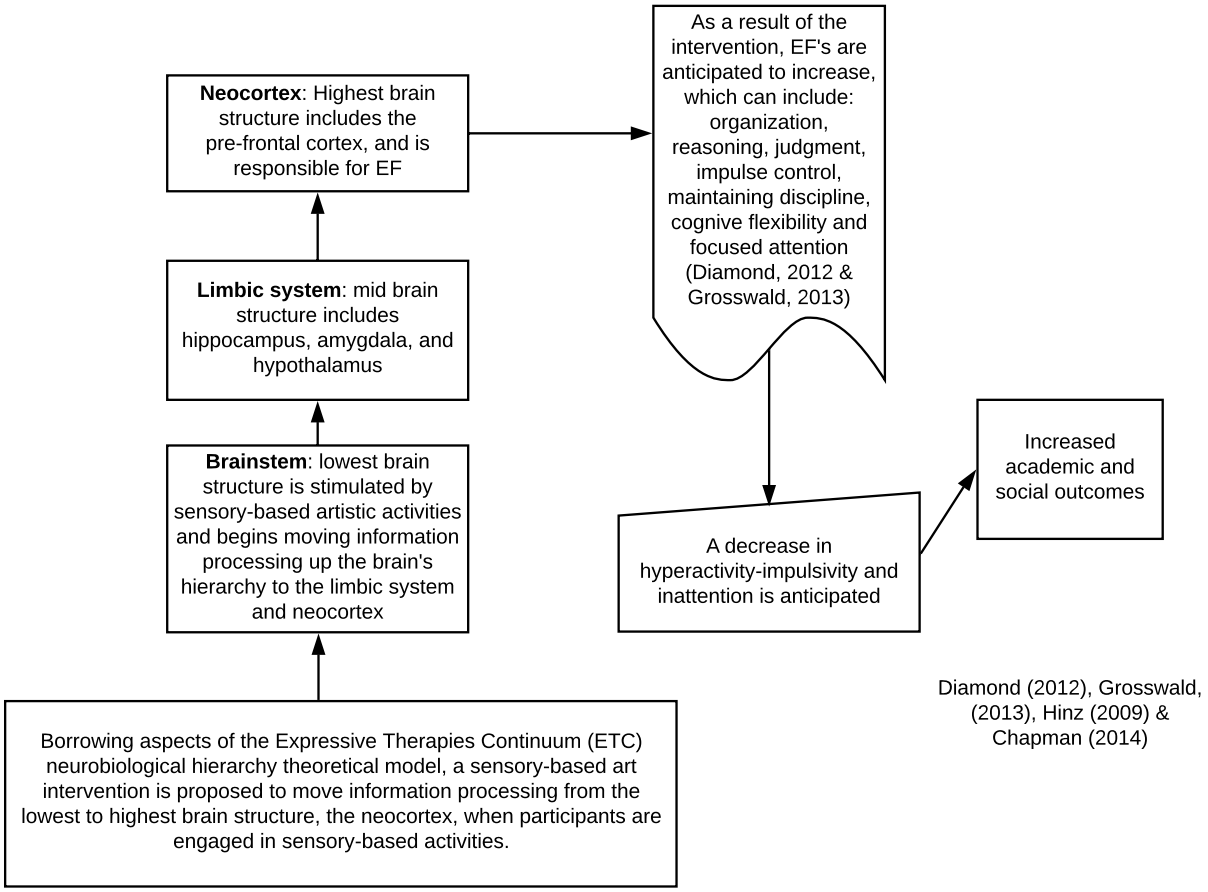

Figure 3. Expressive Therapies Continuum Intervention diagram.

Figure 3 illustrates how participation in the Expressive Therapies Continuum art intervention positively affects the corresponding brain systems: the brainstem, limbic system, and the neocortex, and increases executive function.

Art - and Sensory-Based Interventions

Therapeutic benefits. According to Henley (1998), artistic endeavors enhance cognitive functioning as the child attempts to solve problems within the creative process, all of which require planning and experimentation. Czamanski-Cohen (2016) posits that the artistic process taps into individual strengths and allows greater embodiment, which leads to a solid sense of self. Lusebrink (2010) posits that understanding how the Expressive Therapies Continuum works can enhance further studies utilizing art as an intervention and its effect on the human brain.

Research on artistic approaches and the therapeutic effect they have on the mind and body suggest that it is valuable for healing many different symptoms (Czamanski-Cohen, 2016). Forrest-Bank, Nicotera, Bassett & Ferrarone (2016) posit that the creative process involved in art making is life-enhancing and healing on many levels. They suggest that it increases positive academic, social and behavioral outcomes. Czmanski-Cohen (2016) further suggests that the body-mind processes that emerge through art therapy help to integrate and reorganize aspects of the self, and are consistent with the "non-Cartesian framework of the Expressive Therapies Continuum, in which the body and mind are not viewed as separate and opposite entities" (p. 2). The holistic brain-mind-body is the origin of the self according to Schore (2005). Noblin & Conrad (2004) assert that artistic activities provide a sense of body awareness for children which is integral to the development of self, as each child has a unique experience of themselves through their own body and senses. Sawyer (2012) proposes that creative activities are the fullest realization of the human experience and contribute to one's psychological health. Diamond (2012) suggests that harnessing children's passionate interests, such as a creative art

intervention, leads to positive development and greater academic success, and that children devote time and energy to things they love. Lusebrink (2004) further posits that interaction with art media stimulates new development.

Whenever artistic activities are utilized for educating children, there is always the possibility one medium will not be as effective at maintaining prolonged attention as another. This can be due to several factors, such as the child's maturity level, how loud and interactive the environment is, and the child's ability to function in the setting, sensory-motor delays, the challenge or difficulty of the artistic medium, as well as how enjoyable the activity is. In essence, the more pleasurable the child finds the artistic activity and the safer the child feels in the environment, the more engaged the child will remain in the creative process. Moreover, Hinz (2009; Malchiodi, 2003) further suggests that for an Expressive Therapies Continuum intervention to be effective at moving information processing up the brain's hierarchy to the neocortex, sensory-based art activities should challenge the individual. As such, due to the short attention span and varying degrees of hyperactivity-impulsivity of each participant in the study, it was imperative to the success of the intervention that the activities were highly engaging, challenging, interactive and fun.

Academic and social benefits. Recent research on visual art has focused on its psychological and physiological effects, such as reducing stress, altering behaviors and thinking patterns (Bolwerk et al. 2014). Furthermore, Henley (1998) posits that artistic endeavors enhance cognitive abilities because they require the child to solve problems, "an undertaking which requires planning, experimentation and communion of personally relevant subject matter" (p. 8). Providing children the opportunity to engage in creative pursuits permits creating

projects which encourages problem-solving skills and higher order thinking while fostering positive self-efficacy and perseverance. Ziff (2012) suggests that creative arts can reduce stress in children experiencing cognitive delays and is a source of relaxation which supports learning outcomes. Ziff posits further that the more resistive mediums such a collage work increases the understanding of cause and effect and aids in the development of problem-solving skills. Bolwerk et al. (2014) suggest that visual art interventions have stabilizing effects on an individual by altering behaviors and thinking patterns. Hoffman (2016) proposes that engaging in creative arts helps children develop pro-social attitudes and develop empathy towards others, through navigating unfamiliar social situations and environments. Douglas & Jaquith (2009) as cited in Ziff , Pierce, Johansen & King (2012), propose that art making can be a support to classroom instruction and that "choice-based art builds problem-solving skills, working habits, reflecting, connecting, constructing knowledge and assists in problem finding" (p. 110). As such, providing children a choice of artistic media promotes efficacy and opportunities to make meaningful connections to the content. Czmanski-Cohen (2016) proposes that the experience of tactile engagement with art materials is cognitively arousing and requires prolonged attention, which is vital to helping with the inattentive and hyperactive-impulsive behaviors of ADHD. Ziff (2010) further suggests that children who engage in sensory-based expressions can control inappropriate behaviors as times goes on.

Sensory-Based Artistic Activities Versus Cognitive Behavioral Treatments

Cognitive Behavior Therapy is a widely utilized form of verbal or talk therapy in mainstream medicine that teaches skills or coping methods to children for handling their ADHD or associated difficulties (Van der Oord et al. 2012). For example, a child diagnosed with the

hyperactivity presentation of the disorder may not be able to sit for long periods of time. Cognitive Behavior Therapy may teach skills the child can employ to assist the child in controlling this behavior. Verbal therapies are utilized in many healing professions, but some children, especially those with behaviors stemming from neurodevelopment or neurobiological complications, may require a more hands-on approach to healing. Chesley, Gillett & Wagner (2008) as cited in Wilson & Ziomek-Daigle (2013) further suggest that not all children can express themselves through verbal methods alone. As such, when my youngest child experienced ongoing negative affect from a car accident, Cognitive Behavior Therapy was recommended. After a year of attending verbal therapy, however, symptoms had worsened, which led to seeking alternative means of healing. After twelve sessions with a licensed play therapist who utilizes the Expressive Therapies Continuum theoretical model, my son's debilitating anxiety dissipated, even with daily exposure to the accident site.

According to Czamnsi-Cohen (2016), Lusebrink's work laid the foundation of how neurobiological activity is impacted when employing the Expressive Therapies Continuum theoretical model. As such, conducting a study through this theoretical framework is significant to understanding why artistic activities have such a healing effect, as well as how they impact executive function and the behaviors associated with ADHD.

In the next chapter, the methods are discussed: procedures and measures used in the study, as well as the observations of the boys before, during and after the study. Analysis of the data is also presented. This Expressive Therapies Continuum intervention is an experiential case study studying the effects sensory-based art activities upon three non-medicated 6th to 8th-grade boys diagnosed with ADHD.

Chapter 4

Methods

The purpose of this case study is to examine the effects of a sensory-based art intervention on inattention and hyperactivity-impulsivity behaviors in three non-medicated 6th to 8th-grade boys with ADHD. Using an art intervention approach informed by the Expressive Therapies Continuum (Chapman, 2014; Hinz,2009; Lusebrink, 2004; 2010), three non-medicated boys with ADHD engaged in sensory-based activities over a 5-week time period.

This chapter describes the procedures and measures used in the study. Observations of the boys were conducted before, during and after the study by parents, trained observers and myself.

Recruitment

The Sonoma State University Institutional Review Board approved the petition to conduct the study (Appendix C) via email on March 17, 2017 (Appendix D). Advertising for the study began three weeks before the start of the intervention through Pursuing Academic Choices Together private Facebook page for families attending the academy, and through weekly emails with the recruitment flyer (Appendix E) attached. Details of the research were described in detail, as well as the proposed benefits. Additionally, the same flyer was posted on the front door of the school, and three 2-hour informal meetings were held at the Maestro coffee shop in Natomas, California, where parents could drop in and ask me questions about the study before deciding to participate. The deadline for signups was April 12, 2017. Six boys expressed interest in participating in the study. However, only four met the criteria of a medical diagnosis of ADHD.

All participants were recruited before the start of the case study. The volunteer participants met with me prior to the study during private, individual, face-to-face meetings at the Pursuing Academic Choices Together academy, along with one of their parents. The proposed study and interventions were described in detail, and during each private meeting, the parent of each child signed the Informed Consent (Appendix F). Each participant signed the Minor Assent (Appendix G) with his parent present, acknowledging their involvement in the study and the right to withdraw at any time.

After I met with all the participants and their parents, an email was sent (Appendix H) outlining the pertinent details of the study: dates and times of the Expressive Therapies Continuum intervention, drop-off and pick-up times, as well as suggestions of clothing to wear. Included in the email was the Parental Behavioral Checklist.

The 5-week Expressive Therapies Continuum (Appendix I) intervention began on May 3, 2017, and concluded on June 7, 2017, with art sessions held from 4:00 to 5:30 pm every Monday and Wednesday. The art sessions took place at the Pursuing Academic Choices Together academy's art room in Natomas, California.

Each participant in the study attended the Pursuing Academic Choices Together academy, a campus-based homeschooling program through Natomas Charter School in Natomas, California. One of five schools in the charter, the academy provides an alternative learning environment for children with exceptional academic abilities or unique educational needs that have been unmet in mainstream education. Each family is assigned an academic counselor who assists the parents in choosing or developing curricula that best educates the child given their learning style. Additionally, children can attend campus-based enrichment classes as part of their

overall educational experience. Each of the participants regularly attended campus-based enrichment classes at the Pursuing Academic Choices Together, such as dance, Minecraft, and coding, as well as a middle school program held two full days a week.

Participants

Participants recruited for this study were three non-medicated 6th to 8th-grade boys with an official medical diagnosis of ADHD. Each participant is between the ages of 12 and 14. Two participants live with both their biological parents, another child comes from a single parent home, and the fourth is from a blended family. Two families participating in the study are from an upper middle-class economic status. Two of the participants are the only child in their family.

Subject Mortality

In any research study, there is a potential of losing participants due to unforeseen circumstances that were previously unaccounted for; this is referred to as attrition or subject mortality. Loss of participants can be attributed to many different factors, such as moving away, no longer wanting to participate in the study, a death in the family, or in some cases, being asked to leave a study because a variable had not been disclosed to the researcher before the start of the study.

Four participants were recruited to participate in the case study. Two weeks into the intervention, however, one of the participants was removed because I was not informed that the child was being heavily medicated for an anxiety disorder. Permitting the child to continue with the intervention would have skewed the data collected, since none of the other participants were being treated for the same condition. The three remaining participants completed the 5-week sensory-based art intervention. Data is reported for these three participants.

