CHILDHOOD AND TRAUMA: THE EFFECTS OF ADVERSE CHILDHOOD EXPERIENCES ON THE BRAIN, BEHAVIOR, AND LEARNING IN THE ELEMENTARY SCHOOL CLASSROOM

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ABSTRACT

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Aeryn Aguilar

A variety of studies have been conducted on how trauma, caused by emotional, physical, or verbal abuse, impact children's lives. Many of the studies which involved observations and assessments were done with the preexisting knowledge that these children had been through a traumatic experience. Instead of looking at behavior of known cases, this study's goal is to find out whether or not children's observable behaviors can predict cases of trauma. For example, is acting out or defiance a key sign of trauma or is it part of the typical development for the elementary school-age group? This thesis takes into account three major elements effected by trauma: the brain, behavior, and the learning process. Within this paper, the importance of all three in the case of children and traumatic experiences is explained. Within the research study, behavior is examined by first observing classrooms of nine year-old, elementary school children using certain criteria to predict which of the children might have traumatic backgrounds. Using the Trauma Symptom Checklist for Children (TSCC-A) to assess and measure posttraumatic stress, the scores of the assessment are compared to the observations, to determine if such correlations can be made between certain behaviors

and past traumatic experiences. The purpose of this research is to aid public elementary school staff in understanding how trauma effects children in the classroom and what the results of those effects means for the children's learning processes.

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INTRODUCTION

Is there a relationship between past traumatic childhood experiences and how those children effected by trauma develop, behave, and learn in the elementary school classroom? Trauma is not easily defined with one particular description. Trauma can be many things and it can mean something different to many people. The same goes for the effects of trauma. What can be agreed upon is that every experience human beings have involves the brain and the brain in turn effects the body's future responses to similar experiences. What must be explored to answer the research question, is how these different elements: the brain, behavior, and learning interact with each other and how they are effected by one another.

This research is significant to the field of education, because in the classroom, children undergo multiple stressors, but many teachers are unaware of how trauma effects stress responses in certain children, therefore they might not recognize that a child needs more support or varying types of teaching methods to be successful in the classroom and in learning overall. This thesis paper is aimed at educating other professionals in the field about the devastating effects of trauma on developing children in middle childhood and the importance of trauma informed practices in elementary school classrooms. For these reasons, this paper will address a variety of topics ranging from brain anatomy and function, the process of learning, stress response behaviors and the correlation between observable behavior and traumatic exposure. In examining the literature, it became clear that explaining how the brain, behavior, and learning effect one another after a traumatic

experience, was necessary in order to properly represent the research problem in question.

For the most part, trauma is defined as a distressing or disturbing experience, ranging from an event such as a natural disaster or significant psychological, emotional, or physical harm brought on by another person. Adverse childhood experiences focuses on traumatic events involving interactions with other people which can either happen to the child themselves or the child can witness the event. For example, adverse childhood experiences can be emotional or physical abuse, witnessing violence in the home, exposure to parental substance abuse, and even parental separation or divorce. This paper will use trauma as a general term for adverse childhood experiences, while adverse childhood experiences itself will be used in relation to talking specifically about any physical, psychological, or emotional abuse that can result in developmental deficits in a child's brain, which in effect, changes the child's behavioral responses and learning processes.

LITERATURE REVIEW

Introduction

Childhood trauma, brain development, behavior, and learning are topics that, by themselves, have considerable bodies of research published in their respected fields (Shonkoff & Garner, 2012). However, the idea that all of these subjects fit together, work together, and are effected by each other when learning in a school setting, is a much newer concept that has gained momentum in recent years (Lombardi, 2017). The term "trauma-informed care" is usually a foreign term to many primary school educators today (Falk & Troeh, 2017; Schwartz, 2016) and the concept of a trauma-informed classroom is unclear to educators and school administrators who do not have experience with child development or psychology. Those who do have experience within these fields of study know that when teachers pay attention and identify signs of trauma, they will also recognize a difference in how children learn (Dorado & Zakrzewski, 2013). There are three key questions that need to be asked: how researchers know there is a difference between a typical child learning and a child who has experienced trauma, what research supports that understanding, and why such information is pivotal when working with children in the classroom. This literature review considers a collection of studies and data by researchers across multiple fields in an attempt to answer these questions.

This study explores the relationship between childhood trauma, brain development, and observable behavior. This literature review surveys research in the

fields of child development, psychology, and neuroscience as they relate to the topic of brain development, learning, behavior, and trauma. This chapter will investigate the following categories and subcategories: brain anatomy, the parts of the brain and their functions, functional locality, and learning; brain development in early childhood (birth-five) and middle childhood (6-12), a look at the relationship between brain development and function within early and middle childhood; the brain and emotion (emotion locality), fear/stress responses, and varying observable behaviors in traumatized children. Following those topics the review will examine the literature on resilience and its importance in relation to trauma, the Adverse Childhood Experiences (ACEs) test and related assessments, trauma-informed care in elementary schools and the practice's impact, including concluding statements, and gaps in the research.

Brain Anatomy

Before brain development can be discussed in its relation to trauma and behavior, the anatomy of the brain needs to be explored. Brain anatomy is important, because the location of information being processed, stored, and retrieved is essential to understanding not only how the brain develops concepts and learning, but also which parts of the brain are responsible for observable responses to trauma and which parts of the brain are effected or changed by traumatic events. After each part of the brain is defined, individual parts will be discussed in relation to learning. Later on in the review,

the effect of trauma on learning, brain development, and behavior in these parts of the brain will also be explained.

The brain is made up of three different sections: the hindbrain, the midbrain, and the forebrain. The hindbrain consists of the cerebellum, pons and medulla. The midbrain consists of the tectum, tegmentum, superior colliculi, inferior colliculi, substantia nigra, ventral tegmental area, periaqueductal grey area, raphe nucleus, and the reticular formation. Together, the midbrain and most of the hindbrain are often referred to as the brainstem. The forebrain consists of the cerebrum, corpus callosum, insula, cingulate cortex, fornix, mammillary bodies, and subcortical structures such as the basal ganglia and limbic system. Within the limbic system is the thalamus, hypothalamus, hippocampus, and the amygdala. Within the basal ganglia is the globus pallidus, putamen, and caudate nucleus. Within the cerebral cortex there are the four lobes: the frontal lobe, occipital lobe, temporal lobe, and the parietal lobe. (Pinel, 2008; Rice University, 2014). Although all of these parts of the brain have been broken down for clarity, this section's main focus will be on the brainstem, cerebrum, and cerebral cortex, which are the three main parts of the brain (Schmidler, 2017). These three main parts of the brain are important, because within them, there are smaller pieces which take part in the functions of learning.

The brainstem (the hindbrain and midbrain) connects the spinal cord to the upper brain. The spinal cord is responsible for controlling a human's reflexes and instinctive processes like breathing, sneezing, heartrate, blood pressure, and yawning. The brain stem (also called the lower brain) is known as the oldest and most primitive part of the

brain, because the brainstem is the first part of the brain to form in an embryo's development (Nolte, 2002). The brainstem works with the central nervous system and the peripheral nervous system, using the autonomic nervous system, to regulate automatic functions in the body. The brainstem and the autonomic nervous system not only regulate heartrate, blood flow, and body temperature, but also digestion, proper organ function, and physical stress responses/the fight or flight response (Dougherty, 1997; Nolte, 2002). In a relaxed state, when the body is calm, heartrate is steady, and digestion occurs, the parasympathetic branch of the autonomic nervous system is in control. In traumatic or highly stressful events, these physical responses are triggered by the sympathetic branch of the autonomic nervous system, accompanied by the brainstem, in order to activate the child's survival instincts. In the instances when these physical responses are triggered, the body goes from a calm state to an alarmed state and digestion decreases (Pinel, 2008).

The cerebrum is the largest part of the brain, divided into two hemispheres: the left and the right, which connect to each other using nerve fibers called the corpus callosum. The cerebrum is responsible for higher-order function brain processing, such as learning, memory, and understanding language (Nolte, 2002).

The cerebral cortex surrounds the cerebrum like a thick outer layer. The cerebral cortex is divided into four units called lobes and these lobes are named the frontal lobe, parietal lobe, occipital lobe, and temporal lobe, which also have their own roles to play in the brain (Ackerman, 1992). The frontal lobe is the unit in the cerebral cortex that controls motor (large and fine) movements and coordination. The frontal lobe is also the

unit that initiates higher-order thinking, problem-solving, organization, metacognition, and critical thinking (Nolte, 2002).

The parietal lobe is the unit of the cerebral cortex that encompasses sensory input and output, language, and attention (Nolte, 2002). If the parietal lobe becomes damaged, depending on which side of the lobe has been damaged, sensory and/or auditory disorders may occur. Spatial recognition and awareness (housed in the right side of the parietal lobe) or the ability to process and understand spoken language (housed in the left side of the parietal lobe) can be difficult as a result of damage (Barton & Butters, 1970; Brody, Butters, Goodglass, & Samuels, 1970).

The occipital lobe is the unit in the cerebral cortex that helps to process visual information, such as color and shape recognition, movement, brightness, and texture (Nolte, 2002).

The temporal lobe is the part of the cerebral cortex that processes sensory information, the auditory sense being the most prominent. The temporal lobe's role of processing the sensory information should not be confused with the parietal lobe's storage of sensory input and output (Nolte, 2002). This breakdown of the anatomy of the brain is an overview of the structures that make up the brain. In the next section, how these structures work during brain function will be examined; how emotion plays a part in each of these structures will also be discussed in a later section, as well as how trauma effects the function of each of the structures.

Brain Function

The brain is the most complex organ in the human body. The human brain houses billions of neurons and those neurons make trillions of neural connections starting at birth. Every time a child sees, hears, smells, tastes, or feels something in their environment, more connections are made (Perry, Pollard, Blaicley, Baker, & Vigilante, 1995). The brain also has different structures that help control complex functions in the brain. In this study, the term brain function is used to describe what the brain is doing when learning and how that functioning differs when looking at traumatized children. The term brain localization refers to what structure of the brain lights up in a brain scan when a child is learning and the specific job that part of the brain performs when learning.

Imagine a child who has experienced a traumatic event (whether the event is a natural disaster, chronic abuse, or something in between). After the event, the child's brain internalizes the traumatic experience and adapts itself in order to react to the (external and internal) environment, predicting how the brain and the body needs to respond to similar situations in order to survive (Perry, 2006). Furthermore, the initial adaptive response to the trauma is most likely the automatic response to any future trauma.

Everything human beings do comes from the brain, including the senses that are used (Perry et al., 1995). What humans' sense and experience changes the structure and function of their brains, especially at the infant stage when everything is developing and

the infant is making new connections (Perry et al., 1995). Moreover, the more the action is repeated, the stronger those connections related to that action become (Sprenger, 1999). The brain then stores these experiences for future use, predicting how the brain and the body will respond to the same or similar type of situation in the future.

Learning and memory also depend on these repeated actions in order to create connections (Perry et al., 1995). Children store information given to them through a lesson at school and what they see, hear, touch, or taste is locked away in their brain for future use. Depending on whether or not they frequently pull out that information, the connections they made within that lesson can grow stronger, providing the support to remember or recall what they learned. If the information a child is learning does not get reinforced or if the action being learned is not used repeatedly, the connections that formed in the child's brain will become weaker and over time the child will forget. This action of losing neuronal connections is termed synaptic pruning (Sandoval, 2015). For a traumatized child, learning and memory can have deficits due to the effects of physical or emotional trauma. Physical trauma may result in parts of the brain being unable to store short-term memories, which could stunt the learning process or dissociative behaviors, such as memory loss or feeling detached from reality, could cause a child not to retain information during classroom instruction.