Measures

Parental behavioral checklist. The Parental Behavioral Checklist (Appendix J) captures how many times inattentive and hyperactive-impulsive behaviors are observed daily by one parent of each participant (see Figure 4). The Parental Behavioral Checklist items were modified from the National Institute for Children's Health Quality, Vanderbilt Assessment Scale, a leading diagnostic tool utilized by medical professionals for ADHD assessments. Becker, Langberg, Vaughn & Epstein (2013) reported the clinical reliability of the Vanderbilt Assessment Scale in diagnosing children with ADHD and found it to have "good internal consistency, factor structure, and concurrent validity for the assessment of ADHD" (p. 3). The Parental Behavioral Checklist rates the frequency of 17 specific inattention and hyperactivity-impulsivity observed behaviors, from *once daily*, *2-3 times daily*, or *4 or more times daily*.

The measure was sent to one parent of each participant prior to the intervention via email, with instructions on how to fill out the checklist, and how to return it to me.

Parental Behavioral Checklist

Rater Name: _____

Child's Name: _____

Date: _____ PC#____

Pre-intervention_____ Post-intervention_____

Instructions: Answer how frequently your child displays the following behaviors by placing a checkmark next to each question.

Behaviors	Once daily	2-3 times daily	4 or more times daily
1. Easily organizes tasks.			
2. Makes careless mistakes with homework. Example: proficient in math concepts but has multiple errors on homework assignments.			
3. Has difficulty keeping attention to the task at hand.			
4. Enjoys tasks that require ongoing mental effort.			
5. Fails to finish activities, not due to refusal or failure to understand. Example: Starts to gather items for school but does not complete the task.			
6. Does not follow through when given directions, not due to refusal or failure to understand. Example: When given multi-step directions follows only one or two steps.			
7. Enjoys engaging in quiet solo activities.			
8. Avoids tasks requiring prolonged mental effort.			
9. Is easily distractible (cannot block out extemporaneous sounds or activities). Example: Attends to dogs barking, TV, noises from back of house, conversation, outside activity.			
10. Is forgetful in daily activities.			
11. Fidgets with hands.			
12. Squirms in seat. Example: Changes position multiple times when doing homework.			
13. Has difficulty organizing tasks and activities.			
14. Leaves seat when remaining seated is expected.			
15. Quiet solo play is difficult.			
16. Blurts out answers before questions have been completed.			
17. Interrupts others' conversations.			

Figure 4. Parental Behavioral Checklist.

Behavioral checklist. The Behavioral Checklist (Appendix K) (see Figure 5) is a summative frequency measure of hyperactive-impulsive and inattentive behaviors. It was used by six trained observers and myself during naturalistic observations of each participant during regular classroom instruction. The checklist contains nine specific inattentive and hyperactive-impulsive behaviors. In addition observers rate the level of activity during the classroom observations. This was to determine if classroom activity levels were associated with observed behaviors. For example, if Participant 2 was attending a cooking class and the activity level was high (loud noises, lots of social interaction and having fun), I wanted to ascertain if there would be a decrease in inattention and hyperactivity-impulsivity behaviors due to sustained attention on engaging in something pleasurable, or if there would be an increase in behaviors.

Behavioral Checklist for boys with ADHD

Rater Name: _____

Child's Name: _____

__(1) Ob # 1 __ (2) Ob # 2 __(3) Ob # 3 __(4) Ob # 4 __(5) Ob # 5 __(6) Ob # 6

Date _____ 10 Minute Observation Time Begin: _____End: _____

Directions:

1) Mark which observation you are conducting (#1, #2, etc.)

2) Using the rating scale below, place a mark on the line that best reflects the level of *activity in the classroom* at the time of the observation. **Very active -** classroom is loud and noisy with students actively engaged in group activities. **Not very active -** classroom is quiet with students engaged in independent work or teacher led instruction.

Very active ____ ____ ____ ____ ____ ____ ____ Not very active
7 6 5 4 3 2 1

3) Each observation has a total duration of 10 minutes. Do not go over the 10 minutes. Each observation will be broken down into 5 two-minute intervals; you will place a [/] next to each time the child exhibits the behavior. For example, if the child stares off into space during an entire two-minute observation you would place 1 [/] next to that behavior. If the child continues to stare off into space during each of the 5 two-minute intervals he would receive 5 [/] total.

If the child does not exhibit any of the behaviors leave the checklist blank and state, "No behaviors observed" next to the child's name.
Numbers 2 & 3 are specific behaviors I am observing; if the child exhibits other behaviors that are not listed, hand write them on numbers 4 & 5.

4) Fill in the date, and what time the 10 minute observation began.

5) Fill in observation end time.

6) Place this form in a sealed envelope with "Danyae Spada-Chassé" on the front and give it to the front desk person to place in my mailbox.

Behaviors Observed:

1. Stares into space	
2. Wants to use the bathroom or get a drink	
3. Looks at peers for directives	
4. Avoids task at hand_____	
5. Avoids task at hand:_____	
6. Fidgets with hands	
7. Squirms in seat	
8. Leaves seat	
9. Disrupts peers	

Figure 5. Behavioral Checklist

Field Notes

Field notes were recorded on my iPad during each of the ten Expressive Therapies Continuum art sessions, as a way of capturing subjective impressions of the participants, and for referencing later on. The notes included behaviors that surprised me, any incidences that arose between the participants, artistic media the participants were drawn to, those the participants did not like, and the level of engagement with different art media. For example, participants 1 and 3 spent every art session engaging in perler beads during free-art time, versus participant 2 who preferred to work with drawing and clay. These notes were taken throughout the entire art session.

Observer Training

Six observers were recruited from the Natomas Charter School to conduct naturalistic observations utilizing the Behavioral Checklist. Two were teachers who worked at the Pursuing Academic Choices Together academy, three were parents of children who attended the school, and another educator came from one of the other campuses within the Charter School. Observers were chosen that the participants were familiar with, yet who had no personal or educational connection to the participants.

Each observer was individually trained by me on how to fill out the Behavioral Checklist before the study began; including the date, participant code number, rater name, observation number, and the beginning and ending time, as well as being discreet to lessen the potentiality of observer effect. Observer effect can result when subjects being observed focus on the observer's presence instead of naturally engaging in the activity at hand (Fraenkel, Wallen & Hyun, 2012).

Behavioral checklist observations. The trained observers and I conducted twelve classroom behavioral observations of each participant using the Behavioral Checklist. The observers conducted six observations, and I conducted six, for a total of 12 observations for each participant. Each observation lasted 10 minutes and was broken into five 2-minute intervals. Two observations were conducted before the start of the intervention (pre-intervention), eight observations were conducted during the intervention, and two were conducted immediately following (post-intervention).

Each observation lasted 10 minutes, with behaviors recorded every 2 minutes. Recording data in this way provided a consistent means for all trained observers and myself for documenting behaviors, eliminating the possibility of over- or under-reporting behaviors. For example, if during the first 2 minutes of an observation a participated fidgeted with their hands five times, they received five tallies for that 2-minute interval. If there were no other observed instances of fidgeting for the remainder of the observation, the remaining intervals were left blank. If that same participant disrupted their fellow peers eight different times throughout the observation, those instances would be recorded under the interval in which they were seen. If other behaviors not already listed were witnessed during the observation, they were recorded under items 4 and 5 of the checklist.

At the conclusion of the observation, the ending time was recorded. The checklist was placed in an envelope, sealed, and with the word Confidential written on the front and placed in my mailbox behind the front counter of the school. They were collected at the end of each day.

Pairing observers with participants. Given the unique homeschooling environment at the Pursuing Academic Choices Together, each participant attended classes at various days and

times each week. Each participant was paired with multiple observers who could conduct an observation during a time both the participant and the observer were on campus. For example, Participant 2 attended the following classes each week: Taekwondo, violin, Minecraft, computer coding, comic book design, debate and amusement park design. Depending on the day and time the class was held, one of the six trained observers was assigned to a different class over the course of the study to observe behaviors in various classroom settings, at varied times and activity levels, to capture a diverse range of data.

Procedures

Parental behavioral checklist observations. The Parental Behavioral Checklist was filled out by one parent of each participant prior to the start of the intervention to establish a baseline of observed behaviors at home. This is the pre-intervention measurement of hyperactive-impulsive and inattentive behaviors. At the end of the 5-week intervention, the Parental Behavioral Checklist was filled out a second time by the same parent. This is the post-intervention measurement of hyperactive-impulsive and inattentive behaviors.

Expressive therapies continuum intervention. Each Expressive Therapies Continuum intervention consisted of the following activities, in order: a 5-minute bilateral scribbling (Appendix L) warm-up exercise, a 30-minute structured group artistic activity, some form of exercise, deep breathing, a small break, and 45 minutes working either independently or with peers in some form of free-art exploration. Each activity is described below.

On the first day of the intervention, a brief overview of the brain and the systems impacted by sensory-based activities was introduced to the participants. This mini-lesson provided a foundation for the participants in the intervention. Next, the four participants were

asked to create a set of mutually agreed upon rules for the ten-session intervention. These included being respectful to one another and remaining quiet while I was giving instructions. It was important to me that each participant felt safe to explore artistic activities in a nurturing and nonjudgmental environment. Noblin & Conrad (2004) posit that, "children learn the value of respecting each other…by following mutually agreed upon rules…that originate from their ideas" (p. 11). Therefore, establishing rules of expected behavior that the participants collaborated upon was consequential in maintaining a safe space for each participant.

Participants were expected to engage in the intervention without using their cell phones. However, electronic devices have become so habitual that children have difficulty separating from them. As such, during the first art session, every participant was repeatedly using cell phones. When the devices were taken away at the beginning of the second intervention, however, one participant had heightened anxiety levels at not having immediate access to the phone. Each week as the participants handed over their phones, there was a greater sense of freedom and not needing the device to feel secure. By the end of the intervention, each of the participants readily engaged in the artistic activities in front of them instead of being so pre-engaged with their electronic devices.

Bilateral scribbling. Bilateral scribbling (Chapman, 2014) is a sensory-based activity where both hands are used simultaneously, drawing scribbles (lines and circles) on a sheet of paper with markers. This was a warm-up activity for preparing the participants for the art intervention. It is proposed to activate body sensations and lower structures of the brain (Chapman, 2014; Hinz, 2009).

After this exercise was introduced and demonstrated by myself, the participants requested they take turns leading this warm-up activity while the others followed along. Noblin & Conrad (2004) suggest that providing activities where children can be a group leader offers opportunities to become successful members of groups. As such, providing the chance for each participant to lead the others in the bilateral scribbling activity appears to have readied the participants for the upcoming intervention activities and brought a cohesiveness to the group.

Structured group artistic activity. In this 30-minute period, I presented a new artistic media that all the participants engaged in as a group. Examples include making salt dough or decorating initials. This provided the opportunity for experimentation with various artistic tools under my supervision. Half an hour is suggested to the minimum time period for students to have a satisfying artistic experience (Ziff, Pierce, Johansson & King, 2012).

Physical activity. Immediately following the structured art group activity, participants engaged in a physical activity led by myself. Given the sustained attention that was expected of the participants during the art session, this provided an outlet for the boys to release pent-up energy in a safe and structured way. As such, I walked the boys through the same physical exercise that crossed over the center of the body, which involved crossing the left leg over the right leg while intertwining the left and right arms and simultaneously interlacing the fingers. This exercise was an efficient way for the participants to expel excess energy in a fun and safe way.

Deep Breathing. Participants were led by me through a deep breathing exercise which consisted of closing the left nostril for 4 seconds, holding their breath for 4 seconds, then pressing the right nostril while breathing out of the left nostril for 4 seconds. The same process

was repeated for the right nostril. The sequence was repeated four times. The deep breathing technique was utilized to assist the participants in maintaining attention and reducing hyperactive behaviors (Van der Oord, Bögels, Peijnenburg, 2012).

The participants were given a 5 minute break to use the facilities and get a drink of water before continuing with the intervention.

Free art exploration. During the 45 minute free art time, participants were given the choice of continuing to work with the art medium from the structured art activity, or choosing one of the other sensory-based stations. Some art activities included: perler melting beads, painting birdhouses, painting by numbers, drawing and tracing, stamping, painting, creating and coloring mandalas, working with clay, making items with a rainbow loom, and origami.

Two warnings of time left for artistic exploration were given to the participants; the first after 35 minutes and the second after 40 minutes. After 45 minutes, I instructed the participants to begin cleaning up and placing whatever project they were working on in their designated cupboard, explaining that whatever was left unfinished could be completed at the next art session. After that, I assisted the participants in cleaning up each art station, putting away the supplies for the following intervention session and rearranging the classroom for the next day's morning activities.

Data Analysis

Parental behavioral checklist. Each of the 17 items of the Parental Behavioral Checklist was assigned a score of 1 (once daily), 2 (2-3 times daily), or 3 (4 or more times daily). Items 1, 4 and 7 were reversed scored. High scores on an item indicate higher levels of inattention and hyperactivity-impulsivity, while low scores indicate lower levels.

Scores were reported for each of the 17 items for each participant pre- and post-intervention. The items scores for each participant were then averaged for a mean pre- and post-intervention level of observed inattention and hyperactivity. Items with an NA indicate the parent did not answer the question. These items were omitted from the analysis.

Items 11, 12, and 17 were grouped into a Hyperactivity-Impulsivity Behaviors Scale, and the mean scores across participants were reported pre- and post-intervention. The Hyperactivity-Impulsivity scale includes the items “Fidgets with hands," “Squirms in seat," and “Interrupts other’s conversations." Items 2, 3, 9, 10 and 13 were grouped into an Inattention Behaviors Scale, and the mean score across participants were reported pre- and post-intervention. The Inattention scale includes the items “Makes careless mistakes with homework," “Difficulty keeping attention to the task at hand," “Easily distractible," “Forgetful in daily activities," and “Difficulty organizing tasks and activities."

Behavioral checklist. Frequency scores from the nine items were separated into Time 1 (1st and 2nd observations) and Time 2 (5th and 6th observations). Mean values at Time 1 and Time 2 were computed for each participant across observers. Finally, mean values for each item were computed at Time 1 and Time 2.

Items 6, 7 and 9 were grouped into a Hyperactivity-Impulsivity Behaviors Scale, and the mean score across participants was reported at Time 1 and Time 2. The Hyperactivity-Impulsivity scale includes the items “Fidgets with hands," “Squirms in seat," and “Disrupts peers.” Item 1 “Stares into space” was the only inattentive behavior from the checklist and therefore could not be placed into an Inattentive Behaviors Scale. Activity level was averaged

for each participant across observers at Time 1 and Time 2. Finally, mean item values were compared with mean activity levels.

Missing Data

Participant 1 had three questions from the pre-intervention Parental Behavioral Checklist that were not answered by the parent and two from the post-intervention checklist. Participant 3 had two questions from the post-intervention Parental Behavioral Checklist that were not answered by the parent. Participant 2 was not in classes during the first round of observations. Participant 3 was on a school science trip during the fourth week of observations and missed one art intervention session.

Participant Narratives

Information from the Field Notes is used to construct a narrative description of each participant's experiences in the 5-week intervention. Scores from the Parental Behavioral Checklist and the observer's Behavioral Checklist are used to support the narrative and provide quantitative evidence for behaviors.

Data Management

All pertinent paperwork for the participants and their parents were placed in a binder and stored in a locked filing cabinet in my home office at all times. The names of all parties were changed to ensure their identities and pertinent information remains anonymous and confidential.

In the next chapter, analysis of the data are organized by Participant, which lends greater comprehension of the results from the case study. This Expressive Therapies Continuum intervention is an experiential case study studying the effects sensory-based art activities upon three non-medicated 6th to 8th-grade boys diagnosed with ADHD.

Chapter 5

Results

The purpose of this case study is to examine the effects of a sensory-based art intervention on inattention and hyperactivity-impulsivity behaviors in three non-medicated 6th to 8th-grade boys with ADHD. This chapter examines the data that was gathered prior (pre-intervention), during, and immediately following (post-intervention) the five-week sensory-based art intervention.

Participant 1

Field notes. During the naturalistic observations, Participant 1exhibited great difficulty staying focused during any class in which the teacher was present but not formally teaching, such as Minecraft. Most inattentive and hyperactive-impulsive behaviors were reported when the participant had to wait for the teacher's help. Contrastingly, in classroom settings where there was one-on-one instruction, such as violin or drawing, the participant exhibited significantly less inattentive and hyperactive-impulsive behaviors, because there were fewer students and more direct instruction. When the classroom environment was very active, such as Taekowndo, the participant exhibited the most inattentive behaviors that were off-task, such as playing with the mat when the teacher was helping one of the many other students, or providing instructions on the next move.

Art intervention. Participant 1 was the most impulsive and least attentive of the three participants in the study, and consistently started new projects during the two warnings for cleanup. However, once it was established that projects would be placed in the cupboard for the next intervention, and could not be taken home, this impulsive behavior decreased. The

participant constantly pushed boundaries to see what he could get away with, such as playing on the cell phone under the table during the first art session. Because of this, I requested the phone at the beginning of each art session; by the fifth art session, the child voluntarily handed me the phone, without hesitation. The participant consistently chose to paint bird houses with gaming motifs, and perler melting beads as free-art activities. On two separate occasions, the participant asked me to pick up different colors of glow-in-the-dark perler beads to be used for different projects. When I showed up with beads as requested, the child appeared utterly amazed that the request had been fulfilled, and his demeanor became more confident and less hyperactive-impulsive (see Table 1).

Parental behavioral checklist. Each of the 17 items from the Parental Behavioral Checklist was assigned a score of 1 (once daily), 2 (2-3 times daily), or 3 (4 or more times daily). Items 1, 4 and 7 were reverse scored. High scores on an item indicate higher levels of inattention and hyperactivity-impulsivity, while low scores indicate lower levels.

Table 2 shows the differences in parent's observations of at-home inattention and hyperactive-impulsive behaviors from the Parental Behavioral Checklist pre- and post-intervention for Participant 1 (see Table 2).

The slight increases in inattentive & hyperactive-impulsive behavior were:

- Item 9, "Is easily distractible"
- Item 7, "Not enjoying quiet solo activities"
- Item 6, "Does not follow through"

Table 1

Participant 1, Structured and Free-Art Activity Scores

Structured Artistic Activities	Interest Level from 1-10
Clay Art (Create something meaningful to them)	5
Draw Initials with various art media (markers, oil pastels)	8
Paint Clay items	9
Create Salt Dough	8
Paint Various Styles of Bird Houses	10
Choose Pictures for Collage Work	7
Create Collages	9
Decorate Body Image on Large Paper	10
Decorate Picture Frames	7

Free-Art Activities	0-10	Comments
Perler Melting Beads	10	Consistently chose this activity, Very Engaged
Painting Birdhouses	10	Painted multiple bird houses using themes, Very Engaged
Paint By Numbers	9	Very Engaged
Origami	0	Never Tried
Rainbow Loom	0	Never Tried
Stained Glass Coloring Books	4	Lost Interest after 8 minutes
Coloring Mandalas	5	Lost interest after 6.5 minutes
Drawing	1	Low Interest
Creating With Clay	5	Used hands to roll pieces of clay into long shapes
Stamping	1	Low Interet
Foam Shapes	0	Never Tried
Creating with Various Mediums (oil pastels, pencils, paint)	7	Stayed with activities for 15 minutes, however lost interest quickly with various mediums

The slight decreases in inattentive & hyperactive-impulsive behavior were:

- Item 17, “Interrupting others’ conversations”
- Item 16, “Blurting out answers”
- Item 14, “Leaves seat”
- Item 13, “Has difficulty organizing tasks and activities”
- Item 12, “Squirms in seat”
- Item 3, “Has difficulty maintaining attention”

All other behaviors remained relatively constant. The mean difference in all behaviors pre- and post-intervention is 0.36 for Participant 1. This shows support for a slight decrease in inattentive and hyperactive-impulsive behaviors over the course of the study.

Behavioral checklist. Scores from the nine items were separated into Time 1 (1st and 2nd observations) and Time 2 (5th and 6th observations). Observations for each item for each participant were summed for Time 1 and Time 2. Mean values at Time 1 and Time 2 were computed for each participant.

Table 3 shows the mean scores from the Behavioral Checklist for Time 1 & Time 2 for Participant 1 (see Table 3). The slight increase in inattentive & hyperactive-impulsive behavior was:

- Item 8, “Leaves seat”

The high increase in inattentive & hyperactive-impulsive behavior was:

- Item 6, “Fidgets with hands”

The slight inattentive & hyperactive-impulsive decreases in behavior were:

- Item 3, “Looks at peers for directives”

- Item 4, “Avoids task at hand”

The moderate decrease in inattentive & hyperactive-impulsive behavior was:

- Item 9, “Disruptive to peers”

The high decrease in inattentive & hyperactive-impulsive behavior was:

- Item 7, “Squirms in seat”

Table 2

Participant 1, Parental Behavior Checklist Item Scores, Pre- and Post-Intervention

Item	Pre-Intervention	Post-Intervention	Difference
1	NA	NA	0
2	2	2	0
3	3	2	1
4	NA	3	0
5	2	2	0
6	2	3	-1
7	1	2	-1
8	2	2	0
9	2	3	-1
10	2	2	0
11	2	2	0
12	3	2	1
13	3	2	1
14	3	2	1
15	NA	NA	0
16	3	1	2
17	3	1	2
Mean	2.36	2.0	0.36

Note: NA= item not answered on checklist.

All other behaviors remained comparably constant. The mean difference from Time 1 & Time 2 was 1.44, indicating a slight average decrease in hyperactive-impulsive and inattentive behaviors for Participant 1.

Table 3

Participant 1, Behavior Checklist Items Mean Scores, Time 1 and Time 2

Item	Description	Time 1	Time 2	Difference
1	Stares into space	0	0	0
2	Wants to use the bathroom or get a drink	0	0	0
3	Looks at peers for directives	3	0	3
4	Avoids task at hand	5	1	4
5	Avoids task at hand	3	3	0
6	Fidgets with hands	7	16	-9
7	Squirms in seat	12	1	11
8	Leaves seat	0	3	-3
9	Disrupts peers	8	1	7
Mean		4.22	2.78	1.44

Participant 2

Field notes. Participant 2 was observed in jazz dance classes each week throughout the duration of the intervention. Throughout these highly engaging and active learning environments, the participant was consistently focused, with no reported inattentive and hyperactive-impulsive behaviors, except when the teacher was teaching a new dance move, helping another student, or providing instructions. For example, when the teacher was not actively engaging the students by practicing the dance routine, I reported multiple fidgeting and

squirming behaviors. Additionally, the hyperactive behavior that received the most tallies was dancing in place when not instructed.

Art intervention. Participant 2 was the quietest and calmest of the three participants in the study, and enjoyed participating in conversations with the other two boys if it was a topic that he had an interest in. Otherwise, the participant was frequently aloof, and at times quarrelsome, if one of the other participants expressed a differing opinion about a topic, which created tension among the participants. The participant was emotional when first coming to each art intervention, and appeared to enjoy the companionship of the two other participants until the free-art portion of the intervention. Thereafter, the participant became introverted and did not want to engage in conversations, but instead, enjoyed working independently with clay and drawing free-hand things that were personally consequential. The participant greatly disliked the wet salt dough structured art activity, in which the participant's hands got very sticky and gooey (see Table 4) This could be due in part to a tactile-delay or a propensity towards obsessive-compulsive tendencies.

Parental behavioral checklist. Each of the 17 items from the Parental Behavioral Checklist was a signed a score of 1 (once daily), 2 (2-3 times daily), or 3 (4 or more times daily). Items 1, 4 and 7 were reverse scored. High scores on an item indicate higher levels of inattention and hyperactivity-impulsivity, while low scores indicate lower levels.

Table 5 shows the differences in parent's observations of at-home inattention and hyperactive-impulsive behaviors from the Parental Behavioral Checklist pre- and post-intervention for Participant 2 (see Table 5). The slight increases in inattentive & hyperactive-impulsive behavior were:

Table 4

Participant 2, Structured and Free-Art Activity Scores

Structured Artistic Activities	Interest Level from 1-10
Clay Art (Create something meaningful to them)	8
Draw Initials with various art media (markers, oil pastels)	5
Paint Clay items	5
Create Salt Dough	3
Paint Various Styles of Bird Houses	1
Choose Pictures for Collage Work	6
Create Collages	8
Decorate Body Image on Large Paper	10
Decorate Picture Frames	7

Free-Art Activities	0-10	Comments
Perler Melting Beads	1	Low Interest
Painting Birdhouses	1	Low Interest
Paint By Numbers	1	Low Interest
Origami	0	Never Tried
Rainbow Loom	0	Never Tried
Stained Glass Coloring Books	0	Never Tried
Coloring Mandalas	1	Low Interest
Drawing	8	Very Engaged
Creating With Clay	8	Very Engaged
Stamping	2	Lost Interest Quickly
Foam Shapes	2	Lost Interest Quickly
Creating with Various Mediums (oil pastels, pencils, paint)	5	Enjoyed Experimenting With Charcoal Pencils on Canvas, Tracing Images

- Item 17, “Interrupting others’ conversations”

- Item 13, “Difficulty organizing tasks and activities"
- Item 8, “Avoiding tasks requiring prolonged mental effort"
- Item 7, “Not enjoying quiet solo activities"
- Item 2, “Making careless mistakes with homework”

All other behaviors remained constant. The mean difference in all behaviors pre-and post-intervention is -0.29 for Participant 2, signifying that inattentive and hyperactive-impulsive behaviors showed a slight increase over the study.

Table 5

Participant 2, Parental Behavior Checklist Item Scores, Pre- and Post-Intervention

Item	Pre-Intervention	Post-Intervention	Difference
1	3	3	0
2	2	3	-1
3	3	3	0
4	3	3	0
5	3	3	0
6	3	3	0
7	2	3	-1
8	2	3	-1
9	3	3	0
10	3	3	0
11	2	2	0
12	2	2	0
13	2	3	-1
14	2	2	0
15	1	1	0
16	2	2	0
17	2	3	-1
Mean	2.35	2.64	-0.29

Behavioral checklist. Scores from the nine items were separated into Time 1 (1st and 2nd observations) and Time 2 (5th and 6th observations). Observations for each item for each participant were summed for Time 1 and Time 2. Mean values at Time 1 and Time 2 were computed for each participant.

Table 6 shows the mean scores from the Behavioral Checklist for Time 1 & Time 2 for Participant 2 (see Table 6). The slight increase in inattentive & hyperactive-impulsive behavior was:

- Item 9, "Disrupts peers"

The moderate increase in inattentive & hyperactive-impulsive behavior was:

- Item 7, "Squirms in seat"

The slight decreases in inattentive & hyperactive-impulsive behavior were:

- Item 8, "Leaves seat"
- Item 6, "Fidgets with hands"
- Item 4, "Looks at peers for directives"

The moderate decreases in inattentive & hyperactive-impulsive behavior were:

- Item 3, "Avoids task at hand"
- Item 1, "Stares into space"

All other behaviors remained comparably constant. Mean difference from Time 1 & Time 2 was 0.34, indicating a slight improvement in inattentive and hyperactive-impulsive behaviors in Participant 2.

Table 6

Participant 2, Behavior Checklist Items Mean Scores, Time 1 and Time 2

Item	Description	Time 1	Time 2	Difference
1	Stares into space	4	0	4
2	Wants to use the bathroom or get a drink	0	0	0
3	Looks at peers for directives	2	0	2
4	Avoids task at hand	5	1	4
5	Avoids task at hand	0	2	0
6	Fidgets with hands	1	3	2
7	Squirms in seat	2	7	-5
8	Leaves seat	1	0	1
9	Disrupts peers	0	1	-1
Mean		1.67	1.33	0.34

Participant 3

Field notes. Participant 3 was observed primarily during regular classroom instruction, such as math, language arts, and social studies. When classes involved direct instruction, such as teaching a math lesson, but the teacher was not actively engaged with the students one-on-one, there was a significant increase in the fidgeting and squirming behaviors, especially if the participant was required to sit still, take notes, or work on an assignment quietly. Two of my observations were conducted when the participant was working independently on a project and was permitted to stand at the desk and walk around the classroom. During these observed instances, the participant was highly engaged, and fewer inattentive and hyperactive-impulsive behaviors were observed.