Sensitization is another result from trauma that may hinder learning. When the brain becomes hyper-aroused due to trauma, even minor stressors can trigger a fear response and in doing so, may result in the child either being too anxious or afraid to learn, or so distracted by fear or stress they cannot focus (Perry et al., 1995). In a child's

developing brain, these fear responses organize themselves into neural systems. Later, these molecular structures that allow for the organization of systems to be created in the brain are the same structures that process new information (Perry et al., 1995).

Brain locality

In this subsection, the structures of the brain and their functions in relation to learning will be examined and explained. Many of these anatomical structures have already been broken down and defined in the previous section: brain anatomy. In this section, however, the details of these structures in relation to learning and trauma will be elaborated. Some of the descriptions of these structures only focus on learning, while some focus on both learning and trauma. In addition, some structures of the brain that were not introduced in the previous brain anatomy section, will be introduced in this subsection. The descriptions below that focus solely on learning will be expanded on in a later section when discussing the effects of trauma on the brain in greater detail. It is important to first explain how these structures are typically expected to function, so when the effects of trauma on these structures is explained, the differences when typical and atypical functions are compared, is clear.

Carrion and Wong (2012) discuss the impact of trauma on the developing brain, particularly how trauma effects the learning process. Within the school system, studies have shown that traumatized children have lower performance in school, lower reading levels, and lower language and articulation skills (Carrion & Wong, 2012). These

characteristics can be traced back to what is happening in the brain (using neuroimaging) and, in particular, what is occurring in the hippocampus and the prefrontal cortex (Carrion et al., 2012).

The hippocampus is a structure in the limbic system of the brain that is turned on during the process of receiving and internalizing information and retrieving that information later when needed (Carrion et al., 2012). In this way, the hippocampus is a part of the structure in the brain that supports the process of learning and memory (Nolte, 2004). Imagine someone being unable to remember what the previous sentence in a book explained, what task they were going into the kitchen to perform, or a concept a teacher discussed five minutes ago. Damage to the hippocampus is damage to long-term and short-term memory, because it is in the hippocampus where short-term memory gets transferred into long-term memory (Hartley, Bird, Chan, Cipolotti, Husain, Vargha-Khadem, & Burgess, 2007; Heinemann, 2005; Jeneson & Squire, 2012; Kumaran, 2008). However the damage to short-term and long-term memory in the hippocampus more or less only involves the recall of facts and events, when it comes to learning. The body can still physically remember how to perform a task, such as how to play the piano, ride a bike, or anything else having to do with muscle memory (Nolte, 2002).

For children who have experienced trauma, the hippocampus has been shown to fire differently. Because of fear and stress responses activated in the brain using the same structures as the ones that process new information, learning and memory are affected and hindered due to the brain's response to the past experiences of trauma (Carrion et al., 2012). The brain is usually also in a state of hyperarousal during a fear or stress response,

which means the child is not in control of their thought processing and therefore retaining information and retrieving information will be challenging (Carrion et al., 2012).

The prefrontal cortex (housed in the frontal lobe) is a structure in the brain that helps with the regulation of attention and associating stimuli with a response. In other words, having the brain tell the body how to react to sound, touch, taste, or sight (Carrion et al., 2012). Attention and stimuli response also have an effect on learning. The prefrontal cortex (PFC) allows the brain to filter information and in doing so, suppresses other stimuli in the environment that might be distracting (Carrion et al., 2012). For example, typically developing children can filter out noises around them and concentrate either on their inner thought or on a specific sound, like a teacher's voice. This ability to focus makes it easier for the child to access information received from that stimuli, because the stimuli is isolated from other distractors (Carrion et al., 2012).

With a traumatized child, the filter that supports attention and focus is interrupted by the fear/stress response. When fight or flight (a fear or stress response) is triggered, the child cannot control their attention or filter out numerous stimuli and, as a result, they cannot control their brain's response or what their brain chooses to focus on (Carrion et al., 2012). Furthermore, when a stress/fear response is activated, the memory of the past trauma can be triggered and the brain can send signals to the body, forcing the body's response to associate the event with a freeze, fight, or retreat action (Carrion et al., 2012). Although the fight-or-flight/fear response is one of the most researched responses to stress, keep in mind it is not the only one. The most commonly used coping method to distress is dissociation (Perry, 2004; MacKinnon, 2012).

Carrion, Kletter, and Wong (2012) also researched neuroimaging and posttraumatic stress disorder (PTSD) in children. This study was done after their initial study on the hippocampus, the prefrontal cortex, and learning. Again, they focused on the prefrontal cortex (PFC) and the PFC's relationship to shifting attention, response to stimuli, memory, and learning. The neuroimaging used in the research showed that there were lesions on the PFC part of the brain and using that data they connected the lesions on the PFC to deficits in attention, memory, cognition, and executive function (Carrion, Kletter, & Wong, 2012).

Children who have experienced trauma are more likely to have trouble shifting their attention and focusing, difficulty with complex cognitive thought processing such as problem-solving, and attaining lower levels of the developmental domains like language, visual-spatial awareness, and reading (Carrion et al., 2012). In Carrion, Kletter, and Wong's (2012) research, a connection was found between PTSD and a low intelligence quotient (IQ) in the children that were tested. There is evidence within this neuroimaging study that suggest slower cognitive processing, emotional sensitivity, trouble with memory, and lower test scores can all be attributed to the damage of the prefrontal cortex (Carrion et al., 2012).

Consistent with the data accumulated in Carrion, Kletter, and Wong's (2012) study, there is room to argue that damage to the prefrontal cortex and effects of trauma on a child's stress/fear response, cause deficiency in learning. Both the prefrontal cortex and the hippocampus are responsible for the absorption and retention of information, as well as responding to the environment in which the information is being given. With the

neuroimaging of these two structures in the brain, researchers are able to see that there is a correlation between damage in the prefrontal cortex and PTSD in children (Carrion et al., 2012). The importance of neuroimaging as evidence of the connection between traumatized children and the differences in learning will be more thoroughly examined in a later section of this review.

As previously mentioned, the cerebrum is the largest part of the human brain, but the cerebrum's role in the learning process is not solitary. The cerebrum, which is part of the forebrain and located at the top of the brain, also works with the cerebral cortex and its lobes. (Rice University, 2014). The cerebrum deals with thinking, memory, and perception of language. The cerebrum specializes in processing sensory input and output, which include not only physical (motor) responses, but also thought processing in response to the sensory input or output (Nolte, 2002).

The cerebral cortex's primary function in relation to the function of the cerebrum is to process new incoming information. The processing of new information is used by the visual, auditory, motor, language, and prefrontal cortexes (Swenson, 2006). The cerebral cortex uses these other parts to process information through the senses. The prefrontal cortex also has two main parts: the dorsolateral prefrontal cortex (DLPC) and the orbitomedial prefrontal cortex. The DLPC is the part of the prefrontal cortex which is involved in executive functions, such as working memory, judgment, planning, abstract thought, reasoning, problem-solving, and focusing attention (Swenson, 2006). As previously mentioned in the study done by Carrion and Wong (2012), the functions in the

prefrontal cortex such as memory, problem-solving, executive function, and attention are compromised when reliving a traumatic event (PTSD).

The lobes (frontal, parietal, occipital, and temporal), which are located within the cerebral cortex, are the four main areas of the cerebrum. As a reminder of the anatomy, the frontal lobe is located behind the forehead. The frontal lobe is concerned with the control of behavior (emotion), movement, thinking, reasoning, memory, and speaking. The temporal lobe is located by the ears, on either side of the head. The temporal lobe is concerned with controlling processes such as hearing and understanding language. It is also concerned with the control of behavior and memory, similar to the frontal lobe. The occipital lobe is located at the back of the head. The occipital lobe is concerned with controlling and processing vision. The parietal lobe is located at the top of the head. The parietal lobe is concerned with controlling processes, such as the sense of direction, spatial recognition, reading, and the sense of touch (Schmidler, 2017; Rice University, 2014). These three elements of the brain (the cerebrum, the cerebral cortex, and the lobes), with help from the hippocampus and the prefrontal cortex, work together to process thought, reason, new incoming information, and learning.

All of these functions within the lobes of the cerebral cortex, along with the functions of the cerebrum, and the functions of the hippocampus within the limbic system cannot function properly when a child is stressed, going through PTSD, or in their fight or flight brainstem/autonomic nervous system (Bremner, 2005). When a fear or stress response is triggered, the brainstem and the autonomic nervous system take control over the child's response to their environment. The child can no longer problem-solve, reason,

focus, or consciously/unconsciously filter out any outside information, including sound and movement of other objects, like people (Sherin & Nemeroff, 2011). During the fight or flight response, there is also a deficit in the control of emotions (Nolte, 2002). In the next subsection, the structures in the brain and their functions in relation to emotion will be discussed.

Emotional locality

The main structures of the brain associated with emotion include the amygdala, the hippocampus, and the autonomic nervous system. While the amygdala and the hippocampus control emotional responses (both conscious and subconscious), the autonomic nervous system controls the reflexes' responses, as well as other bodily responses to emotion (Nolte, 2002). The amygdala and the hippocampus also have an influence on memory. In this particular section, only memory in the context of emotion will be discussed. However in a later section, memory will be discussed in broader terms when it comes to the other structures of the brain, as well as the relationship between memory, learning, and trauma.

The amygdala is located in the limbic system, just below the cerebrum. The amygdala also touches parts of the hippocampus and the temporal lobe. The amygdala is responsible for receiving sensory inputs through different modalities such as visual, auditory, and visceral types of structures in the brain. The amygdala is also involved in emotional responses to the environment; this includes the role emotion plays in learning

(Nolte, 2002). When talking about emotion, the spectrum is quite large. Human emotions and feelings are complex, powerful, and influential to a human's behavior and response to situations. Someone could act in anger, frustration, sadness, grief, or even happiness and excitement. The amygdala is the structure at the center of all this activity (LeDoux & Phelps, 2005; Nolte, 2002).

When the amygdala is stimulated in a traumatic situation, most often what happens is that the amygdala will respond to the stimuli by zeroing in on the appropriate emotion and focusing solely on that response. This emotional response in turn triggers the physical response, which could range from freezing or fleeing in fear, or fighting in anger. Although it has been stated already that the amygdala's response to any outside stimulation varies widely when it comes to emotion, the main emotion that the amygdala controls is fear (Nolte, 2002). The amygdala's fear response to averse events is especially important in the context of trauma, because if the fear response is constantly being fired in the brain, this can become toxic and damaging to the brain's development (Lewis & van der Kolk, 2015).