Art intervention. Participant 3 was the most social and outgoing out of the three participants in the study, frequently trying to engage the other two participants in conversations about sports, gaming, movies and cars. The participant enjoyed any art media that required manipulation, such as clay, cutting, the dry and wet salt dough structured art activities, drawing geometric shapes, and creating projects that required intricate tactile work. For example, the artistic media consistently chosen for the free-art time was perler melting beads, where the participant frequently made various car symbols, such as BMW or Porsche. Similarly, during the structured art portion in which the boys drew their body outlines on large paper and decorated them, the participant was highly motivated to make his creation uniquely different with various art media utilized (see Table 7).

Parental behavioral checklist. Each of the 17 items from the Parental Behavioral Checklist was assigned a score of 1 (once daily), 2 (2-3 times daily), or 3 (4 or more times daily). Items 1, 4 and 7 were reverse scored. High scores on an item indicate higher levels of inattention and hyperactivity-impulsivity, while low scores indicate lower levels.

Table 8 shows the parent's observations of at-home inattention and hyperactive-impulsive behaviors from the Parental Behavioral Checklist pre- and post-intervention for Participant 3 (see Table 8). The slight increases in inattentive & hyperactive-impulsive behavior were:

- Item 17, "Interrupting others' conversations"
- Item 16, "Blurting out answers"
- Item 7, "Does not enjoy engaging in quiet solo activities"
- Item 4, "Enjoys tasks that require ongoing mental effort"

The slight decreases in inattentive & hyperactive-impulsive behavior were:

- Item 14, “Leaves seat when remaining seated is expected”
- Item 12, “Squirms in seat"
- Item 11, “Fidgets with hands"
- Item 9, “Easily distractible”
- Item 5, “Fails to finish activities”

All other behaviors remained relatively constant. The mean difference in all behaviors pre- and post-intervention is -0.07 for Participant 3, signifying a slight increase in inattentive and hyperactive-impulsive behaviors. This does not show support for a decrease in inattentive and hyperactive-impulsive behaviors over the course of the study.

Behavioral checklist. Scores from the nine items were separated into Time 1 (1st and 2nd observations) and Time 2 (5th and 6th observations). Observations for each item for each participant were summed for Time 1 and Time 2. Mean values at Time 1 and Time 2 were computed for each participant.

Table 9 shows the mean scores from the Behavioral Checklist for Time 1 & Time 2 for Participant 3 (see Table 9). The slight decreases in inattentive & hyperactive-impulsive behavior were:

- Item 9, “Disrupts peers”
- Item 8, “Leaves seat”
- Item 4, “Avoids task at hand”
- Item 3, “Looks at peers for directives”
- Item 2, “Wants to use the bathroom or get a drink”
- Item 1, “Stares into space”

Table 7

Participant 3, Structured and Free- Art Activity Scores

Structured Artistic Activities	Interest level from 1-10
Clay Art (Create something meaningful to them)	9
Draw Initials with various art media (markers, oil pastels)	8
Paint Clay items	9
Create Salt Dough	10
Paint Various Styles of Bird Houses	4
Choose Pictures for Collage Work	9
Create Collages	9
Decorate Body Image on Large Paper	10
Decorate Picture Frames	8

Free-Art Activities	0-10	Comments
Perler Melting Beads	10	Chose activity consistently, Very Engaged
Painting Birdhouses	5	Lost interest after 7.5 minutes
Paint By Numbers	2	Lost interest quickly
Origami	0	Never Tried
Rainbow Loom	0	Never Tried
Stained Glass Coloring Books	2	Lost interest quickly
Coloring Mandalas	7	Made own mandalas to color
Drawing	8	Tried drawing pictures from the internet
Creating With Clay	8	Cut away pieces of larger block and made smaller shapes
Stamping	0	Never Tried
Foam Shapes	0	Never Tried
Creating with Various Mediums (oil pastels, pencils, paint)	7	Enjoyed using oil pastels and paint

Table 8

Participant 3, Parental Behavior Checklist Item Scores, Pre- and Post-Intervention

Item	Pre-Intervention	Post-Intervention	Difference
1	2	2	0
2	2	2	0
3	2	3	-1
4	NA	2	0
5	2	1	1
6	2	2	0
7	1	2	-1
8	NA	3	0
9	3	2	1
10	2	2	0
11	3	2	1
12	3	2	1
13	2	2	0
14	2	1	1
15	1	1	0
16	1	3	-2
17	1	3	-2
Mean	1.93	2.0	-0.07

Note: NA= item not answered on checklist.

The moderate decreases in inattentive & hyperactive-impulsive behavior were:

- Item 6, “Fidgets with hands”
- Item 5, “Avoids task at hand”

The high decrease in inattentive & hyperactive behavior was:

- Item 7, “Squirms in seat”

Participant 3 decreased all behaviors with a mean difference of 3.67 from Time 1 & Time 2, indicating a great decrease in hyperactive-impulsive and inattentive behaviors.

Mean Scores Across Participants

The pre- and post-intervention Parental Behavioral Checklist scores for the three participants were compared (see Table 10), showing Participant 1 experienced a decrease (0.36) in observed inattentive and hyperactive-impulsive behaviors. Participants 2 and 3 showed a slight decrease in observed inattentive and hyperactive-impulsive behaviors (-0.29 and -0.07), respectively. The overall mean difference from pre- to post-intervention show no change in parent's observations of at-home inattention and hyperactive-impulsive behaviors pre- and post-intervention.

Table 9

Participant 3, Behavior Checklist Items Mean Scores, Time 1 and Time 2

Item	Description	Time 1	Time 2	Difference
1	Stares into space	4	3	1
2	Wants to use the bathroom or get a drink	1	0	1
3	Looks at peers for directives	3	2	1
4	Avoids task at hand	3	2	1
5	Avoids task at hand	4	0	4
6	Fidgets with hands	12	6	6
7	Squirms in seat	23	7	16
8	Leaves seat	2	1	1
9	Disrupts peers	3	1	2
Mean		6.11	2.44	3.67

Table 11 shows the pre- and post-intervention mean scores of the Hyperactivity-Impulsivity and Inattention scales across all participants (see Table 11). The overall difference in inattention behaviors was 0.27, and hyperactivity-impulsivity behaviors demonstrated an overall

0.55 difference in observed instances. Given the slight decrease in inattentive behaviors and the high decrease in hyperactive-impulsive behaviors across participants, data from the Hyperactivity-Impulsivity and Inattention scales suggest slight support of a decrease in inattentive and hyperactive-impulsive behaviors over the course of the study.

Table 10

Each Participant Parental Behavior Checklist Mean Score, Pre- and Post-Intervention

Participant	Pre-Intervention	Post-Intervention	Difference
1	2.36	2.0	0.36
2	2.35	2.64	-0.29
3	1.93	2.0	-0.07
Mean	2.21	2.21	0

Table 11

All Participants, Mean Score, Inattention and Hyperactivity-Impulsivity Scales Pre- and Post-Intervention

Scale	Pre-Intervention	Post-Intervention	Difference
Inattention	2.6	2.33	0.27
Hyperactivity-Impulsivity	2.55	2.0	0.55

Table 12 shows the difference from Time 1 & Time 2 for all three participants, from the Behavioral Checklist (see Table 12). The slight increases in inattentive & hyperactive-impulsive behavior were:

- Item 5, “Avoids task at hand”
- Item 2, “Wants to use the bathroom or get a drink”
- Item 6, “Fidgets with hands”
- Item 8, “Leaves seat”

The slight decreases in inattentive & hyperactive-impulsive behavior were:

- Item 3, “Looks at peers for directives”
- Item 1, “Stares into space” (only inattentive behavior from the checklist)

The moderate decreases in inattentive & hyperactive-impulsive behavior were:

- Item 4, “Avoids task at hand”
- Item 9, “Disrupts peers”

The high decrease in inattentive & hyperactive-impulsive behavior was:

- Item 7, “Squirms in seat”

The overall difference from Time 1 & Time 2 for all three participants was 1.82.

Table 12

All Participants, Behavior Checklist Items Mean Scores, Time 1 and Time 2

Item	Time 1	Time 2	Difference
1	2.67	1.0	1.67
2	0.33	0	0.33
3	2.67	0.67	2.0
4	4.33	1.33	3.0
5	2.33	1.67	0.66
6	6.67	8.33	-1.66
7	12.33	5.0	7.33
8	1.0	1.33	-0.33
9	3.67	1.0	2.67
Mean	4.0	2.18	1.82

Items 6, 7, 9 were taken from the Behavioral Checklist Hyperactivity-Impulsivity scale and the mean score across all participants were reported at Time 1 & Time 2 (see Table 13). Item

7 “Squirms in seat” showed the greatest decrease among the three participants, contributing to the overall decrease in hyperactivity-impulsivity behaviors, showing a slight to moderate decrease of 2.42 in observed instances. This lends slight support to the hypothesis that participants would experience a reduction of hyperactive-impulsive behaviors.

Table 13

All Participants, Behavior Checklist Hyperactivity-Impulsivity Scales Mean Scores, Time 1 and Time 2

Item	Time 1	Time 2	Difference
Hyperactivity-Impulsivity	5.75	3.33	2.42

Mean Activity Levels

Table 14 shows the mean activity levels for Time 1 & Time 2, for all three participants (see Table 14). Time 2 shows significant increased activity levels during classroom instruction, compared to Time 1.

Table 14

Mean Activity Levels, Time 1 and Time 2

	Time 1	Time 2	Difference
Activity Level	2.67	4.91	-2.24

Table 15 shows the mean activity levels and mean item values of inattentive and hyperactivity-impulsivity behaviors for Time 1 & Time 2, from the Behavioral Checklist, across all participants (see Table 15). Higher activity levels during naturalistic observations in Time 2 compared to mean item values in Time 2 suggest a correlation between high activity levels and decreased inattentive and hyperactive-impulsive behaviors.

Table 15

Mean Activity Levels and Mean Inattentive and Hyperactive-Impulsive Item Scores, Time 1 and Time 2

	Time 1	Time 2	Difference
Activity Level	2.67	4.91	-2.24
Mean Inattentive & Hyperactive-Impulsive Items	4.0	2.18	1.82

In the next chapter, results of the case study are discussed. Limitations and implications of the study are discussed, as well as potential areas of research and future work. This Expressive Therapies Continuum intervention is an experiential case study studying the effects sensory-based art activities upon three non-medicated 6th to 8th-grade boys diagnosed with ADHD.

Chapter 6

Discussion

The purpose of this case study is to examine the effects of a sensory-based art intervention on inattention and hyperactivity-impulsivity behaviors in three non-medicated 6th to 8th-grade boys with ADHD. Using an art intervention approach informed by the Expressive Therapies Continuum, this theoretical model suggests that engagement in sensory-based activities moves information processing epigenetically to the neocortex, resulting in hemispheric synchronization for whole-brain functioning, and increased executive function.

In this chapter, results of the case study are discussed, and alternative explanations for the different outcomes are explored. Benefits of the research are presented, as well as the limitations.

The study lends slight support to the hypothesis that a sensory-based art intervention informed by the Expressive Therapies Continuum decreases inattention and hyperactive-impulsive behaviors in three non-medicated 6th to 8th-grade boys with ADHD, and that impaired executive function improves. The means for measuring improved executive function (and decreased inattention and hyperactive-impulsive behaviors) were through data captured from the Parental Behavioral Checklists (filled out by parents) and Behavioral Checklists (utilized during naturalistic observations of behaviors in regular classes). Analysis of the data give limited support for the effectiveness of the intervention, as well as the Expressive Therapies Continuum as the theoretical model utilized in the study.

Parental Behavioral Checklists

Participant 1. The pre- and post-intervention scores from the Parental Behavioral Checklist for Participant 1 (see Table 2) showed a slight decrease in inattentive and hyperactive-impulsive behaviors. This might suggest that the higher-order thinking activity of working with perler beads contributed to the reduction of observed behaviors, given the child's time investment, and in enjoyment in, the creative process.

Participant 2. The pre- and post-intervention scores from the Parental Behavioral Checklist for Participant 2 (see Table 5) showed a slight increase in inattentive and hyperactive-impulsive behaviors. This suggests that engaging in the Expressive Therapies Continuum did not affect the child's inattentive or hyperactive-impulsive behaviors, from the standpoint of the parent. One factor that could have contributed to the outcome was the personal preference of working with clay and free-hand drawing, that may not have required as much higher-order thinking as one of the other art media. A second factor could be that the highly social environment of the art intervention was not suitable for the participant, given the child's need for quietness and solitude when engaged in the creative process.

Participant 3. The pre- and post-intervention scores from the Parental Behavioral Checklist for Participant 3 (see Table 8) showed a slight increase in some behaviors, and a slight decrease in others. One factor that could have contributed to the outcome was that three of the unanswered items on the Parental Behavioral Checklist were about sustained attention. Therefore, I did not have access to pertinent baseline information about the child's functioning at home. Another factor could be the level of engagement the participant had in creating intricate

designs with perler beads, providing immediate gratification, and the propensity to replicate success during the art sessions.

Parental Behavioral Checklist Mean Scores

Results for all three participants from the Parental Behavioral Checklist (see Table 10), show that the Expressive Therapies Continuum had no effect on the group overall. Several factors could have contributed to this outcome. The parent-child relationship at the time each checklist was filled out could have influenced how the checklist was filled out (such as the parent over-inflating specific behaviors). A second element that may have affected the outcome was the short period of time the participants had to engage in artistic activities designed to alter behaviors that have been in place for years.

Mean differences from the Parental Behavioral Checklist for all participants (see Table 11) show the changes in behaviors from pre- to post-intervention. Hyperactive-impulsive and inattention behaviors both decreased. Several factors could have contributed to the overall changes, particularly the unique way each child processes novel information, and how this correlates to individual changes in behavior. Challenging art media each participant engaged in each week may have also played a role, many of which required a time investment to achieve mastery and subsequent success. Participants continuing to work with art media they enjoyed at home could have also played a role in reducing the behaviors.

Behavioral Checklists

Participant 1. Data collected from the Behavioral Checklist during Time 1 and Time 2 for Participant 1 (see Table 3) shows the most significant decrease was for “Squirms in seat,” which infers a positive correlation between engaging in sensory-based artistic activities during

the Expressive Therapies Continuum intervention, and the ability to sit for longer periods of time without constantly changing position. This might suggest that participating in sensory-based activities, such as perler beads, that require higher-order thinking skills such as problem-solving and abstract thinking can increase executive function and decrease hyperactive-impulsive behavior.

Participant 2. The mean scores from the Behavioral Checklist for Participant 2 during Time 1 and Time 2 (see Table 6) show a moderate decrease in inattentive and hyperactive-impulsive behaviors, and a moderate increase in “Squirms in seat." This could be due to being consistently observed in high activity classroom environments, with very little one-on-one teaching directives and greater distractions in the classroom environment, and multiple children moving around and dancing when not instructed. Given the dance class where the observations were conducted, Participant 2 was constantly moving around, like many other children, despite instructions to remain still. Another factor that could contribute to the outcome was the highly social interactions and heightened energy level during each art session; the participant was consistently exposed to stimulating art media and engaging interactions with the participants.

Participant 3. Item mean scores from Time 1 and Time 2 from the Behavioral Checklist (see Table 9) show Participant 3 was the only child in the study to demonstrate a decrease in all observed behaviors. Moreover, Participant 3 showed the greatest overall decrease in the “Squirming in seat” behavior among the three participants. This high decrease could be contributed to the the child engaging in perler beads, a higher order process, during each art session. The right brain controls body movements, and when sensory-based activities are engaged in that require dedicated focus and the child’s time investment, such as perler beads,

further development takes place in the right brain. A second factor could be the child's propensity to want to master the challenging art media, which was demonstrated by replicating the same car symbols multiple times, until he was satisfied with the results.

Behavioral Checklist Mean Scores

The difference from Time 1 and Time 2 from the Behavioral Checklist for all three participants (see Table 12) shows that "Squirming in seat," had the highest decrease. This suggests that the majority of the participants were positively affected by the Expressive Therapies Continuum intervention, though in varying degrees. Given that each child engaged in activities they found enjoyable and personally meaningful, this fostered an innate striving towards mastery of whatever media he was engaged in. Moreover, given that development of the right brain controls the body, the significant decrease among all participants may also be contributed to the level of complexity of the art media chosen by each participant, and how time-invested the child was.

Hyperactivity-Impulsivity mean scores taken from the Behavioral Checklist for all three participants from Time 1 and Time 2 as shown in Table 13 show a high decrease in the three behaviors included in the data. This may have been dependent upon the more complex art media the participants engaged in during the intervention, especially Participant 1 and Participant 3, who consistently worked with perler beads, a higher-order thinking art activity that appears to be effective in engaging the child in abstract thinking and problem-solving dilemmas as they arise during the creative process.

Mean activity levels captured from the Behavioral Checklist at Time 1 and Time 2 for all three participants as shown in Table 14 show an increase in classroom activity levels during

naturalistic observations. Participant 1 and Participant 2 were observed in high activity classroom environments during Time 2 (dance class, Taekwondo, cooking class), versus Participant 1 who was consistently observed in low activity classroom environments, which may have affected the increase.

Activity Level Mean Scores

Mean activity levels and mean item values from the Behavioral Checklist for Time 1 and Time 2 as displayed in Table 15 show an increase in activity classroom levels and a decrease in observed inattentive and hyperactive-impulsive behaviors for all three participants. This suggests that increased activity levels during classroom instruction may have a positive correlation to a decrease in observed hyperactive-impulsive and inattentive behaviors as a result of engaging in the Expressive Therapies Continuum intervention.

Inconsistencies of the behavior decrease in correlation with classroom activity level settings could be viewed as a methodological weakness of this study. The low number of participants could also be a methodological flaw. The results suggest that although high activity classroom levels provide an engaging environment for learning, each child's ability to integrate the information successfully is dependent upon their individual neurocognitive abilities.

Field Notes

Based on the field notes taken by the researcher during the 10-session art intervention, the artistic activities were effective, to varying degrees, for each participant. Each of the artistic mediums utilized in the study required dedicated focus and intricate work, thus allowing the participants to use their talents in thoughtful and creative ways, demonstrating higher-order thinking and problem-solving skills.

Participant 1. Participant 1 enjoyed painting birdhouses and decorating/painting his body image on a large piece of paper for the structured group art activity, as shown in Table 1. The free-art activities found most enjoyable to the participant were the perler melting beads and painting birdhouses. Given the high levels of impulsivity and hyperactivity of the participant, these activities allowed the child to settle into activities that were enjoyable, and that the child was invested in. These sensory-based activities supported the development of the right brain, which demonstrated a reduction of the behaviors in every setting, including home and naturalistic observations (see Table 1).

Participant 2. Participant 2 preferred the art media of decorating/painting his image on a large piece of paper as the most enjoyable for the structured group art activity as shown in Table 4 The child created his body image in a separate area of the room from the two other participants. The free-art activities most enjoyed by the child were drawing and creating items out of clay, both activities that are created independently. The child preferred solitude during the free-art time activities, as opposed to active engagement with the other participants, suggesting that the participant would benefit from a more structured and quiet space when engaging in artistic endeavors. One reason for this outcome could be that the participant is an only child, and is used to working independently or with an adult on artistic endeavors. Engaging with the other participants in the study could have posed more of a distraction than an enjoyable experience for the child (see Table 4).

Participant 3. Participant 3, as shown in Table 7, enjoyed creating salt dough and decorating/painting his image on a large piece of paper for the structured group art activity. Perler melting beads was consistently the most preferred art medium for free-art time throughout

the Expressive Therapies Continuum intervention. The child's significant decrease in hyperactive-impulsive behaviors during naturalistic observations suggests that this art activity permitted the child to engage in higher-order thinking for extended periods of time, which aided in further developing the right brain, resulting in the reduction of observed behaviors (see Table 7).

Benefits Gained by Participating in the Art Intervention

Navigating social situations. Given their social immaturity, many children diagnosed with ADHD frequently encounter setbacks as a result of inappropriate behavior during social situations. Due to heightened levels of impulsivity and hyperactivity, this population of learners can unintentionally act in ways, or blurt out an off-handed statement, that can be misconstrued by others. As such, sensory-based interventions are an effective avenue to learn social rules of engagement, and to navigate awkward social situations. For example, one of the participants came to an art session irritable, saying off-handed comments to the other two participants about their creative work. The two participants picked up their projects and moved to the other side of the room while reminding the first participant about the ground rules of not discussing each other's creations. After 15 minutes of awkward silence, the first participant walked over to the two others and apologized, commenting he was feeling sad about something concerning his pet. The two participants side-ways hugged the first participant, and began working as a group while sharing stories of their own grief over losing a pet. The compassion displayed and unconditional forgiveness was paramount for the participants' to understand the natural consequences of acting hostile and the results of being altruistic.

Child-invested. According to Diamond (2012), children learn by doing, devoting time and energy to activities they love. Henley (1998) further suggests that individuals who engage in the creative arts are exposed to opportunities for problem-solving and higher order thinking which fosters perseverance and self-efficacy (p. 8). As such, throughout the intervention, each participant engaged in art media he found enjoyable, despite having to solve dilemmas and frustrating setbacks. The level of patience and focused attention on an activity appeared to depend on the participant's interest in the project being created, and the opportunity for successful replication. For example, one participant wanted to make his mother four napkin holders out of perler melting beads, which are a challenging art media to work with, requiring tweezers to pick up individual beads which are melted together to create a design. A simple project can take an hour or longer to make, placing the beads one at a time, in creative designs. I was impressed with the child's ability to draw out the diagram on paper first, stopping periodically to take measurements, and the fortitude to keep trying. After three failed attempts during two different art sessions, the participant finally succeeded. Similar obstacles were encountered by each child, but the immediate gratification of one success encouraged the innate drive to replicate another successful project.

Limitations of the Case Study

The participants in this case study were unique from other ADHD populations, given the homeschooling environment in which each child is regularly taught. Moreover, given the boys' distinct personalities and behaviors, and different art media preferences, as well as the low number of participants, a larger population of participants may produce different results. None of the participants were receiving medication therapy during the intervention; results of the study

may have illustrated different results if another comparison group had been part of the study. Given the study was conducted at a location and with a researcher the participants were already comfortable with, results might have deviated if the study was conducted at a location foreign to the participants, and with a researcher the boys were unfamiliar with. While the case study examined the effects of a sensory-based intervention on boys, a comparison group of girls with ADHD may have proven valuable for understanding how impaired executive function affects this gender.

Although the Parental Behavioral Checklists were an effective way to gather data on each participant on behaviors observed in the home, the fact that one parent of each child in the study filled out this subjective measure could be viewed as a methodological flaw. As such, given that only one parent of each participant filled out the Parental Behavioral Checklist, there could potentially be a bias towards wanting to portray their child in a favorable light, with less accurate behavior recording, as opposed to using a more precise reporting biological measure, such as cortisol levels. Furthermore, filling out the checklist could have been hurried, and lacking thoughtful consideration of each question asked. Hence, different measures would likely produce different results.

Implications of the Case Study

According to Van der Oord, Bögels, & Peijenburg (2012), treatments other than medication therapy and Cognitive Behavior Therapy need to be investigated, focusing on the core problems of ADHD, instead of just treating the symptoms. Moreover, given that children with ADHD may also have comorbid sensorimotor integration delays that overlap with ADHD behaviors, Chapman (2014) posits that engagement in “sensory-based art activities assists in

repairing sensory and motor delays" (p. 85). Sensory-based artistic experiences are also effective at reducing hyperactive-impulsive and inattentive behaviors, as demonstrated by the individual results from the case study. As such, medical institutions and school districts should consider sensory-based interventions as a cost-effective and low-cost alternative to administering medication and talk therapy. Moreover, many children with ADHD and Sensory Integration Disorder have an underdeveloped right brain, which controls sensory delays and body movements, such as hyperactivity-impulsivity or inattention. Engaging in sensory-based art activities strengthens the right brain, which can result in reduced negative behaviors and greater integration of the mind-body-brain (Schore, 2005). The benefit is a more whole human being.

In the next chapter, I discuss the importance of sensory-based artistic activities on the brain and learning outcomes for children with neurobiologically based learning disorders. Additionally, potential areas of research and future endeavors are discussed, as well as the conclusion of the thesis. This Expressive Therapies Continuum intervention is an experiential case study studying the effects sensory-based art activities upon three non-medicated 6th to 8th-grade boys diagnosed with ADHD.

Chapter 7

Conclusion

Quality arts instruction has become increasingly less available in public schools over the years, even though associations between engagement in the arts and academic benefits have been documented (Ruppert, 2006, in Forrest-Bank et al., 2016). Charter schools offering creative arts as part of their curriculum are emerging all over the country, as parents recognize the beneficial aspects of artistic exploration. Both of my children are fortunate enough to attend charter schools spanning their academic careers that employ some form of the arts, providing, I believe, a more well-rounded education. As a result of this educational experience, my children are more self-confident and developed individuals in navigating demanding and unexpected academic and social experiences. The results from the case study demonstrate equally compelling evidence of the importance of artistic exploration as a vital component to a child's educational experience. As each participant unconsciously strove to overcome obstacles as they worked with challenging art media, they became increasingly determined to master what they sought to create (such as designing and creating napkin holders with perler beads). This, in turn, increased their self-esteem, as earlier successes were replicated again and again. As a teacher, it was a joy to observe as each child grew more self-confident as they mastered challenging art media, and became more aware of their unique abilities. As a researcher, I was intrigued by the determination of each boy to overcome, at times, intense frustration and disappointment. These discerning attributes are what I admire and appreciate in children with ADHD, given their unique social and academic challenges. As such, my long-standing history with this population provided the passion and drive for conducting the pilot study, as well as making a meaningful contribution to what the

research community knows about ADHD. The results propel my motivation for continuing this important research work, because of the positive and everlasting effects on the participants.

Given my years of working with children in traditional and alternative classroom environments, and conducting the pilot study, I suggest that learning difficulties such as ADHD and Sensory Integration Disorder are neurobiologically based. Furthermore, I believe these disorders can be corrected with right-brained sensory curriculum, and fostering greater integration, for whole brain synthesis. School districts employ experts who assess for academic, occupational, speech, and psychological delays, but very few test for sensory processing and integration delays. It is important that medical institutions and school districts seek out experts trained in how to identify and ameliorate sensorimotor issues in children, if they are to receive the necessary help required to be successful learners.

Potential Areas of Research

It is our duty as educators, researchers and parents to help children achieve wholeness. One way to do this is to employ right-brained sensory-based activities that better interconnect the brain and body. This, in turn, provides vital opportunities for children to use imagination to create things that inspire, engage and nurture their spirits. As such, replicating the pilot study with funding and a higher sample size would provide the research community, as well as medical institutions and school districts, a better understanding of the positive effects of sensory-based, right-brained activities on neurobiologically based learning delays, such as ADHD and Sensory Integration Disorder. The larger sample size would allow for attrition. Further, improved assessment instruments measuring increases in academic performance and increased focus time on specific tasks, such as a 3 minute, 5 minute and 10 minute sensory drawing exercises, allow

for more fine-grained analyses. This research is vital for children who are challenged with disorders that prevent them from fully participating in academic and social activities, because it would provide the means for correcting neurobiologically based learning difficulties through a means that is child-invested, easy to employ, and cost-effective.