Fear conditioning is also an important factor in the use of emotion and the amygdala. Fear conditioning is a type of training of the brain, where an animal or a human associates a sound, a touch, or an object with fear and a response, because the stimulus in question usually results in the human or animal receiving something unpleasant from the interaction (such as an electric shock). The sound, touch, or object is called the conditional stimulus (CS) and the averse result is called the unconditional stimulus. The human or animal's reaction or response is called the conditional response

(freeze, fight, or flight) (Stanford, 2017). Similar to what happens with chronic or toxic stress due to the continuous fear response, fear conditioning changes how the brain reacts to aversive situations. For example, if a child has been conditioned in a situation of abuse to be afraid of large men, the next time the child sees a large man out in public, the child is likely to react in fear (Mahan & Ressler, 2012; Stanford, 2017). The amygdala not only has an important role in the reception of outside stimuli and the expression of emotion, but the amygdala also plays a role acquisitioning the fear conditioned response (Stanford, 2017).

On the other hand, when the amygdala is damaged or removed through surgery, the intensity of emotions decrease or are indistinct altogether. Destruction to the amygdala can cause decreased levels of aggression, anger, frustration, excitement, joy, and even sadness (Nolte, 2002). Instead the person is calm, unaware, and detached. This is because when the amygdala is removed, there is nowhere for the stimuli to be received or responded to. This not only involves the amygdala's emotional response, but the autonomic nervous systems physical response as well. Fear conditioning and the absence of the amygdala also have roles to play in learning. It has been stated that the stronger emotional response that a person has to an event or working on a task, the more likely the person will remember the event or how to perform that skill (Abe, 2001; Cahill & McGaugh, 1998; Nolte, 2002). This correlation of emotion to memory also involves the hippocampus.

The hippocampus is the primary memory system within the brain and the amygdala is the main structure in the brain that houses and processes emotion;

particularly, fear (Phelps, 2004). These two systems work independently (Phelps, 2004), storing and recollecting both implicit and explicit memory (Nolte, 2002) and receiving and processing emotional input and output (Nolte, 2002). However, these two systems also interact in certain situations where memory and emotion collide (Phelps, 2004). Most of the evidence for amygdala–hippocampal interactions comes from research examining how memories associated with strong emotional responses are more vivid and easier to access than that of other memories (Abe, 2001; Cahill & McGaugh, 1998; Nolte, 2002; Phelps, 2004).

Going back to the example of fear conditioning, the child's evasive reaction to seeing a large man after being exposed to abuse by someone of a similar description, utilizes the hippocampus through emotional memory. The hippocampus retrieves the memory and with the memory comes the emotional and the physical response the child's brain triggered (Phelps, 2004). The influence of the amygdala and emotion on the hippocampus and memory uses this same concept of emotional event, response, and storage of the emotional reaction. Some studies have shown that the amygdala releases a stress hormone, triggering a more intense emotional reaction, making the event more memorable than one that did not elicit a strong reaction (Phelps, 2004). Therefore it can be proposed that the amygdala enhances memory through emotion (Phelps, 2004).

However, the hippocampus also influences the amygdala by forming narrative images as representations and interpretations of events and their emotional significance, during emotional stimulation (Phelps, 2004). For example, telling a child that if they talk back, they will get hit. The hit may or may not occur, but the perception of the threat can

still elicit an emotional response, especially if the result of the proposed threat has occurred in the past. These results suggest that having an instructed, episodic representation of the emotional significance of a stimulus can lead to activation of the amygdala, which in turn mediates the physiological expression of fear when this stimulus is encountered. These types of fears are imagined and anticipated, but never actually experienced, yet they rely on similar neural mechanisms for expression as those that are learned through direct experience (Phelps, 2004).

Moreover, these emotional memories can be triggered either implicitly or explicitly, meaning that the child can consciously or subconsciously remember the event. When consciously remembering events, the child can recall exactly what they were doing or what was said and how they felt, while subconsciously remembering comes more from the body and physical memory (Nolte, 2002). Explicit memory (or declarative) memory is the conscious, accessible recall of remembered facts or events, while implicit memory is the subconscious (usually physical) response to remembered events or stimuli. For example, in a traumatic event your explicit memory will consciously recall how you felt or what you did, while your explicit memory will subconsciously recall how you reacted physically during the event (Nolte, 2002). When talking about implicit, conditioned reflexes to situations, the autonomic nervous system also plays a role in the brain's emotional locality.

The autonomic nervous system is a part of the nervous system in the human body that controls involuntary or unconscious regulations within the internal organs (Nolte, 2002).

The autonomic nervous system also includes and is divided by three subsystems:

the sympathetic, parasympathetic, and enteric nervous systems (Nolte, 2002). The autonomic nervous system controls and regulates such mechanisms as digestion, the heart, and the glands, but within the context of trauma and emotion, the autonomic nervous system also controls the fight or flight reflexes of the body (Porges, 1997). These reflexes include the mobile and immobilization reflexes needed for fight or flight, as well as heartrate increase or decrease and the metabolic regulation during the fight or flight period, where heartrate and, in turn, metabolism, might be rapidly increasing (Porges, 1997). Sweating, swallowing, facial expressions, sensation, and pain are also associated with the autonomic nervous system. However, the autonomic nervous system and its subdivisions do not simply control and regulate the internal organs alone. The autonomic nervous system and its subdivisions also control facial expression, vocalization, and the expression of feelings in regard to the body.

The visceral afferents, are the mechanisms in the autonomic nervous system, responsible for the conduction of sensory impulses such as pain or sensation related to reflex which determine the feeling of or from the body (Porges, 1997). For example, the feeling or sense of nausea during an emotional event or feeling sick to the stomach during an unpleasant situation are visceral manifestations of the autonomic nervous system (Porges, 1997). During these types of periods where the body and brain are hyperaware or aroused, the autonomic nervous system might also respond with rapid breathing and heartrate, amplifying the emotion, usually fear, that is being conveyed (Porges, 1997).

The sympathetic nervous system is the subdivision in the autonomic nervous system associated with mobilization; activation of this system is linked to the movement

of the major limbs on the human body. This subdivision has also been linked to the fight or flight reflexes during stress or fear responses (Porges, 1997). The sympathetic nervous system controls cardiac output, which is how much blood is being pumped to the heart at a given rate, and the sweat glands, which cool the body's temperature. Furthermore, the sympathetic nervous system and the polyvagal system (the many-nerves system theory in relation to stress responses, proposed by Stephen Porges, 1997) work side by side within fear or stress responses, with the sympathetic nervous system controlling the fight or flight reactions and the fibers within the polyvagal system controlling other responses, such as the freeze or immobilization response in a terrifying situation (Porges, 1997).

The parasympathetic nervous system also plays a role in the fear or stress response. Control of facial muscles and expression including eye movement (rapid eye movement) and widening of the eyes, pupil dilation, nostril flaring, and brow furrowing, have been noted as part of the parasympathetic nervous system's role (Porges, 1997). The parasympathetic nervous system, along with the sympathetic nervous system and the general role of the autonomic nervous system overall, controls, regulates, and expresses how the human body physically shows emotion (Porges, 1997). How these structures and systems in the brain are effected developmentally as a result of trauma will be discussed in a later section of this review.

Memory

Throughout this review, the hippocampus has played an integral part in understanding brain function and emotional memory. As a recapitulation, the hippocampus is where memories are stored and used (Phelps, 2004) and it plays a crucial part in the process of learning (Abe, 2001). Memory storage and recall are important when it comes to learning, because retrieving prior knowledge in the formation of new information or in recognizing previous events or situations, is how the brain learns new things or strengthens something already learned (University of California, Berkley, 2018). In cases where traumatic events are involved, the memory center of the hippocampus can be effected (Bremner, 2005).

Posttraumatic Stress Disorder (PTSD) is a significant example of how memory works against someone after a traumatic event. PTSD can cause episodes of flashbacks, nightmares, and changes in memory, where images become distorted (Bremner, 2005). Verbal declarative memory (or explicit memory) is the type of memory the hippocampus engages with (Bremner, 2005) and in comparison with studies of how strongly emotional memories are remembered for future recalls (Abe, 2001; Cahill & McGaugh, 1998; Nolte, 2002), other studies have shown that the hippocampus' verbal declarative memory, as well as dissociative episodes from short-term events (every day, short-term memory) suffer as an effect of PTSD (Bremner, 2005). Not only can the function of the hippocampus be effected by traumatic incidents, but the structure of the hippocampus itself can also lose its volume. Although studies have not shown loss of volume in

children after trauma, adults who suffered childhood abuse were shown to have loss of hippocampal volume, demonstrating the long-term effects of traumatic events in childhood (Bremner, 2005; Shonkoff & Garner, 2012). Furthermore, traumatic events do not have to be abundant to cause lasting effects. Smaller hippocampal volume has been recorded more often in patients who suffered one traumatic event, than in patients who suffered multiple traumatic experiences (Bremner, 2005).

The process of learning involves multiple forms of memory, such as semantic, episodic, procedural, automatic, and emotional memory. Semantic memory is the type of memory most often used in the classroom, which relies on recalling repeatedly learned facts and basic knowledge (Sprenger, 1999). Episodic memory (remembering events, times, and dates in order), procedural memory (physically knowing how to perform tasks, especially motor skills), and automatic memory (knowing how to do something without using any processing, because the action was repeated so many times) are also used in learning processes, although they are used less often than semantic memory (Spregner, 1999). Emotional memory is the most powerful type of memory, so much so that it can activate all the other types of memory, cause a person to forget everything but that emotional feeling or event, and increase motivation (Spregner, 1999). Even though emotional memory is the most powerful and the most influencing, it is also the lesser used out of all the other types of memory, when learning in an elementary school setting (Spregner, 1999). With memory and learning being so closely connected and understanding how deeply affected long-term memory can be after trauma, perhaps what needs to be implemented in school instruction is the utilization of new, positive,

emotional memories in the classroom. Not only would the positive emotional memories improve learning (Sprenger, 1999), but they would also influence the children's long-term memory.

Brain Development

In an effort to more clearly define the difference or the contrast between children who typically develop and children who experience childhood trauma, it is important to discuss brain development, particularly brain development of middle childhood, which is the stage of human development associated with elementary school-aged children (the population focus of this paper). Although there are differing definitions of ages for middle childhood, for this paper middle childhood will be defined as elementary school-aged children, ranging from ages 6 to 12. To understand the full scope of brain development however, early childhood brain development will also be briefly reviewed.

During utero, a typical child's brain grows rapidly, not only in volume, but also in developing neural pathways and structures (Bremner, 2005). However, development of the brain structurally, as well as functionally does not stop at birth (Gauvain & Cole, 2004). Throughout the first years of a child's life, when they grow from infant to toddler and onto a child, the brain is constantly taking in information, learning, forming synaptic connections in the brain, and pruning skills they developed, yet did not use enough (Gauvain & Cole, 2004; Mah & Ford-Jones, 2012). Though the development of the brain in early childhood is critical to how the brain will develop in later stages (Gauvain &

Cole, 2004), middle childhood brain development is the stage where many of the brain's structures form long-term connections (Bremner, 2005).

Middle childhood

During middle childhood, the brain is building on prior knowledge, while also participating in new experiences and selectively activating specific regions in the brain. (Mah & Ford-Jones, 2012). Where the brain was being stimulated in multiple areas during early childhood, taking in each new experience to create an abundance of neural connections (or synapses), the brain in middle childhood is strengthening connections, pruning unused knowledge, and relating familiar stimuli to particular regions in the brain where the stimulus has been before (Mah & Ford-Jones, 2012). Furthermore, during the middle childhood stage, the child becomes more in control of their thought process, including reasoning during periods of planning and/or problem-solving. Recall becomes easier due to myelination (the process of myelin coating the axon of a neuron in the brain to protect the neuron and allow for more efficient signal conduction), as does abstract and complex cognitive (or higher-order) thinking (Mah & Ford-Jones, 2012).