Directions for Future Work

My higher academic aspirations are to attain a Ph.D. in Psychology and work with other researchers to broaden this research. With this attainment, I hope to conduct large case studies in ADHD and sensorimotor delayed populations, to better understand how sensory-based methodologies can be employed for healing children. Likewise, advocating for increased sensory-based artistic curricula in the educational system is an area of equal importance.

Closing Perspectives

The phenomena discussed in this study hold profoundly personal significance, given my years of interacting in various capacities with children diagnosed with ADHD. Raising two children with differing subtypes of the disorder and unique learning styles necessitated investigating plausible etiologies of ADHD, which became the research foundation on which this case study was designed. Conducting a study that is neurobiologically based, epigenetic in nature, and from a non-Cartesian perspective has been an immensely rewarding experience. It permitted interweaving my interests in neuroscience and and scientific inquiry. Moreover, designing an art intervention informed by the Expressive Therapies Continuum for three distinctly different participants was inspiring, as, rather unexpectedly, the boys appeared compelled to want to return for each session throughout the 5-week art intervention. They found

the artistic media to be challenging, interactive, fun and encouraged them to move past their self-established boundaries, to new discoveries of themselves.

Albert Einstein is no doubt one the greatest geniuses of our time, contributing to our modern day science and forever changing our world. Little is known, however, that when Einstein was a child he had speech and developmental delays (Isaacson, 2007; Melillo, 2009). Whenever there was a problem Einstein found perplexing, such as a mathematical equation, he would play a musical instrument, a sensory-based activity, while envisioning the problem until an answer or theory came to him. By utilizing both sides of his brain, Einstein increased information processing up his brain's hierarchy to the neocortex, which ultimately improved his executive function abilities. The inventions and theories Einstein is so famous for stemmed from his innate ability to think outside the box. This case study was designed and implemented in a way to assist the participants in accessing both sides of the brain, with both hemispheres working synchronistically, to achieve whole brain functioning and higher order thinking.

Children with ADHD are a prodigious community of learners that can be influential to the world community as a whole. But, they require the appropriate tools and methods to achieve success. It is my hope and desire that the information outlined in this thesis provides a means for this population to achieve extraordinary success and provide meaningful contributions.

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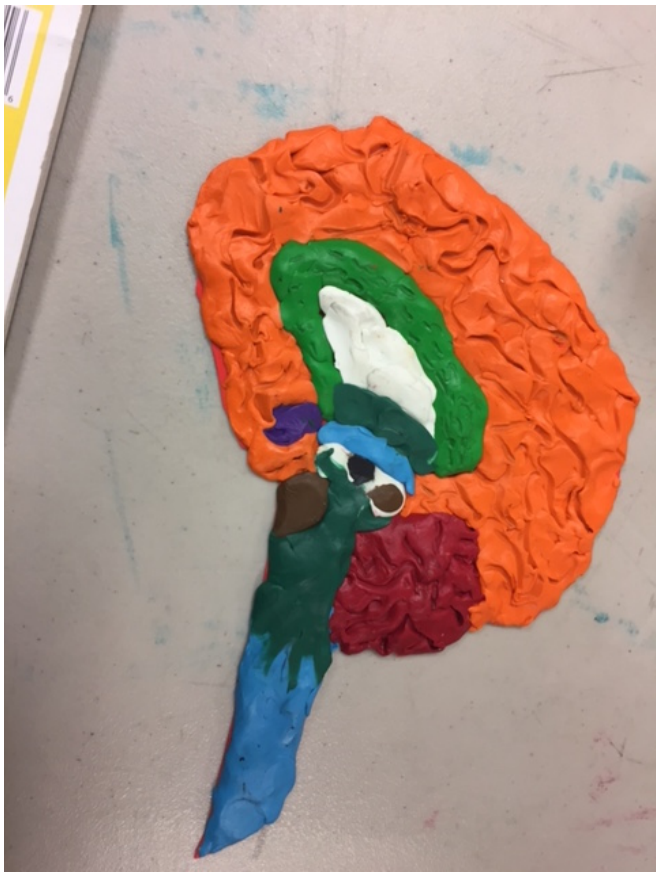
Appendices

Appendix A

5-Week Brain Workshop: Sensory-Based Student Projects



Appendix B

Glossary

Affect. An automatic response to a given stimuli, in the form of an emotion, and can lead to psychosomatic symptoms. Affect can be positive or negative.

Amygdala. Responsible for the fight or flight response, processes emotions in order of importance, is the fear center, and is connected to multiple brain systems, including the neocortex which is responsible for executive function (Fannin & Williams, 2012).

Brainstem. Lowest and least developed of the brain structures, responsible for basic autonomic functions, as well as the brain system stimulated by sensory-based artistic activities, which begins organically moving information processing up the brain's hierarchy (Chapman, 2014).

Cognitive Behavioral Therapy. Also known as talk therapy. Focuses on how thoughts influence emotions and behaviors. Targets the reduction of symptoms such as anxiety, fear, anger and behaviors such as inattention, hyperactivity, carelessness and impulsivity through modifying behavior (Van der Oord, Bögels, & Peijnenburg, 2012).

Cognitive/Symbolic level. Third level within the Expressive Therapies Continuum (see kinesthetic/sensory, perceptual/affective and creative, the three remaining levels within the continuum's hierarchy). The neocortex or cerebrum is the brain structure which corresponds with this level on the continuum, which is responsible for executive functions which can involve reasoning, cause and effect and problem solving (Chapman, 2014; Hinz, 2009).

Corpus Callosum. A thick band of fibrous nerve fibers, that bridge the left and right hemisphere, permitting transmission of neural messages between the two hemispheres so that motor, sensory and cognitive information can be integrated (Chapman, 2014).

Creative Level. Fourth level of the Expressive Therapies Continuum, a neurobiological hierarchy theoretical framework that posits the left and right hemisphere must work in synchronicity in order to achieve whole brain synthesis. The Creative level represents whole-brain synthesis, the ability for the brain to successfully process and integrate incoming information for whole-brain functioning, and encompasses the kinesthetic/sensory, perceptual/ affective and creative/symbolic levels (Hinz, 2009).

Executive Functions. The neurocognitive processes that allow an individual to translate incoming information into working memory (Wilecutt et al., 2005), such as understanding cause and effect, reasoning, deciphering language. The brain system responsible for executive functions is the neocortex which is the highest brain structure.

Expressive Therapies Continuum. A neurobiological hierarchy theoretical framework that posits the left and right hemisphere must work in synchronicity in order to achieve whole brain synthesis. This methodological approach to sensory-based art parallels how information is processed in the human brain (Chapman, 2014), and consists of four levels on a continuum. The four levels are kinesthetic/sensory, perceptual/affective, cognitive/symbolic and creative.

Hyperactivity-Impulsivity. Inability to pay attention to task at hand. Symptoms can include fidgeting, excessive talking, squirming, being disruptive to others (Quinn, 2009).

Inattention. Poor organizational skills, dreaminess, forgetfulness, inability to stay focused on task at hand, easily distractible (Quinn, 2009).

Kinesthetic/Sensory level. Foundational level of the Expressive Therapies Continuum, a neurobiological hierarchy theoretical framework that posits the left and right hemisphere must work in synchronicity in order to achieve whole brain synthesis. When sensory-based art is

engaged in, this level is proposed to stimulate the lowest brain structure, the brainstem which automatically begins moving information processing up the brain's hierarchy (Hinz, 2009).

Left Hemisphere. Controls the right side of the body. It is suggested to be the receiver of auditory input, and thinks in logical terms. The left hemisphere is considered the analytic brain (Hinz, 2009).

Limbic System. Mid brain structure, responsible for the formation of memories and emotional experiences and includes the amygdala, hippocampus, thalamus, hypothalamus (Chapman, 2014; Lusebrink, 2004).

Myelination. The process by which sheaths of myelin form around a neuron, which is associated with high information processing speeds. The greater the myelin fatty sheaths around the neurons, the more rapidly and consistently impulses are transmitted, which can result in more successful integration of novel material (Grosswald, 2013).

Naturalistic Observations. Observing individuals in their natural settings (Fraenkel, Wallen & Hyun, 2012).

Negative Affect. Any emotion that arises when exposed to various stimuli. The inability to regulate one's automatic response to a perceived threat, regardless of how insignificant, is called negative affect. Symptoms can include anxiety, hyper-arousal, dissociation, or numbness (if it is emotionally based) (B. Kammer, personal communication, September 5, 2016).

Neocortex/Cerebrum. Highest brain structure, which encompasses the left and right hemispheres, and processes incoming information (Grosswald, 2013; Henley, 1998). The neocortex is bridged by the corpus callous and oversees executive functions for more successful integration of incoming information.

Neuronal network. A group of brain cells that function as a whole unit for a specific purpose (Fuster, 2000).

Observer bias. The possibility that certain characteristics or ideas of an observer could bias what they are observing (Fraenkel, Wallen, & Hyun, 2012).

Observer Effect. The presence of an observer can have an effect on the behaviors of the individuals they are trying to observe, and can negatively affect the outcome of a study (Fraenkel et al., 2012).

Perceptual/Affective level. Second level of the Expressive Therapies Continuum, a neurobiological hierarchy theoretical framework that posits the left and right hemisphere must work in synchronicity in order to achieve whole brain synthesis. The limbic system is the second brain major brain structure and processes emotions when one is engaged in the artistic process (Hinz, 2009).

Neocortex. The highest brain structure, and part of the neocortex (Willcutt et al. 2005).

Right hemisphere. Controls the left side of the body, and is posited to interpret the auditory information we receive, and permits understanding of abstract concepts. The right hemisphere is considered the creative brain (Hinz, 2009).

Appendix C

Institutional Review Board Application

SONOMA STATE UNIVERSITY—INSTITUTIONAL REVIEW BOARD FOR THE RIGHTS OF HUMAN SUBJECTS

Application for Approval of Research Involving Human Subjects

This application is designed to fulfill the responsibilities of Sonoma State University relative to the Code of Federal Regulations, Title 45, Part 46, regarding research involving human subjects. Failure to comply with the policies and procedures referenced in this application (1) may cause individuals to incur personal liability for negligence and harm; (2) may cause the University to lose federal funding, prevent individuals from applying for or receiving federal research funds, and prevent the University from engaging in research; and (3) will be viewed by SSU as a violation of university policies and procedures and will result in appropriate administrative action.

All research involving the use of human subjects conducted by SSU faculty, staff, or students —or sponsored in part or whole by SSU— must be reviewed and approved by the University's Institutional Review Board (IRB) for the Rights of Human Subjects prior to the start of the project and then must be conducted in full compliance with University policies and procedures. **It is the responsibility of the principal investigator to refer to the IRB any project involving human subjects, even if the subjects are not considered to be "at risk."** This includes research conducted in conjunction with classroom assignments that will be published or shared, as well as student dissertation or thesis. It also includes all interviews, questionnaires, surveys, observations, educational tests, and secondary analyses of previously collected data that will be incorporated into published research or other public presentation. Such projects may be undertaken only after appropriate approval and may be continued only so long as that approval remains in effect. Changes in a project, or continuation of the project following adverse or untoward occurrences during the project, are also subject to review and approval.

Research intended solely for classroom use (with no possibility of further disclosure or publication) and conference/workshop evaluation surveys do **not** require IRB review.

Submit applications to: Sonoma State University, Institutional Review Board –Salazar 2057, 1801 East Cotati Ave., Rohnert Park, CA 94928

If you have any questions, contact the Office of Research and Sponsored Programs at 664-3972 or email *irb@sonoma.edu*

***NOTE**: Your complete application is **due one month prior** to the start of your research. It should include:*

- *Pages 1-3 of this application plus additional pages for the Protocol Requirements (page 3) as needed.*
- *A copy of your written informed consent form OR a request for waiver of written informed consent with a copy of the oral text you intend to use to inform your subjects of the points listed on the Checklist of Informed Consent (see http://www.sonoma.edu/aa/orsp/human_subjects.shtml for a sample consent form and checklist).*

This form is designed to be completed on a computer using Microsoft Word. Complete all applicable gray form fields and check boxes. See http://www.sonoma.edu/aa/orsp/human_subjects.shtml for a version suitable for completion by hand or typewriter

Your signature below certifies that:

- You have read this 6-page packet and understand your responsibilities and liabilities as a principal investigator.
- You have reviewed the University's policies and procedures on research involving human subjects and will ensure your research is conducted in full compliance. Copies of the policies and procedures are available from the Office of Research and Sponsored Programs (ORSP) in Schulz 1105. The information is also posted on the ORSP website at http://www.sonoma.edu/aa/orsp/ .
- You have completed Module 2 (Investigator Responsibilities & Informed Consent) of the Human Subject Assurance Training provided online by the Office of Human Research Protections at: http://137.187.172.153/CBTs/Assurance/login.asp
- You, your spouse, or your dependent children have no financial interest in your project that will or may be reasonably expected to bias the design, conduct, or reporting of your research.

Signature of Principal Investigator: _____ Date: 2/23/17

Title of Project: Could This Be The Missing Link? The Impact of a Sensory-Based Art Intervention in 6-8 Grade Boys with Attention Deficit Hyperactivity Disorder

Name of principal investigator: Danyae Spada-Chassé Telephone: 916-709-3800

Home Address: 329 W Q Street Rio Linda, CA 95673 Email: danyae@me.com

Department: Psychology Title or Academic Status: Master's Student

Co-Investigator(s): None

For student investigators only:

Please print or type name of professor or faculty advisor: Dr. Laurel McCabe

Signature of professor or faculty advisor: _____ Title or Academic Status: Professor

Department clearance: Laurel McCabe Date: 2/23/17

Student investigators must obtain clearance from their department's human subjects committee, if one exists. Psychology students are required to obtain the signature of the department chairperson.

Last Name: _____

Protocol Summary Sheet

If requesting Exemption or Expedited Review, specify category (see http://www.sonoma.edu/aa/orsp/human_subjects.shtml for Appendix B: Research Activities Eligible for Exemption or Expedited Review): _____	Title of Project: Could This Be The Missing Link? The Impact of a Sensory-Based Art Intervention in 6-8 Grade Boys with Attention Deficit Hyperactivity Disorder (ADHD)

Brief description of purpose of project:
The purpose of this qualitative case study is to examine the effects of a sensory-based art intervention in inattention and hyperactivity-impulsivity behaviors in 6-8 grade boys with Attention Deficit Hyperactivity Disorder (ADHD).

☒ New project ☐ Modification ☐ Sub-study ☐ Previous study	Date Starting Interaction with Human Subjects: When Approved	End Date: March 2018	Funding Source (if any): None

Subjects

Number: 12 | Population: 6-8 Grade Boys with ADHD

Source/How contacted: Students attending one of the Natomas Charter School academies located in Natomas, CA. In discussion with the schools where students willl be recruited; parents will be contacted via email when approved.

Instruments

Check all that apply: ☐ Tests ☐ Questionnaires ☐ Interview guides ☒ Other: Behavioral checklists (2) are being utilized.
Attach one copy of each instrument used. If not yet developed, provide drafts, samples, and/or outlines

How administered:
☐ Telephone ☐ Mail or email ☒ In person Length and frequency of procedure: One parent of each participant will fill out a behavioral checklist pre and post intervention. Observers will utilize a behavioral checklist for boys with ADHD a total of 6 times throughout the study to assess inattention and hyperactivity-impulsivity behaviors.

Setting: From the academy where each student is recruited from. For example, students recruited from the Pursuing Academic Choices Together (PACT) academy will be observed in a classroom setting on that campus. Students recruited from one of the other academies would be observed in a classroom setting on that campus.

Data

Check all that apply. Data will be recorded by:
☐ written notes ☐ audio tape ☐ video tape ☒ photography ☐ film ☒ other: Conducting 6 10-minute observations at varying times throughout the study using the Behavioral Checklist for Boys with ADHD (attached). Also, photos of the participants' art work will be photographed each week.

Data will include:

☐ information which can identify the subject (e.g., name, social security number, other unique identifier) specify: _____	☒ codes linked to subjects name by separate code key ☐ codes not linked to subjects names

For items checked above, circle box of those related to data that will be reported

Data will be used for:
☒ publication ☐ evaluation ☐ needs assessment ☒ thesis ☒ other: Professional presentations

Informed Consent

☒ written (attach copy of consent form; see http://www.sonoma.edu/aa/orsp/human_subjects.shtml for Appendix A: Informed Consent Guidance)
☐ oral (attach text of statement and request for waiver of written informed consent; see http://www.sonoma.edu/aa/orsp/human_subjects.shtml for Appendix A: Informed Consent Guidance)

THIS SPACE FOR IRB USE ONLY

This project:
☐ is exempt under category A- _____
☐ is eligible for expedited review under category B- _____
☐ requires IRB review

_____ Human Subjects Administrator _____ Date

_____ Chair, IRB _____ Date

Comments:

If you have any questions, contact the Office of Research and Sponsored Programs at 664-3972 or email irb@sonoma.edu.

Protocol Requirements

Answer each of the following questions. Use as many pages as necessary to fully respond; most protocols can be covered in five pages or less.

1. What are your research objectives?

The purpose of this qualitative case study is to examine the effects of a sensory based art intervention on inattention and hyperactivity-impulsivity behaviors in 6-8 grade boys with Attention Deficit Hyperactivity Disorder (ADHD). The art intervention will be conducted at the Pursuing Academic Choices Together (PACT) homeschooling academy located at 1172 National Drive, # 30, Sacramento, CA.

I am studying the effects of an art intervention utilizing aspects of the Expressive Therapy Continuum, a neurobiological model of creative expression, on inattention and hyperactivity-impulsivity behaviors in twelve 6-8 grade boys with ADHD. The Expressive Therapy Continuum suggests when one is engaged in sensory/kinesthetic art activities, information processing moves from the lowest to highest structures of the brain.

Research suggests a possible etiology of ADHD is impaired executive functioning (Grosswald, 2013) which can lead to the behaviors of hyperactivity-impulsivity and inattention. Participants in the study will engage in weekly sensory/kinesthetically based art activities which I hypothesize will move information processing up the brain hierarchy to the prefrontal cortex, resulting in an increase in executive functioning and a reduction in hyperactivity-impulsivity and inattention behaviors.

2. Discuss the significance and scientific merit of the study.

The significance of the study is that it adds to what is known about art interventions on reducing inattention and hyperactive-impulsive symptoms in boys with ADHD.

3. In what manner and to what extent will human subjects be involved?

Twelve 6-8 grade boys with a medical diagnosis of ADHD will engage in a five week art intervention from 4:00 to 5:30 pm every Monday and Wednesday in the PACT academy art room. Additionally, each participant will be observed a total of 6 times on different occasions to assess hyperactivity-impulsivity and inattention behaviors. The researcher and 2-3 observers trained in naturalistic observations will observe each child at each time period. 2 observations will be conducted prior to the art intervention, once at 2 weeks, once at 4 weeks, and 2 times upon the conclusion of the study. Each observation will be ten minutes, and will be conducted at varying times, permitting greater validity. Behavioral checklist is attached.

One parent of each participant will complete a behavioral checklist prior to, and immediately after the art intervention to assess inattention and hyperactivity-impulsivity behaviors. Behavioral checklist is attached.

4. What procedures, instruments, etc. will be employed?

The instrument Behavioral Checklist for boys with ADHD will be utilized by the researcher and observers while conducting 6 10-minute behavioral observations in a classroom setting.

A behavioral checklist (attached) assessing hyperactivity-impulsivity and inattention behaviors will be filled out by one parent of each participant prior to and immediately after the art intervention.

One parent of each participant will sign the informed consent; each participant will sign a minor assent form (attached).

The only procedure employed will be the 5 week art intervention, taking place at the PACT academy every Monday and Wednesday from 4-5:30pm.

5. What existing data, if any, will be used?

6-8 grade boys participating in the study must have a medical diagnosis of ADHD. This pre-existing data determines whether a student will be able to participate in the study.

6. What will the subjects be told about their involvement in the study?

Parents of participants will be told I am studying the effects of a sensory based art intervention on inattention and hyperactivity-impulsivity behaviors in 6-8 grade boys with ADHD.

Participants will be told I am conducting an art intervention to see if art has an affect on hyperactivity-impulsivity and focusing behaviors in boys with ADHD (see minor assent).

If any guardian expresses interest in the study who does not speak English, a translator will be provided.

7. Describe the procedures for obtaining and recording the informed consent of subjects. Attach a copy of the consent form if written consent is planned. If oral consent is planned, attach a copy of the text of the statement and a request for waiver of written consent.

To ensure confidentiality, an in-person meeting with the parent of each potential participant who express interest in the study will be arranged by the researcher. Upon determining the student meets the criteria to participate in the research study, concerns or questions the parent has about the study will be addressed. If the parent chooses to have their child participate in the study, the informed consent will be signed.

With the parent present, the potential participant will be asked if they understand the nature of their participation in the study, and if they have any questions or concerns. Filling out the minor assent indicates they want to participate in the study (see attached).

8. Describe any potential risks to the subjects, including psychological stress and physical hazards. How are these risks outweighed by the sum of the benefits to the subjects and the importance of the knowledge to be gained?

I do not foresee potential risks to the subject/s.

9. Describe any interventions or manipulations of subjects or their environments.

Twelve 6-8 grade boys will engage with various artistic media (clay, painting, crochet, collage, etc.) every Monday and Wednesday from 4-5:30 pm for a five week art intervention. The art intervention will be held inside the PACT academy's art room. Plan for the art intervention is attached.

No other interventions of the subjects nor their environments will take place.

No manipulations of the subjects nor their environments will take place.

10. What measures will be taken to safeguard the welfare of subjects, their right to privacy and confidentiality of information?

Participants' identities will be kept anonymous and confidential, and any identifying information will be disguised. A pseudonym will be used in the paper. Pictures will be taken of art work, no pictures of any kind will be taken of the participants. The boys can stop the art intervention at any time, by either telling myself or their parent they no longer wish to participate in the research study.

Identities of the parents will be anonymous and confidential and any identifying information will be disguised. A pseudonym will be used in the paper. Parents may choose to answer any questions on the pre and post assessment, and can choose to stop the art intervention at any time by either telling me in person or emailing me.

11. Are school-age children or other minors to be involved? If so, please describe the subject population.

Participants will be selected from a pool of 6-8 grade boys who attend one of Natomas Charter School's academies, who have received a medical diagnosis of ADHD. Parents will sign the informed consent, participants will sign the minor assent.

12. Are psychological tests to be used? If so, please name them.

Yes, the behavioral checklist utilized by the parents of the participants. See attached.

Yes, the behavioral checklist used in the participants classroom observations. See attached.

13. Describe the debriefing of subjects. What steps will be taken to deal with the after-effects of emotional stress resulting from the research procedure?

I will discuss with parents my hypothesis that a five week sensory/kinesthetic based art intervention will move information processing up the brain hierarchy to the prefrontal cortex, resulting in an increase in executive functioning, a reduction in hyperactivity-impulsivity and inattention behaviors and better academic and social outcomes. I do not anticipate any after-effects of emotional stress as a result from the art intervention.

14. What procedures will be taken to insure prompt reporting of (a) proposed changes in the activity, (b) any unanticipated problems involving risks to the subjects or others, (c) any injury to subjects, and (d) any non-compliance with policies and procedures?

I will promptly report any changes, problems, injury, or noncompliance to the Human Subjects Committee.

15. What type of remuneration, if any, will be offered to subjects for their participation in the research?

None.

Appendix D

Approval Email From Sonoma State Institutional Review Board

March 17, 2017

RE: IRB #2767 “Could This Be the Missing Link?”

Dear Danyae,

I am pleased to inform you that your application to the Sonoma State Institutional Review Board has been reviewed by the full board and approved A-2 Exempt. This approval is effective from March 17, 2017 and has no expiration date.

Please contact the IRB at irb@sonoma.edu immediately if you encounter unforeseen difficulties or make significant changes to your planned procedures. We would also like to be notified when your project has been completed.

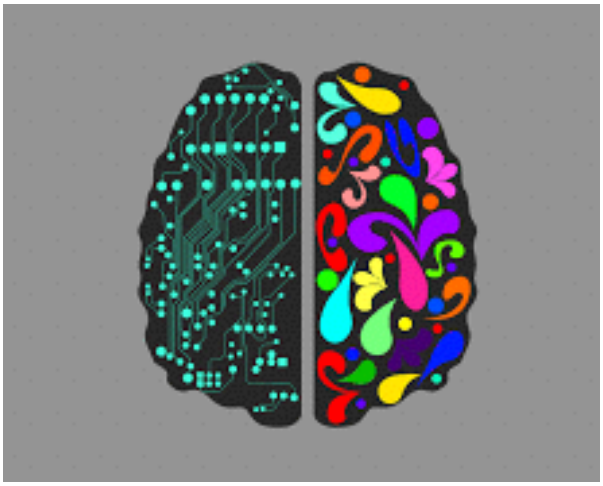
Thank you for your cooperation with IRB protocol. Best wishes to you in your research endeavors.

Patrick Jackson
Chair, SSU IRB
707.664.2126

Appendix E

Recruitment Flier

5 Week FREE Sensory-Based Art Course for 6-8 Grade Boys with ADHD



What: 5 Week Sensory - Based Art Course for 6-8 Grade Boys with ADHD

- Fun & Interactive
- Structured & Independent Activities
- Various Artistic Media: painting, collage, clay, mosaics, etc.
- Art Course is a Pilot Study Examining Inattention & Hyperactive Behaviors after involvement in a 5 week art course

When: May 3 - June 7

Time: Every Monday & Wednesday, 4 - 5:30 PM (Total of TEN sessions)

Where: PACT Academy Art Room

Criteria for qualifying: 6-8 grade boys with a medical diagnosis of ADHD. There are only 12 spots available, cut off date is April 15

Danyae Spada-Chassé, teacher of "Your Amazing Brain", is conducting this study as part of earning a Master's degree in Psychology.

To find out more information about the study:
Email danyae@me.com
In the subject line: PACT Art Study so email can easily be identified OR
Join Danyae at Maestro Cafe off Truxel and Arena to learn more about the study and whether your child qualifies to participate.

Friday, March 31 from 11-12
Saturday, April 8 from 11-1
Monday, April 10 from 9-11

Note: Natomas Charter and PACT are not conducting the study, nor is PACT responsible for any outcomes. Participation is completely voluntary.

Appendix F

Informed Consent for Parent(s) of Participants Engaging in Five Week Sensory - Based Art Intervention

Your child is being invited to participate in a study assessing the effects of a sensory/ kinesthetically based art intervention on 6-8 grade boys with ADHD. The study is being conducted by Danyae Spada-Chassé under the supervision of Dr. Laurel McCabe of Sonoma State University as part of my thesis to earn a Master's degree in psychology. My purpose in this study is to determine if a five week art intervention has an impact on inattention and hyperactivity-impulsivity in 6-8 grade boys with ADHD.

If you would like your child to participate in the research study, he must have received an official ADHD diagnosis of the inattention and hyperactivity-impulsivity presentation.