Changes occur in social, emotional, and individual aspects of development, with children not only interacting with their environment and community, but also figuring out where they fit in society as an individual (Mah & Ford-Jones, 2012; Kraus, 2008). Independent thinking and understanding, expressing ideas, forming meaningful connections with peers and family members, and being able to regulate all of the

stimulation that comes with these maturing, complex, experiences is what will shape a child's worldview during this developmental stage, as well as the adolescent and adult stages (Mah & Ford-Jones, 2012; Kraus, 2008).

Timing of experiences during different stages in a child's development is important, as is the level in which challenges for children are set. For example, teachers using scaffolding techniques in education by introducing multifaceted concepts or problems and guiding children's learning to support them in understanding the concept or solving the problem (Shabani & Khatib & Ebadi, 2010). Typically developing children can usually meet these age-appropriate challenges, use complex cognitive thinking effectively, and interact with the world around them, with little to no interference or severe struggle. In other words, typically developing children should be able to respond to tolerable amounts of stress in a productive way (Child Welfare Information Gateway, 2015). The brain of a traumatized child is different (Shonkoff & Phillips, 2000).

Brain development and trauma in middle childhood

Throughout the majority of this paper, the specific regions in the brain associated with developmental skills and important cognitive functions related to learning during childhood, have been discussed. Not only have the functions of these developing regions been discussed on a basic level, but also in regards to how the structures might develop and function differently after a traumatic experience. Therefore, this section is dedicated to diving deeper into how the traumatized brain of a child in the stage of middle

childhood might react to situations (both in learning and socializing) in the elementary school classroom. It should be noted that not every child who has experienced a traumatic event or repeated traumas, will behave or respond to a stimulus in the same way. Genetic predispositions (such as a child's temperament) as well as environment have an effect on a child's response to the world around them (Mah & Ford-Jones, 2012). Furthermore, it is important to distinguish that when discussing damage to the brain, in this case, the focus is on developmental damage rather than physical damage from a physical brain injury. Although there are many cases of physical abuse where damage to the brain has occurred as a result (Child Welfare Information Gateway, 2015), developmental damage to the brain that relates to neglect, maltreatment, and experiences of traumatic events in association with deficits in the learning areas of the brain (broken down in the anatomy section) is the emphasis for this section of the review.

As mentioned in the overview on middle childhood brain development, complex cognitive thinking is introduced and used in this developmental stage. Attention and focus is needed during complex cognitive thinking, which means a child needs to be able to shut out distractions in order to store information. From the research stated in a previous section in this review, children exposed to toxic stress can have trouble focusing their attention and in effect, their learning processes can be interrupted (Carrion, Kletter, & Wong, 2012). The prefrontal cortex (PFC) and the parietal lobe of the cerebral cortex are the structures of the brain that are involved with a human's most intricate and complicated thought processes, including attention (Nolte, 2002). The PFC can become developmentally damaged and smaller in volume when exposed to maltreatment at

critical periods in its development (National Scientific Council on the Developing Child, 2012). This developmental shrink in the structure of the prefrontal cortex may cause lack of ability to pay attention (Carrion et al, 2012).

Critical thinking and executive function are two other aspects of age-appropriate expectations for elementary school children (Mah & Ford-Jones, 2012), which also involves the prefrontal cortex, as well as specific functions of the rest of the cerebral cortex (Nolte, 2002). Executive functioning involves more than just attention. Executive functioning deficits cause an inability to develop different skills and complete tasks successfully, as well as impair learning processes such as working memory. (Wilson, Hanson, & Li, 2011). The deficits in executive functioning as a result of trauma to the developing child, can also lower academic achievement (Carrion et al, 2012; Child Welfare Information Gateway, 2015).

Finally, the brain of a child not only learns through developing cognitive connections, but also through physical interaction with the environment and in responding to situations. Observable behavior in children who have experienced traumatic events is the last piece needed to connect the effects of trauma on elementary school-aged children.

Behavior

Observable behavior in traumatized children is as varied as the scope of traumatic experiences. Nature and nurture play a role in behavioral responses to stimuli in that

temperament (nature or genetics) might predispose a child to react to a situation differently than another child in the same situation (Mah & Ford-Jones, 2012). For example, a child with a calm temperament will act differently in a stressful situation, than a child with an anxious temperament. There are also varying types of behavioral responses to stressful situations, also called coping skills. A child could either lash out in anger or frustration, act through a fear response (freeze, fight, or flight), or they can shut down and separate themselves from the situation (Delaney, 2006; Sherin & Nemeroff, 2011).

Social interaction is a natural part of human development (Kraus, 2008). Even at birth, infants form strong bonds with caregivers and continuing on into toddlerhood, middle childhood, and adolescents, social interaction with peers becomes increasingly important (Kraus, 2008). Behavior is an integral part of social interaction, because there are social rules applied in certain social settings (Chen & French, 2008). For example, the social expectations when interacting with a family member at home are different than expectations of social behavior during a test in school. In the context of behavior after a traumatic event, there is no one expectant behavior, because responses to stress (and the change in response after trauma) have multiple variables (Delaney, 2006; Sherin & Nemeroff, 2011). There are three specific behaviors that researchers have seen in subjects with posttraumatic stress disorder (PTSD) and in recorded observable behavior after a traumatic event(s) (Delaney, 2006; Mackinnon, 2012; Miller, n.d.; Wilson et al., 2011).

Disruptive behavior

One of the behaviors associated with trauma is aggression (Wilson et al., 2011; Perry, 2013). Although aggression on the spectrum of emotional dysregulation is rare in traumatized children and is mostly displayed in boys rather than girls (Perry, 2004), it is nevertheless important to discuss. Trauma itself is a spectrum of situations or events that can range from parental divorce, chaotic living, a parent in prison, or a death in the family, to child neglect, maltreatment, or abuse. Aggression or anger in children is usually masked frustration, irritability, or anxiety due to poor coping or articulation skills (Silva, n.d.; Nelson, 2006). This excludes children who are otherwise atypical as a result of psychological disorders or intellectual exceptionalities. It should be noted that some psychological disorders (such as PTSD) can occur after a traumatic event and aggression, although still a rare symptom of certain psychological disorders, can occur as a result of emotional dysregulation or distress (Nevid, Rathus & Greene, 2017).

Hyperarousal

Another behavior connected to trauma is hyperarousal or the activation of the fear and stress responses to overstimulation or perceived threat. In multiple sections throughout this review, fear responses and fear conditioning are mentioned. The fear response is an adverse reaction to perceived threatening stimuli (Perry et al., 1995; Phelps & LeDoux, 2005; Mahan & Ressler, 2012; Stanford, 2017). For example, a child exposed

to multiple events in which a parent or guardian yelled at them angrily, might become hypersensitive to loud noises (Mahan & Ressler, 2012; Stanford, 2017). If, in the same example, the child were to be part of a class activity that involved loud noises, the child may react with a fear (freeze, fight, or flight) response. During a fear response, the brain goes into survival mode (Pinel, 2008), turning down all other functions, such as digestion and higher-order thinking (Nolte, 2002). The child becomes singularly focused on the perceived threat and survival. Describing the observable characteristics of this behavior comes from instances of PTSD, in which fear responses are more common (Bremner, 2005). Posttraumatic stress disorder, is itself, characterized as a maladaptive response to particular stimuli after a traumatic experience (Nevid et al., 2017). Similar to the fear response that occurs in the brain, posttraumatic stress symptoms are linked to certain sights, sounds, and even smells (Nevid et al., 2017). One specific characteristic of posttraumatic stress is, in some cases, the individual enters a dissociative state (Nevid, et al., 2017; Perry, 2004; Mackinnon, 2012).

Dissociation

The most common coping mechanism for stress or threat, as well as the most easily overlooked, is dissociation (Perry, 2004; Mackinnon, 2012). Dissociation is a period of feeling dazed, disconnected, or temporarily being unable to remember immediate past events. In an overwhelming situation in which a child might feel overstimulated or stressed, dissociation can allow for separation from the situation (Perry

& The ChildTrauma Academy Channel, 2013).. Characteristics of dissociation in an observable setting might look like distraction, inattention, or staring into space (Nevid et al., 2017). Dissociation can be caused as part of a fear response, much like hyperarousal. However unlike hyperarousal, instead of becoming hypersensitive to a stimuli, the brain causes the child to shut out the stimulus and focus on nothing (Perry & Szalavitz, 2017). Dissociative behavior, as well as the other behaviors mentioned above, can have a profound effect on a child's learning in school (Perry, 2016). Not only are these children unable to focus on learning vital concepts during classroom instruction, but they are also dealing with the adverse effects of their traumatic experiences (Carrion, Kletter, & Wong, 2012); at some points even reliving experiences if they have PTSD or similar posttraumatic symptoms (Perry & Szalavitz, 2017). The ultimate point being made in this review is that traumatic experiences, no matter what the degree or situation, deeply effect how the brain functions, which then also effects how the body reacts and behaves as a response to stressful circumstances, including learning in the classroom (Gröger, Matas, Gos, Lesse, Poeggel, Braun, & Bock, 2016). Learning as a child can be a very overwhelming and demanding process. Genetic predisposition may set some children up to be able to manage stress better than others, but for a child who is both genetically predisposed to adversely react to stress and was also exposed to traumatic experiences during their childhood, learning can be even more of a challenge (Perry, 2016), especially if the classroom setting is chaotic or mismanaged. For this reason, it is crucial that elementary school teachers are fully informed about trauma-informed best practices.

Supporting Children

In the midst of all the research being done on the effects of adverse childhood experiences, the next step is to identify best practices in schools, particularly practices aimed at supporting and encouraging learning for children who are at risk (Schwartz, 2016). The Adverse Childhood Experiences (ACEs) assessment is targeted toward adults who may have experienced traumatic events in their childhood and the test shows the individual how much they are at risk for developing anything from heart disease to depression due to the stress their body's endured during those adverse moments in their lives (Boullier & Blair, 2018; Merrick, Ports, Ford, Afifi, Gershoff, & Grogan-Kaylor, 2017; Felitti, Anda, Nordenberg, Williamson, Spitz, Edwards, Marks, 1998). The ACEs assessment is designed for adults, however it doesn't take into account assessing children who may be at risk.

There are multiple assessments that have been developed over recent years (Eklund & Rossen, 2016) which assess children's risk and determine where they rank on the scale of trauma symptoms. One such assessment was used in this thesis' research study: the Trauma Symptom Checklist for Children (TSCC-A), which will be discussed at length in the methods and results sections. These tests and assessments are immensely important for the research in this field (Eklund & Rossen, 2016), yet they are not the only significant part of the changes that need to occur in order for these children to thrive and be successful. Trauma-informed care in the elementary school classroom, trauma

educated teachers, and home-base support is also necessary in combatting the (sometimes) lifelong or long-term effects of traumatic experiences (Schwartz, 2016).

Trauma-informed care

One of the most recent ways that the education system has been working to support traumatized children is through trauma-informed care practices (Schwartz, 2016; Brunzell, Stokes, Waters, 2016). Trauma-informed care varies in its services and policies, depending on the school district and what standards are established when the implementation of the practice is nominated (Schwartz, 2016). Therefore there is no set definition of what a trauma-informed care system is, but the main objective of the trauma-informed care practices are the same: to teach educators how to recognize signs of trauma, teach them to understand the effects of adverse childhood experiences on children, and how to build a safe environment in the classroom where children feel comfortable, supported, and encouraged to learn (Schwartz, 2016; Eklund & Rossen, 2016; Center for Substance Abuse Treatment, 2014).

Although there is no official mandate for trauma-informed care, there are resources available in order to train teachers and staff on best practices (Menschner & Maul, 2016; Schulman & Menschner, 2018). The role of the teachers and other school staff, as well as board of education members for the district, is to be educated in trauma research and best practices, develop connections with students in order to get to know their specific needs, and be familiar with the type of community in which the school is

surrounded (socioeconomic status can be a factor in understanding which students are more at-risk) (Center for Substance Abuse Treatment, 2014). Furthermore, teachers need to communicate with other school officials and staff for support and guidance and most importantly, they need to know what resources are available in their community that can be of assistance to the families of traumatized children (Kahn & Vezzuto, n.d.). Resources for families can range from counseling, therapy, and support groups to food and housing services. With trauma-informed care, the intention is to reach not only inside the classroom, but also inside the home. Parents and caregivers are as much a part of the trauma-informed practice as teachers.

Resilience

Parents and caregivers are part of a child's constant inner circle (Kraus, 2008) and forming strong, healthy, close relationships with caregivers makes healing from trauma easier (Perry, 2013). Building resilience and allowing children to mentally heal after a traumatic experience is one of the most, if not the most, critical periods (Perry & Szalavitz, 2017). Many people make the mistake of thinking that children are all naturally resilient and that the younger they are when a traumatic event occurs, the less the child will remember, but that is a very dangerous falsehood (Perry & Szalavitz, 2017). Researchers in the field have found over the years, that resilience is not born, it's taught (Perry & Szalavitz, 2017; Perry, 1997). The genetic predisposition of a child (as mentioned in earlier sections) may play a part in how fast a child heals after trauma or

how susceptible a child is to adverse responses to stress, but the type of relationships a child has in their life and the stability level of their living also plays a big part in their resilience.

Resilience means being able to bounce back or recover from difficult situations (Perry, 1997). If children are given the right tools to succeed, if they are surrounded by people who understand and meet their needs, and if they have structure in their lives in which they can achieve their goals, they'll build resilience. Despite the effect that trauma has on brain development, function, and behavior, studies have shown that children's abilities, skills, and social interactions improve when there are people surrounding them who sympathize and meet them where they are (Perry, 2013). Research in the field of child development has shown that children respond to individuals who treat them with respect and understanding (Kraus, 2008; Perry, 2013; Perry & Dobson, 2009; Nelson, 2006) and this practice goes beyond just children with adverse childhood experiences; most children benefit from positive social interactions in which they are seen as an equal partner (Nelson, 2006; Siegel & Hartzell, 2004). Instead of believing that children will simply be okay without any supplemental supportive interaction, communities, schools, teachers, and caregivers need to help build a solid, stable, loving foundation on which children can heal and grow.

Conclusion

This review of the literature has discussed and explained the brain's anatomy in relation to the parts of the brain that control learning and the mechanisms used in learning; the brain's function in relation to the anatomical parts of the brain, their roles in learning, and the locality of learning, emotion, and memory. The deficits of development and function as a result of trauma were also discussed. Every part of the brain has a role to play in the learning process, especially when it comes to attention, focus, memorization, problem-solving, higher-order functioning, cognition, abstract thought, and decision-making.

Multiple studies focused on different structures in the brain and their importance in learning, as well as what happens in the brain when trauma occurs and how trauma effects the brain's learning process. Many of the studies used in this review utilized neuroimaging or fMRI scanning research, which captures an image of what the brain looks like and which parts of the brain light up during fear or stress responses, as well as during learning. In addition, the importance of neuroscience research in education, connecting the brain's functional anatomy with learning, was another vital factor discovered during the review of the literature.

Behavior and trauma-informed care in relation to support of traumatized children in the school system were the other two main points of this section. With all the evidence presented on the difference in the function of the brain after trauma, the next step was discussing how the brain effects observable behavior. Although with the most common

coping mechanism being dissociation, recognizing trauma symptoms in children can be difficult without a screening process or in-depth, one-on-one observations of individual children being made. That being said, there have been systems put in place in recent years to help children build resilience and succeed in education.

Implications of learning

In order to combat the effects of adverse childhood experiences in elementary school-aged children, there needs to be supports both in the classroom and in the home. School staff need to be educated and informed of the effects of traumatic experiences on children, including the consequences that these events have on children's learning processes, and they need to be aware of what resources are available for children and families in crisis. Not only do teachers and school officials need to have knowledge of these important aspects, but also the county offices of education and the school boards. Moreover, parents or guardians of traumatized children should be informed about counseling or therapy services if there child is having trouble with emotional regulation or coping after the traumatic experience. The more people that are conscious of the damaging effects of trauma on children and the more support systems that are put into place, the more the child will thrive and build resilience.

Gaps in the research

Although there were multiple studies that discussed the developmental deficits in relation to trauma, an issue within the research was delineating the difference between what happens to the brain after physical injury and what happens to the brain after developmental damage due to emotional trauma, neglect, maltreatment, or family dysfunction. There was more concrete research about lesions in the brain and the result of those lesions on the function of those parts of the brain, than research on the developmental aspect of brain function and trauma.

Additionally, the research done specifically on children in middle childhood (children of elementary school age) is not as abundant as research for children in early childhood or for adults of childhood abuse and neglect. The trauma screenings and assessments for trauma symptoms or adverse childhood experience (ACEs) scores are also mostly for adolescents or adults who had traumatic childhood experiences. There was very few research studies that took into account children in middle childhood who might be experiencing child trauma while also coping from the effects of previous traumatic experiences. This research study will be focusing on this specific group (children in middle childhood) and the goal of the study is to use observation of behavior as a predictor for which children have trauma symptoms. The observations will be contrasted with a trauma symptom checklist assessment. This study is being done, in hopes to shed light on the middle childhood group and how traumatic experiences impacts them.

METHODS

This study was a qualitative study using direct observations and questionnaire data to explore the relationship between past traumatic events and behavior in the elementary school classroom setting. In particular, the study investigates off-task and disruptive behaviors in the classroom through observations using a behavioral checklist, then compares the data collected from the Trauma Symptom Checklist for Children (TSCC-A) to find out if there is any correlation between past traumatic experiences and observable classroom behaviors identified for the checklist. In this way, the study is significant and differs from others in the field. In past studies, the children were identified first as having traumatic backgrounds and then observed for behavior. From this study's findings the research could be used for teachers to identify students who may need trauma informed pedagogical supports.

Research Question and Purpose

Is there a relationship between past traumatic childhood experiences and how those children effected by trauma, develop, behave, and learn in the elementary school classroom? Since this research question is too broad to investigate in its entirety, the research study was broken down to look specifically at observable behavior in the elementary school classroom (i.e. trouble focusing, attention, following directions, participation, etc.). The question becomes, is there a relationship between past traumatic

or adverse childhood experiences and off-task, disruptive behaviors in the elementary school classroom? The purpose of this research study is to determine the correlation between observable behavior and past traumatic experiences. The hope is to present evidence that specific behaviors can be used to identify students who may be suffering from trauma related classroom performance. Past studies have been done on the effects trauma has on brain development and FMRI studies documenting what parts of the brain are, or are not, lighting up during learning, after a traumatic experience. Those being internal factors, this study wishes to explore the external factor of behavior during school instruction.

Research Design

The study used mixed-methods which required a behavioral checklist built from numerous sources identifying varying definitions of off-task behavior, several in-class observations using a time-sampling worksheet, and a trauma screening assessment questionnaire. The observations are used in order to compare assumptions about particular behaviors observed, with the results of the trauma symptoms checklist, to explore whether or not certain behaviors can correctly be associated with traumatic backgrounds in children. The trauma symptom checklist will evaluate the child's emotional state of mind.

Participants

The subjects of this study are public elementary school children in the middle-childhood age range (9-10 years old). This study looks at one school in the Central California area with multiple observations in two fourth grade classrooms. Twelve students participated in the observation study in Class A and seven students in Class B. The total number of participants was nineteen for the observation portion. For the assessment portion, 9 students from Class A participated and 1 student from Class B participated, for a total of 10 participants. The challenge in accumulating a larger number of participants for this particular study, was the type of assessment being used. The Trauma Symptom Checklist for Children (TSCC-A) included sensitive items which the children needed to read, understand, and reflect upon. This challenge was discussed by the researcher and the institutional review board (IRB) beforehand as a foreseeable challenge in collecting data. These two classrooms at this particular school were purposefully selected using recommendations by the principal who had knowledge of which classrooms held students with traumatic backgrounds. The school itself is within a middle-class neighborhood of varying socio-economic status (SES) population, with low incidents of known traumatic or adverse childhood student backgrounds.

To protect the children involved, the initial observation was blind, so I did not know any child's name or background information during this process. I assigned numbers as identifiers arbitrarily. When I administered the trauma screening assessment questionnaire, I used the class identification numbers assigned to the children that I

observed to match observations to the assessment results. For the final stage of data collection, after I identified the students who scored high on the assessment, I created a different number identification system. For the results section, I will refer to the students solely through terms such as “Student 1 of Class A, Student 5 of Class B, and so on. A list linking numbers to the identification of the students was hand written and kept in a locked folder away from public access. Only I and my advisor have access to the data I have collected.

Before the assessment portion was administered, I reminded the children that they did not have to take part if they did not wish to and that they could choose not to answer any question that made them uncomfortable. I also made sure to ask them during the assessment, if they were doing okay, if they had any questions, and if they understood the material. Furthermore, before and during the assessment process, I explained to the children that their answers were confidential (only I will be seeing their results), unless a high score was circled for a few particularly concerning questions. In addition I reminded them that choosing not to take part will not hurt their grades or standing in the classroom in any way and that participation is voluntary.

Instruments

As mentioned previously, this study includes a series of observations using a behavioral checklist and time-sample template, as well as the Trauma Symptom Checklist for Children (TSCC-A). The behavioral checklist was compiled from various checklists

and templates independently researched from teachers and professionals in the field, to describe on-task verses off-task behaviors. The Trauma Symptom Checklist for Children (TSCC-A) tool is a child, self-reporting, questionnaire aimed at scoring the frequency with which the children feel or think a certain way (for example, feeling scared of men, worrying about things, wanting to hurt people, trying not to have any feelings, etc.), to determine whether they are at high risk for trauma or PTSD-type symptoms. The assessment has 44 questions in total and the students must score each question either a 0 (it never happens), 1 (it happens sometimes), 2 (it happens lots of times), or 3 (it happens almost all of the time). Higher scores on critical items will result in a higher total score and therefore indicate higher risk of traumatic exposure.

The subtype TSCC-A was used instead of the TSCC due to concern by the school district and elementary school staff that the questions referring to sexual trauma symptoms were too graphic or inappropriate. Furthermore, a profile form for both males and females (Ages 8-12) was necessary to plot the *T*-scores for each scale, in order to find out in which scale a student scored 65 or above.

The template for the time-sample observations was taken from the Methods of Observation class (a class within the Child Development department at Humboldt State University; the professor is Dr. Claire Knox). The template includes information such as the time, the setting, the behavior, the area of the classroom, how many children are present, and how many adults are present. There is also a comment section to add-in further detail if desired. The purpose of this time-sampling template is to observe how

long a child performs a certain behavior and how many times that behavior occurs within the allotted time.