Your child will attend a five week sensory based art intervention at the Pursuing Academic Choices Together (PACT) academy. Each week's art intervention entails a structured 30 minute art activity utilizing various media such as collage, clay, drawing and coloring. Following the planned art activity, 45 minutes of free art time would allow your child to explore unique types of manipulative art while discovering creative processes they enjoy. In addition, your child will be observed a total of six times: two observations prior to the art intervention, at two weeks, four weeks, and two times upon the conclusion of the study to assess hyperactivity-impulsivity and inattention behaviors. Each observation will be ten minutes, and will be conducted at varying times, permitting greater validity.

You will complete a basic checklist of your child's inattention and hyperactivity-impulsivity behaviors prior to and immediately after the 5 week art intervention.

The information acquired from the study may contribute to researchers' understanding of whether art interventions have an impact on inattention and hyperactivity-impulsivity symptoms in children with ADHD. Your child's participation may contribute to a better understanding of this topic.

I cannot and do not guarantee or promote that your child will receive any benefits from the study. While pictures of your child's artwork will be taken, no identifiers or photos will be taken of your child. Any information which could identify you or your child will be disguised, and pseudonyms rather than your real names will be used in the written research so that your identities will be protected. Findings from the study may be published in scholarly journals and used in professional presentations.

Your child's participation in the study is voluntary, there is no penalty for your or his refusal to participate.

If you have any questions you may reach me at 916-709-3800 or at danyae@me.com. My committee chair, Dr. Laurel McCabe, can be reached at laurel.mccabe@sonoma.edu.

YOU ARE MAKING THE DECISION WHETHER YOUR CHILD WILL BE PARTICIPATING IN THIS STUDY. YOUR SIGNATURE INDICATES THAT YOU HAVE DECIDED TO PARTICIPATE HAVING READ THE INFORMATION PROVIDED ABOVE. YOU WILL RECEIVE A COPY OF THIS FOR YOUR OWN RECORDS.

Child's Name _____

_____	_____	_____
Print Name	Signature	Date

_____	_____	_____
Principal Investigator	Signature	Date

MY CHILD HAS AN OFFICIAL DIAGNOSIS OF ADHD THAT QUALIFIES HIM TO PARTICIPATE IN THIS STUDY.

_____	_____	_____
Print Name	Signature	Date

MY CHILD ____ IS ON MEDICATION THERAPY ____ **NOT** ON MEDICATION THERAPY

MEDICATION IS ADMINISTERED: ____WEEKDAYS ____ WEEKENDS ____ BOTH

MEDICATION IS ADMINISTERED: ____IN THE MORNING ____ NOON _____ NIGHTTIME

Appendix G

Minor Assent

Sonoma State University Institutional Review Board

I am willing to take part in this study that lasts for 5 weeks. I know this is an art intervention that Mrs. Chassé is doing to see if art has an effect on hyperactivity-impulsivity and focusing behaviors in boys like me with ADHD.

I have been told what the research is about. I know that it is like hanging out with other guys my age and doing art for 1 1/2 hours every Monday and Wednesday night for 5 weeks. I also know that Mrs. Chassé and another person will come into my classes once in a while to check on me. This is so they can see if the art intervention is affecting my hyperactive and focusing behaviors.

I also know that I can stop whenever I want by either telling my mom, dad or the researcher (Mrs. Chassé). I won't get into trouble if I decide this isn't something I want to do anymore, and no one will be mad at me for stopping.

Your Name: _____

Today's Date: _____

Your Birthdate: _____

Appendix H

5-Week Pilot Study Email

Hello _____

I am happy to inform you that _____ has been selected to participate in the 5-week pilot study conducted by Danyae Spada-Chassé.

As a reminder, the art intervention starts on Wednesday May 3 and is held from 4-5:30 every Monday and Wednesday through June 7.

_____ should be dropped off by 3:45, as each art intervention starts promptly at 4. Furthermore, _____ should be picked up promptly at 5:40. If you choose to remain on campus, parents can wait in the grand hallway until each art session is finished.

Please ensure _____ has had some type of snack before each art session so he can fully engage in the artistic process, and in clothes that he can easily maneuver in. Since _____ will be engaging in activities that involve paint and glue, please consider sending him in the same clothing that can be discarded at the end of the study.

Attached to this email is a short Parental Behavioral Checklist that needs to be completed and returned to me by April 25. This checklist provides a baseline for _____ inattention and hyperactivity behaviors before the start of the study. Under "rater name," put your name, _____ name, and the date you filled out the form. Mark "pre-intervention." Leave the PC # blank (for my coding purposes). Once completed, you can either scan and email me the completed form or put it in an envelope marked "confidential" and give it to the front desk to place in my mailbox.

I am excited about _____ participation in the study, and look forward to working with him over the next several weeks. Please feel free to reach out via email or a phone call should you have any questions or concerns.

Note: Please provide me the days and times of classes Joshua attends at PACT, for the observation portion of the study.

Warmly,

Danyae Spada-Chassé
email@me.com
(xxx) xxx-xxxx

Appendix I

Expressive Therapies Continuum Intervention

Five Week ETC Intervention for 6th to 8th-Grade Boys with ADHD:

Week 1, intervention 1:
Wednesday, May 3, 2017

First 15 minutes - Introductions, what participants can expect over the next five weeks, free art & structured time expectations (participants lay down the ground rules)

5 minutes - introduce bilateral scribbling

30 minutes - Structured activity
Clay art - do sensory motor play, students experiment creating things meaningful to them

5 minutes - Stretch break with deep breathing exercises

45 minutes - free art time, clean up

Week 1, intervention 2:
Monday, May 8, 2017

First 5 minutes - welcome, bilateral scribbling

30 minutes - structured activity
Use different artistic media to draw initials on paper (markers, acrylic paint, oil pastels, glue, sand)

5 minutes - Stretch break with breathing exercises

45 minutes - free art time, clean up

Week 2, intervention 1:
Wednesday, May 10, 2017

First 5 minutes - welcome, bilateral scribbling

30 minutes - Structured activity
Paint clay items from week 1, intervention 1

5 minutes - Stretch break with breathing exercises

45 minutes - free art time, clean up

Week 2, intervention 2:
Monday, May 15, 2017

First 5 minutes - welcome, bilateral scribbling

30 minutes - structured activity
Create salt dough - boys each measure and mix together ingredients for dough

5 minutes - Stretch break with breathing exercises

45 minutes - free art time, clean up

Week 3, intervention 1:
Wednesday, May 17, 2017

First 5 minutes - welcome, bilateral scribbling

30 minutes - structured activity
Paint various styles, shapes and sizes of bird houses

5 minutes - Stretch break with breathing exercises

45 minutes - free art time, clean up

Week 3, intervention 2:
Monday, May 22, 2017

First 5 minutes - welcome, bilateral scribbling

30 minutes - structured activity
Collage work - Choose pictures out of magazines that reflect interests and curiosities

5 minutes - Stretch break with breathing exercises

45 minutes - free art time, clean up

Week 4, intervention 1:
Wednesday, May 24, 2017

First 5 minutes - welcome, bilateral scribbling

30 minutes - structured activity
Create collage from pictures cut out from week 3, intervention 2

5 minutes - Stretch break with breathing exercises

45 minutes - free art time, clean up

Week 4, intervention 2:
Wednesday, May 31, 2017

First 5 minutes - welcome, bilateral scribbling

30 minutes - structured activity
Trace each participant's body onto large, heavy paper and begin decorating

5 minutes - Stretch break with breathing exercises

45 minutes - free art time, clean up

Week 5, intervention 1:
Monday, June 5, 2017

First 5 minutes - welcome, bilateral scribbling

30 minutes - structured activity
Finish up traced figures from week 4, intervention 2
Work on decorating wooden pictures frames for group picture

5 minutes - Stretch break with breathing exercises

45 minutes - free art time, clean up

Week 5, intervention 2:
Wednesday, June 7, 2017

First 5 minutes - welcome, bilateral scribbling

30 minutes - structured activity
Each participant cut out and inserted group picture for picture frame. Worked independently on any unfinished artistic projects

5 minutes - Stretch break with breathing exercises

45 minutes - free art time, clean up

Different media for students to use during free art time each week: perler beads, coloring pictures, making items with clay, stained glass coloring books, color by numbers activities, mandalas, foam shapes, stamping, making bracelets with a rainbow loom, painting various wooden objects, creating own story book, origami

Appendix J

Parental Behavioral Checklist

PC # _____

Parental Behavioral Checklist

Rater Name: _____

Child's Name: _____

Date: _____

Pre-intervention_____ Post-intervention_____

Instructions: Answer how frequently your child displays the following behaviors by placing a checkmark next to each question.

Behaviors	Once daily	2-3 times daily	4 or more times daily
1. Easily organizes tasks.			
2. Makes careless mistakes with homework. Example: proficient in math concepts but has multiple errors on homework assignments.			
3. Has difficulty keeping attention to the task at hand.			
4. Enjoys tasks that require ongoing mental effort.			
5. Fails to finish activities, not due to refusal or failure to understand. Example: Starts to gather items for school but does not complete the task.			
6. Does not follow through when given directions, not due to refusal or failure to understand. Example: When given multi-step directions follows only one or two steps.			
7. Enjoys engaging in quiet solo activities.			
8. Avoids tasks requiring prolonged mental effort.			

Behaviors	Once daily	2-3 times daily	4 or more times daily
9. Is easily distractible (cannot block out extemporaneous sounds or activities). Example: Attends to dogs barking, TV, noises from back of house, conversation, outside activity.			
10. Is forgetful in daily activities.			
11. Fidgets with hands.			
12. Squirms in seat. Example: Changes position multiple times when doing homework.			
13. Has difficulty organizing tasks and activities.			
14. Leaves seat when remaining seated is expected.			
15. Quiet solo play is difficult.			
16. Blurts out answers before questions have been completed.			
17. Interrupts others' conversations.			

Note: Behavioral questions have been modified from the NICHQ Vanderbilt Assessment Scale.

Appendix K

Behavioral Checklist

PC#____

Behavioral Checklist for boys with ADHD

Rater Name: _____

Child's Name: _____

__(1) Ob # 1 __ (2) Ob # 2 __(3) Ob # 3 __(4) Ob # 4 __(5) Ob # 5 __(6) Ob # 6

Date _____ 10 Minute Observation Time Begin: _____End: _____

Directions:

1) Mark which observation you are conducting (#1, #2, etc.)

2) Using the rating scale below, place a mark on the line that best reflects the level of *activity in the classroom* at the time of the observation. **Very active** - classroom is loud and noisy with students actively engaged in group activities. **Not very active** - classroom is quiet with students engaged in independent work or teacher led instruction.

Very active ____ ____ ____ ____ ____ ____ ____ **Not very active**
7 6 5 4 3 2 1

3) Each observation has a total duration of 10 minutes. Do not go over the 10 minutes. Each observation will be broken down into 5 two-minute intervals; you will place a [/] next to each time the child exhibits the behavior. For example, if the child stares off into space during an entire two-minute observation you would place 1 [/] next to that behavior. If the child continues to stare off into space during each of the 5 two-minute intervals he would receive 5 [/] total.

If the child does not exhibit any of the behaviors leave the checklist blank and state, "No behaviors observed" next to the child's name.
Numbers 1-3 & 6-9 are specific behaviors I am observing; if the child exhibits other behaviors that are not listed, hand write them on numbers 4 & 5.

4) Fill in the date, and what time the 10 minute observation began.

5) Fill in observation end time.

6) Place this form in a sealed envelope with “Danyae Spada-Chassé” on the front and place it in my mailbox.

Behaviors Observed:

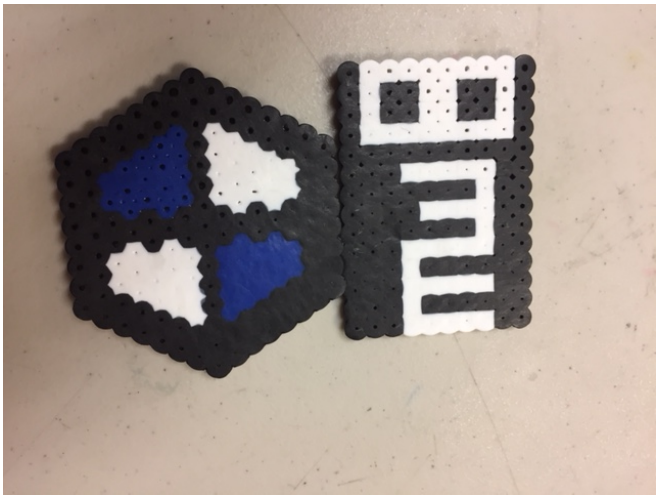
	# of times
1. Stares into space	
2. Wants to use the bathroom or get a drink	
3. Looks at peers for directives	
4. Avoids task at hand: _____	
5. Avoids task at hand: _____	
6. Fidgets with hands	
7. Squirms in seat	
8. Leaves seat	
9. Disrupts peers	

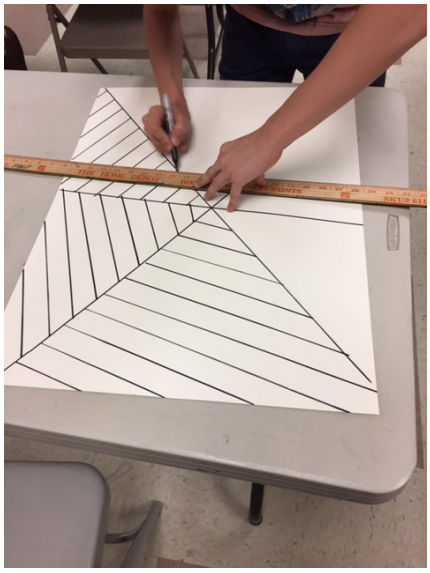
Appendix L

Bilateral Scribbling Example

Appendix M

Participant Projects



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