Procedure

After contacting the school and receiving approval from the local school district office, the first step was collaborating with the principal to help identify which classrooms have students that would be the best fit for the data being explored. After those classrooms were identified, the next step was to get consent for observing and assessing the children from both the parents/guardians and the children themselves. After forms were signed and collected, the time-sample observations were conducted, using the behavioral checklist as a reference for particular behaviors to look for. During this process, I observed a single child for approximately 2 minutes and wrote a descriptive explanation about what they were doing. I continued this process for every participating student, scanning the room about 8-10 times total in the few hours I was allotted. Depending on what day I was observing and which class was available, I was either observing in the morning for an extended period of time, or observing for a short amount at the end of the day. The observation portion went on for approximately 10 days and on the last day of the study, I distributed the assessment.

The Trauma Symptom Checklist for Children (TSCC-A) was given individually to participating students, in a separate classroom. The assessments took about 5-10 minutes per student. Each student read the items and circled their scores themselves,

unless otherwise unable. After all of the assessments were collected, scores from the assessment were compared to the observation of behavior for each student, to determine if there was a positive correlation between particular behaviors and trauma symptoms. My question was whether the observations give a clue to which students will score high on the assessment or will the results from the data show the researcher that certain behaviors do not equal past traumatic or adverse childhood experiences?

It is important to note that before any of the observations or assessment can be administered, the researcher must get the school district's approval (if they are conducting the research in a public school), the principal's approval, the teachers' (of the classrooms to be observed) approval, parental consent, and child assent. At any point during the research study, these individuals have the right to opt out of participation, even if they have already consented.

Data Analysis Plan

The behavioral data from the observations will be used to identify key behaviors, some that might also be a part of the behavioral checklist and others at the researcher's discretion, which can be signs of distress, instability, or atypical development. Comparing these key behaviors with the trauma symptom checklist scores, if there is a correlation between observed behaviors and a child's background, this method of study could identify candidates for trauma informed pedagogy by classroom teachers in the field.

RESULTS

Out of the nineteen total participants that were observed (twelve students from Class A and seven students from Class B), 10 students total participated in both the observation and the assessment portions (9 students from Class A and 1 student from Class B). Class A was observed five times for a significant amount of time and Class B was observed three times. The observations, predictability, and assessment score for each of the 10 students are as follows.

The Traumatic Symptom Checklist for Children (TSCC-A) has two validity scales. Under-responses account for the number of times a child scored lower than average on particular items that are expected to be scored higher. Hyper-responses account for the number of times a child scored higher than average on particular items that are expected to be scored lower. The other scales are clinical scales. Anxiety for this assessment is described as generalized anxiety, hyperarousal, worry, and specific fears mentioned in certain items. Depression is described as sadness, unhappiness, loneliness, crying episodes, and feelings of guilt and/or self-denigration. There are also two items referencing self-injury impulses and suicide. Anger indicates angry thoughts, feelings, and behaviors. Feeling mad, mean, hatred, having difficulty de-escalating during periods of anger, and wanting to yell at or hurt people, or arguing and fighting are also factors for anger. Posttraumatic Stress indicates intrusive thoughts, sensations, and memories of painful past events. Nightmares, specific fears of men or women, and cognitive

avoidance of negative thoughts and memories are also included in the description of Posttraumatic Stress. Dissociation is described as experiences ranging from mild-to-moderate dissociative symptomatology. Dissociation includes derealization, the mind going blank, emotional numbing, pretending to be someone else or somewhere else, daydreaming, having trouble remembering, and dissociative avoidance. Dissociation was broken up into three separate scales for scoring: Dissociation, Overt Dissociation, and Dissociation—Fantasy. Sexual Concerns were also part of the original assessment (TSCC), however in TSCC-A, sexually concerning items are not present and therefore are not counted.

Student 1 from Class A: Age 9, Male

The first day of observations for Student 1 (May 10, 2018; 9:15-2:00) resulted in a mixture of behaviors. In the morning, Student 1 was observed talking during a session of morning work, in which the teacher directed the students to finish any incomplete class assignments with minimal to zero peer interaction. This lasted for about five minutes. During work correction, which lasted fifteen minutes, Student 1 was observed participating in answering a question and also leaning his chair back until the front legs were off the ground and he was balancing on the back chair legs. During this time, Student 1 seemed to be paying attention, but part of his actions were off task. In the time period of the morning when the class was working on math, Student 1 was observed sitting backwards in his chair, watching a child across the room who was asking a

question. All other observations of Student 1 throughout the morning showed typical on-task behaviors, such as following teacher directions, participating in group work, answering questions posed by the teacher, and watching teacher demonstrations. In the afternoon, when the teacher asked the student to read along from a textbook, Student 1 was observed drawing on a piece of paper, which he placed on top of the textbook page. This behavior was the only off-task behavior observed in the afternoon. From the first day of observations, Student 1 was predicted to score high on the assessment test.

The second day of observations for Class A were done in the afternoon on May 14, 2018 between 1:30-2:00. On this day, Student 1 was absent.

The third day of observations for Class A were done in the morning on May 15, 2018 between 8:50-12:10. Of the eight scans in which Student 1 was observed throughout the morning, there were three instances where he seemed to be off-task. At 9:25 during morning work, Student 1 was observed leaning back in his seat, looking over at the teacher and pushing himself back using his legs and hands, moving away from the desk. His workbook was open, however he was not working in it as the teacher instructed. At 11:05 during group work (what the teacher titled “intervention”), Student 1 was instructed to work in his social studies book with a partner. Student 1 was observed talking with a classmate and watching that classmate dance. The classmate was not the partner he was to be working with on the assignment. Finally, at 11:25, also during group work, Student 1 was observed talking and laughing with his work partner and flipping through the pages in his workbook. It was not observed whether or not they were talking about the assignment or something else.

The fourth day of observations for Class A was conducted on May 16, 2018 between 1:00-2:30 in the afternoon. During social studies work, Student 1 was observed adjusting in his seat, leaning back in the seat with his knees up on the desk. His textbook is open and he is looking over and talking to his classmate who sits across from him. The classmate and Student 1 are passing notes to each other. Student 1 is also tossing his eraser around his desk. During the observation, the teacher looks over at Student 1 and asks all students to sit up straight, follow along, and stop talking. At 1:30, during a science lesson, Student 1 is moved next to the teacher after she observed Student 1 acting disruptively. Student 1 is now sitting on the ground with his textbook, next to the teacher's desk. At 1:55, Student 1 is in a group for science group work. After his turn reading aloud to his group members, Student 1 talks to another classmate and looks away from his group members. From this time until the end of the day, Student 1 is observed participating and following teacher instruction.

The fifth and last day of observations for Class A was conducted on May 17, 2018 between 9:00-2:00. At 9:10, during morning work, Student 1 was observed talking to a classmate across from him. He was not observed doing any work at this time. At 9:55 during social studies, Student 1 is watching the teacher talking. Student 1 is also leaning deep into his seat, moving his head so that he is looking straight ahead, towards the classmate who sits across from him. At 1:10 during literature and reading, Student 1 is observed laying down, facing a classmate next to him who is also laying down. Student 1 is whispering to a classmate and then puts his head down, facing the ground. At 1:20, also during literature and reading, Student 1 is now on his back with his book on top of

his face, but his head is looking towards the classmate who is laying down next to him. During the times which are not mentioned throughout this observation, Student 1 was observed following teacher instruction and seen as performing on-task behavior.

Although Student 1 was observed during multiple instances of off-task behavior, during the observation portion there was no observation of aggressive, dismissive, or dissociative behaviors. The TSCC-A scores for Student 1 also did not indicate any posttraumatic stress symptoms. Significant scores for trauma, according to the TSCC-A measures, are considered a raw T score of 65 or above. Student 1 scored below 65 on all of the categories (under-response= 61, hyper-responsive= 47, anxiety= 42, depression= 43, anger= 39, posttraumatic stress= 38, dissociation= 43, overt dissociation= 45, and fantasy= 43). It should be noted however, that Student 1's score for under responsive was a T score of 61. High scores for under responses usually mean that the child circled zero, or "never", for items that should be scored higher for typical developing children. For example, the items "feeling mad" or "having bad dreams or nightmares" are typical developmental occurrences for this age group and as such, scores for these items are expected to be marked as "sometimes" (circled as the number one).

Student 2 from Class A: Age 9, Male

Student 2, much like Student 1, was predicted as a candidate for a traumatic background. Also like Student 1, Student 2 did not demonstrate aggressive or dismissive behaviors, however there were multiple instances recorded of off-task behavior with a

few examples of dissociation, in which the child was staring off, away from the teacher and seemed not to be listening to instruction.

On the first day of observations (May 10, 2018; 9:15-2:00), in the morning, Student 2 was observed fidgeting with a ruler while morning work was assigned, talking with a classmate while leaning back in his chair and not facing the teacher during work correction, and moving his pen around his desk when writing was instructed. In the afternoon, Student 2 was observed leaning back in his chair again, staring ahead and looking away from the teacher while showing a classmate sitting next to him, a piece of paper. At 1:15, Student 2 was using a pen and drawing on his fingers while textbooks were out and the class was instructed to read along. At 1:30, Student 2 was talking to a classmate next to him and the teacher looked over at Student 2 and told him to put his head down. After the teacher looked away, Student 2 continued to talk to the classmate and did not put his head down.

The second day of observations (May 14, 2018; 1:30-2:00) saw Student 2 with his textbook open, seeming to be reading along as instructed by the teacher, and leaning his chair back. At 1:15, during a period of a literature lesson, Student 2 was observed talking to a classmate, leaning back in his chair while pushing off the desk with his feet, as another student was reading a section of the textbook aloud to the class. At 2:00, Student 2 was once again leaning back in his chair while the teacher was giving instruction.

The third day of observations for Class A was done the morning (8:50-12:10) of May 15, 2018. Student 2 was absent during most of the morning, until after 11:00. Student 2 was observed for most of the morning as participating in group work and

following teacher instruction. At 11:45, Student 2 was observed talking to a classmate while leaning on a large bean bag chair and then proceeded to talk to another classmate writing in their work page. This was during the session that the teacher titled "intervention", in which the children work in groups on an assignment. At 12:00, just before lunch, Student 2 is observed folding a piece of paper into an airplane. This action was observed during the ending of "intervention", in which students who have completed their work are given free choice. The teacher was observed given verbal consent of the paper airplane constructions, but also gave instruction on how many paper airplanes were allowed and where the paper airplanes were allowed to fly.

On the fourth day of observations (May 16, 2018; 1:00-2:30), Student 2 was observed following instruction and participating in group work activities. No off-task behavior was observed for Student 2 during this observation. It should be noted that, at 1:30, the teacher of Class A took the students out for a brief 15-minute break outside, so the children could stretch and release any extra energy built up.

On the fifth and final day of observation (May 17, 2018; 9:00-2:00), Student 2 was observed in the morning (9:10) looking across the room and scanning the room while holding and fiddling with a few tiny erasers in his hands. This was observed during morning work, where students are expected to be working on any assignment that is incomplete. At 9:35, during a period of correction for a social studies workbook, Student 2 was observed moving his highlighter around his desk and talking to a classmate across from him while the teacher is at the front of the room, instructing the students to highlight, underline, and circle words and sentences in the workbook. At 9:55, continuing

the social studies lesson, Student 2 was looking down into his desk, away from the workbook that the teacher is having the students work on. At 1:20, during a literature lesson where the students are expected to be reading along, Student 2 was observed looking away from his book and toward a classmate next to him, while adjusting his water bottle. At 1:50, during a science lesson, Student 2 was looking away from their open textbook and was looking down toward their lap while another student read a section of the book aloud. All students were expected to be reading along.

The TSCC-A scores for Student 2 ranged from the high 30's to the mid 50's; clinically insignificant scores for posttraumatic symptoms according to the assessment used. The highest scores noted were a T score of 56 for Under-responses and a T score of 52 for dissociation—fantasy. Hyper-response was scored a 47, Anxiety was scored a 42, Depression scored 43, Anger scored 39, Posttraumatic Stress scored 43, Dissociation scored 47, and Overt Dissociation scored 45. Again, any T scores for these categories scored 65 or above are considered clinically significant, according to the assessment used (the Trauma Symptom Checklist for Children).

Student 3 from Class A: Age 9, Male

Unlike Student 1 and 2, Student 3 was not predicted to have a traumatic background from the initial observation, or from the observations that followed. Student 3 showed no sign of off-task, aggressive, or dismissive behavior. There was however,

many instances where the child scanned the room and a few documented moments when the child seemed to dissociate or zone out during a lesson.

On day one of the observations (May 10, 2018; 9:15-2:00) Student 3 was observed staring at a point in the room, away from the teacher, during the morning work period. At 9:35 during math, Student 3 was scanning and looking around the room while the teacher was asking the class questions about a math problem. At 9:55, Student 3 was talking to a classmate next to him, looking/scanning around the room, and moving a rolled up tissue around his desk while the teacher was finishing up the math lesson. At 10:30, Student 3 was once again scanning the room, looking behind him and moving his head and body slightly, looking around the classroom.

On day two of observations (May 14, 2018; 1:30-2:00) no off-task or significant behavior relative to the study took place during the observation of Student 3.

On day three of observations (May 15, 2018; 8:50-12:10), in the morning, Student 3 was observed scanning the room during morning work and academic magazine reading. At 9:25, while looking down at a history magazine that the teacher instructed the class to read, Student 3 was holding what looked like an unfolded paper clip, moving around in his hand. At 11:25, during "intervention", Student 3 looked over at the observer (the researcher for this study) while a classmate in Student 3's group was talking. At 11:45, during free choice (after completion of group work), Student 3 joins four other classmates making paper airplanes, which the teacher allows until lunch.

Day four of observations (May 16, 2018; 1:00-2:30) resulted in only one observation of seemingly dissociative behavior from Student 3. At 2:10, during group

presentations, Student 3 was observed at his desk, looking toward a classmate sitting across from him. For three minutes (the three minutes allotted for observing each student in one round of scanning the classroom) Student 3 seemed zoned out and stared across the room while a group presented in front of the class.

On day five, the final day of observations for Class A (May 17, 2018; 9:00-2:00), Student 3 was observed at 10:40 during group work, laying down and twisting on the floor, while putting his head down, facing the ground, and talking to a groupmate. At 10:55, Student 3 was looking across the room, away from a group of students presenting at the front of the class. At 1:20, Student 3 was, again, looking ahead and away from his textbook during literature reading. During this time he also scanned the room once.

As mentioned above, Student 3 wasn't observed doing anything blatantly off-task during the five days of observation that took place in Class A. However, there were multiple examples of dissociation in which Student 3 seemed to be staring at a point in the room for a significant amount of time or scanning the room during periods of assigned work. Unlike the previous students mentioned, although Student 3 was not predicted to have any posttraumatic stress symptoms, Student 3 scored high on a few crucial validity scales. Although it was not a score of 65 or above, Student 3 had a T score of 61 for Under-Responses. For the Hyper-Responses (which, similar to the under-responses, take into account multiple items marked high indiscriminately, for items uncommonly marked high in normative samples), Student 3 had a T score of 78. For Posttraumatic Stress, Student 3 had a T score of 68. The rest of the scores ranged from the mid 30's to the high 50's. Anxiety scored 58, Depression scored 48, Anger scored the

lowest with a T score of 35, Dissociation scored 43, Overt Dissociation scored 48, and Dissociation—fantasy scored 38.

Student 4 from Class A: Age 9, Female

During the first day of observations where predictions were made for certain students in Class A, Student 4 was not predicted to have any traumatic background. The four following observations were also completed with no evidence of off-task or disruptive behaviors from Student 4. Student 4, throughout the entirety of the observation process, was observed as being on-task, following directions and instructions, and showed no sign of distress, dismissiveness, or aggression. One aspect of Student 4 that stuck out however, was that she mostly worked on assignments by herself (unless group work was assigned by the teacher) and she didn't talk very much unless she was asked a question directly, by the teacher.

Student 4's T scores for the TSCC-A assessment are as follows. For Under-responses, Student 4 had a T score of 52. For Hyper-responses, the score was 47. Anxiety was scored 37, Depression was scored 46, Anger was scored 46, Posttraumatic Stress was scored 40, Dissociation was scored 37, Overt Dissociation was also scored 37, and Dissociation—Fantasy was scored 42. Although these scores were not high scores according to the assessment tool, it was surprising to see that Student 4 scored 46 in the validity scale for Anger. Throughout the observation process, there was no indicator for Student 4 ever visually looking or seeming angry. Depression was also scored 46, but

which was not surprising due to the fact that observations showed Student 4 mostly by herself and with minimal interactions with other students.

Student 5 from Class A: Age 9, Female

Student 5 was another student not predicted to have any history of trauma. The first day of the observations yielded no examples of off-task behavior, similar to Student 4. Also similar to Student 4, the remaining observations for the five days Class A was observed, Student 5 was not observed off-task, disruptive, dismissive, or in distress at any point. Student 5 was observed following instructions, participating in individual and group work, and completed assignments when instructed.

Student 5's TSCC-A scores are as follows. Under-responses scored 52 and Hyper-responses scored a 47. Anxiety had a T score of 44, Depression scored a 46, Anger scored a 61, and Posttraumatic Stress scored a 47. Dissociation had a T score of 45, Overt Dissociation had a T score of 51, and Dissociation—Fantasy scored a 37. Although it was not a score of 65 or above, the score of 61 for the validity scale of Anger was surprising, much like it was for Student 4, because there were no obvious signs of anger from Student 5 during the observation process.

Student 6 from Class A: Age 9, Female

In the case of Student 6, throughout the observation process, no off-task behavior was observed. A factor with Student 6 was that she was part of a Special Education program and left the classroom every day for a period of time, going to a resource classroom for extra learning support. Due to the periods of time when Student 6 was in the resource classroom, there were periods of time where she was not being observed for the research study. Student 6 was not predicted to have a traumatic background.

During the assessment, because reading difficulty was a factor for Student 6, the questions were read to her. For the TSCC-A scores, Student 6 scored below clinically significant for all validity scales. Under-response had a T score of 47 and Hyper-response was also scored a 47. Anxiety was scored a 49, Depression was scored a 43, Anger was scored a 44, and Posttraumatic Stress was scored a 49. The highest scores were for all three Dissociation validity scales, but again, were not scored at or above a T score of 65. Dissociation was scored a 57, Overt-Dissociation was scored a 56, and Dissociation—Fantasy was scored a 57.

Student 7 from Class A: Age 9, Male

Student 7 was absent on the first two days of observations (May 10, 2018 and May 14, 2018) and therefore was not included in any predictions for a traumatic

background. The observations that followed also yielded no overt indications of past traumatic experiences in the way of off-task behavior.

The third day of observation (May 15, 2018; 8:50-12:10), concluded with only one significant point for Student 7. At 11:05, during a period of group work, Student 7 was observed working alone, looking over at the door to another classroom, and looking at his work paper. Although this behavior is not considerably off-task, the behavior seemed to indicate distraction and perhaps dissociation. No other significant behaviors were observed from Student 7 for the rest of the observation period.

The fourth day of observation (May 16, 2018) also did not yield any significant off-task behaviors from Student 7.

The fifth and final day of observations for Class A (May 17, 2018; 9:00-2:00) included two significant behaviors from Student 7. Again, these behaviors were not observed as blatantly off-task, but were recorded as dissociative behaviors. At 9:35, Student 7 was observed looking at and holding a pencil and looking ahead for a significant amount of time, while the other students around him were expected to be writing things down in a workbook for Social Studies period. At 1:00, during literature period, Student 7 was observed with his book standing up facing him however, Student 7's head was down on his hands with his eyes down toward the desk top. No other significant behaviors were observed from Student 7 for the rest of the day.

Although Student 7 was not predicted as having past traumatic experiences, his scores were the highest of all the students recorded for this research study. The Under-response score was the lowest, with a T score of 46. Hyper-response had a T score of 94.

Anxiety scored a 71, Depression scored a 73, Anger scored a 70, and Posttraumatic Stress scored a 62. Dissociation had a T score of 74, Overt Dissociation scored a 73, and Dissociation—Fantasy scored a 67.

Student 8 from Class A: Age 9, Female

Student 8 was predicted to have past traumatic experiences from the first day of observations. Her behavior was observed on occasion, to be off-task and distracted or overtly observant herself of the classroom and the observer. There was no observed aggressive, dismissive, or dissociative behaviors.

At 1:10 on May 10, 2018 (the first day of observations), Student 8 was observed drawing and coloring a half sheet of paper, talking to the classmates across from her, and looking away from the opened textbook on her desk. The class was instructed to read along in the textbook. At 1:15, Student 8 was whispering and talking to another classmate across from her. This was also observed during classroom instruction for the class to read along in their textbooks. During the first day of observations and throughout the rest of the observation period, Student 8 was repeatedly observed scanning the room and watching the observer.

On the third day of observations (May 15, 2018; 8:50-12:10), at 8:50, Student 8 was observed looking ahead—towards the left side wall of the classroom—and away from the teacher who was giving instructions for the class, as well as the open workbook on Student 8's desk. At 9:05, Student 8 was talking to a classmate across from her and

scanning the room while also writing in her workbook. At 9:25, Student 8 was observed, in succession, writing in a page of the workbook, looking at the projector in the front of the classroom, looking over at a classmate who was making noise at their desk, looking at the observer, and moving her pencil (eraser down) and sticking it in between her fingers, while looking away from the open workbook. The instruction from the teacher was to write their answers down in the workbook page. Once again, throughout the observation period, Student 8 was repeatedly observed scanning the room and looking at the observer for a significant amount of time.

Day four of observations (May 16, 2018) did not yield any significant observed behavior from Student 8.

The fifth and final day of observations (May 17, 2018; 9:00-2:00) Student 8 was once again observed, on multiple occasions throughout the day, scanning the room and looking at the observer for a significant amount of time. There were also observed moments where Student 8 would looking around the group of desks around her, look at the observer, look around the room, and then look at the teacher in succession. At 1:00, Student 8 was observed looking ahead, towards the left side wall of the classroom and away from the literature textbook that the class was instructed to read silently while the teacher read aloud.

Student 8's TSCC-A scores were all below the T score of 65 for clinical significance. Under-response scored a 42 and Hyper-response scored a 47. Anxiety scored a 52, Depression scored 41, Anger scored 44, and Posttraumatic Stress scored 49.

Dissociation scored a 45, Overt Dissociation scored 42, and Dissociation—Fantasy scored a 52.

Student 9 from Class A: Age 9, Male

At 1:15 on May 10, 2018 (first day of observations), Student 9 was observed "playing with textbook" during a class period where the class was instructed to read along while the teacher or other students read aloud. It was not written in the observation notes what "playing with textbook" meant. Later on, at 1:30, Student 8 was leaning back in his chair, away from the desk during an unspecified transition time before instructions from the teacher were given.

At 1:50 on the last day of observations (May 17, 2018), Student 8 was observed working alone on a worksheet. Although this was not an off-task behavior, it is noted because the teacher allowed the students to work either by themselves or with a group. The students around Student 8 were all working in groups of two or more people, while he was working alone. No other significant behaviors were observed during the five days of observation for Student 8 in Class A.

Student 8 was not predicted to have experienced past traumatic events, however he did have a couple higher scores than expected for the TSCC-A assessment portion of the research study. Under-response had a T score of 66 (the only score for Student 8 that was 65 or above). The Hyper-response had a T score of 47. Anxiety scored a 52, Depression scored a 37, Anger also scored a 37, and Posttraumatic Stress scored a 55.

Dissociation scored a 43, Overt Dissociation scored a 37, and Dissociation—Fantasy scored a 57.

Student 10 from Class B: Age 9, Male

The only student who participated in both the observation and assessment portions from Class B was Student 10. May 14, 2018 from 9:00-12:00 was the first day of observations for Class B. Student 10, although not engaging in off-task behavior, was repeatedly observed pushing and pulling to and from his desk while on a large yoga ball (the yoga balls are given to students in order to allow them the freedom to move during class time, in a controlled way) and mumbling to himself while reading.

The second day of observation for Class B was on May 15, 2018 from 1:00-2:00. There was no significant behavior observed for Student 10 during that day of observation.

The third and final day of observations for Class B was on the morning of May 16, 2018 from 8:30-11:00. At 10:30, during group work for science, Student 10 was observed in a group of nine. He was going through a desk (unknown if the desk was his), scooting back around to the front of the table where the group was sitting in a circle, and then rolling a pencil onto his shoulder. The group was instructed by the teacher to discuss the science workbook prompt. At 10:45, Student 10 was lying down on the floor in front of a group of desks. The group was, again, supposed to be discussing the science prompt, however it was overheard by the observer that Student 10 and his group were discussing something off-topic.

No predictions for Student 10 were made about whether or not he would have any past traumatic experiences. However, from the observations recorded for Student 10, it was not expected that he would score high. The TSCC-A scores for Student 10 were nevertheless, higher than anticipated. The Under-response received a T score of 71 and the Hyper-response received a T score of 62. Anxiety scored a 55, Depression scored a 40, Anger scored 37, and Posttraumatic Stress scored 45. Dissociation received a score of 58, Overt Dissociation scored 56, and Dissociation—Fantasy received a T score of 57.

Overall Scores

The majority of the scores for these ten students were lower than clinically significant. Most of the higher scores came from the validity scales, which were put in place to ensure that a child's underscoring or over-scoring certain items were recorded and taken into account for the assessment. Only two out of the ten students attained high scores which included clinical scales, as well as validity scales. The results, interpretation, and discussion of these scores, along with discussion on students who did not participate in the assessment (but that were observed in off-task, disruptive behavior) will be further investigated in the following analysis section.

ANALYSIS

The goal of this research study was to determine whether or not teachers, principals, school administrators, or any professional staff within the elementary school setting could make valid predictions of a child's background based on observable behavior during classroom instruction. The question that prompted this investigation of behavior was, can observably off-task behavior be a reliable sign for children with past traumatic experiences? Off-task behavior can mean any number of actions. Off-task can be disruptive behaviors, for example talking during teacher instruction or making loud noises either by talking or by using objects around the student to make sound. Off-task can also be distraction from a task appointed to the student. For example, reading a comic book during a history lesson or drawing a picture during mathematics instruction or correction. Talking to a classmate after the teacher tells the class to be quiet, ignoring instructions or refusing to participate in classroom work, and displaying aggression towards the teacher or others, are all examples of off-task behavior. The last and most overlooked of these actions is distraction in regards to dissociation, or, staring "off into space" during class time. The latter behavior will be discussed in more detail, later in this section.

What the Results Mean

As briefly mentioned in the results section of this paper, the raw T scores for the Trauma Symptom Checklist for Children (TSCC-A) assessment described only scores of 65 or higher to be clinically significant. Therefore, only scores 65 or higher in any of the clinical scales (anxiety, depression, anger, and posttraumatic stress, dissociation, overt dissociation, and dissociation— fantasy) would indicate substantial trauma symptoms. The breakdown of these scores for the participants in this study are as follows.

Student 1 from class A: age 9, male

Student 1 received raw T scores below 65 for all clinical scales, as well as for the validity scales. The highest score Student 1 received was 61 in the validity scale of Under Response. The interpretation section of the TSCC manual states that raw T scores in the range of 60-65 are suggestive of difficulty and may be significant. The manual does not distinguish between scores given in validity scales versus clinical scales, but it can be determined that the scores close to the minimum of 65 can be clinically significant for the clinical scales only. For example, the validity scale of Under Response is to indicate that the child scored lower on items that were scored higher in the standardization samples. In other words, the validity scales are appropriate to demonstrate a child's tendency to either deny symptomatology or to over-respond (give themselves 3's) to multiple symptom items. Student 1 scored below clinical significance, but the score for the Under-response,

validity scale, may need follow-up due to the score being within the 60-65 range. Although the reason for this under-response score is unknown, what is known about Student 1's behavior based on the observations, could yield some insight. Although Student 1 did not display any blatantly disruptive behavior that was noticed by the classroom teacher, there were multiple instances of observable off-task behaviors recorded.

Student 2 from class A: age 9, male

Student 2 also received raw T scores below 65 for all clinical and validity scales. There were also no scores ranging from 60-65 within either the validity or clinical scales. Therefore, Student 2 has not demonstrated any significant trauma symptoms that might warrant investigation.

Student 3 from class A: age 9, male

Student 3 scored high on a few crucial scales. With a T score of 61 for Under-Responses, a score of 78 for Hyper-Responses, and a score of 68 for Posttraumatic Stress, Student 3 was identified as displaying significant trauma symptoms, as well as being at risk due to the high scoring items for thoughts of suicide and wanting to hurt themselves. After the collection and review of Student 3's assessment scores, the principal and the school counselor were informed of the child's results. This student's score, compared

with the initial observation is important, because it shows an example of a student who follows instructions and does well in the classroom, but also has substantial trauma symptoms. Instead of this child being aggressive, argumentative, closed-off, or disruptive, he is mostly quiet and dissociative at times. These results mean that a child could be overlooked in the classroom while they suffer outside of school. Dissociation, as mentioned in the literature review section, is the most common characteristic portrayed by children after a traumatic experience.

Student 4 from class A: age 9, female

There were no critical results collected for Student 4, although it was noted in the results section that the clinical scales for Anger was scored the highest at 46 out of all the other scales. It is also interesting to note that all the clinical scales for the TSCC-A assessment are not necessarily shown externally, which makes predictions of traumatic symptoms difficult, if you are only looking for external displays of emotions, such as anger.

Student 5 from class A: age 9, female

Again we see a case of no critically high scores for Student 5. However, the clinical scale for Anger scored a 61, which does present some concern and would likely need follow-up. Similar to Student 4, Student 5 did not display any disruptive or off-task

behavior and there were no external signs of anger during the observation process. Once more, the results from the assessment were surprising compared to the prior observations. A pattern of difference between the observations and the assessment results seems to be forming.

Student 6 from class A: age 9, female

Although none of the assessment scores were at or above 65 or were in the 60-65 range to permit further investigation, Student 6's highest scores were found in all three Dissociative scales, with one scoring a 56 and two scoring 57. It should be noted however, that Student 6 attended Special Education classes for certain subjects while also participating in a mainstream classroom. There is no way of knowing whether or not the learning challenges for Student 6 influenced any of the scores for the assessment. For example, the high score on the item "forgetting things…can't remember things" is associated with the Dissociation and Overt Dissociation scales, but it is unclear whether or not the score comes from dissociation due to any traumatic event or from personal learning challenges.

Student 7 from class A: age 9, male

Out of all the participants, Student 7 had the most high scores, as well as the highest high scores for this study. With scores of 94 for Hyper-response, 71 for Anxiety,

73 for Depression, 70 for Anger, a concerning yet lower score of 62 for Posttraumatic Stress, A 74 for Dissociation, 73 for Overt Dissociation, and 67 for Dissociation—Fantasy, Student 7 was identified as displaying substantial trauma symptoms and deemed at risk. Similar to that of Student 3, Student 7 also scored high on thoughts of suicide, wanting to hurt themselves, and feeling afraid someone will kill them. After review of the scores, the principal and the school counselor were informed of the assessment results and acted accordingly. Also similar to Student 3, Student 7 was observed as a well behaved student, but there were instances of dissociation during the observation process and so, yet again, dissociation becomes an important factor when thinking about how children behave after a traumatic event.

Student 8 from class A: age 9, female

There were no significant results collected in the assessment scales for Student 8. However, during the observation process, it was noted how much Student 8 scanned the classroom, looked across the desk at another student, and watched the observer. Although this behavior was interesting and off-task behavior was also frequently observed for this student, the assessment results held up no critical results. Another example of the difference between expectation after observation and the actual scores for trauma symptoms.

Student 9 from class A: age 9, male

With the exception of the validity scale score for Under-Response as 66, all of the scores for Student 9 did not reach the 65 or above standard for clinical significance, nor did they reach the 60-65 range for further concern. The highest score was 57 in the Dissociation—Fantasy scale. Student 9 was observed as an obedient student who mostly followed directions and completed assignments and therefore was not predicted to have any significant trauma symptoms. In this instance, the expectations from the observations were correct.

Student 10 from class B: age 9, male

The last participant in this study was also not expected to have any significant scores. However, much like Student 9, Student 10 scored high in both validity scales, but did not score significant results in the clinical scales. The highest scores for Student 10 came from the Dissociative scales, with a 58 in Dissociation, a 56 in Overt Dissociation, and a 57 in Dissociation—Fantasy. Although these scores are not in range for concern or clinical significance, it is important to point out that this is yet another case of dissociation being the highest scoring scale, which solidifies its importance when working with children; not only children with past traumatic experiences, but also with children in general. Research has shown that children are more likely to hide their

emotions rather than display them. This is especially true when thinking about the school setting as opposed to a home setting.

Result Conclusions

Dissociation was the most important behavior and the most unsuspecting scale in this study. When thinking about children who act out, misbehave, act aggressively, or disrupt in the classroom, there are labels given to these children that might cause them to fail. What's more is that these children could have struggles in their lives that teachers and school staff don't see. Children who dissociate, shut down, are by themselves, or remain quiet are just as at risk of falling between the cracks, simply because they are overlooked. They are good students who follow the rules and do as their told, but they could also be struggling, unseen. The results of this study have shown that expectations after initial observations are not always accurate and in this instance, were inaccurate more than they were accurate. Looking for observable behavior that might hint at trauma symptoms is difficult when emotions can be hidden and/or suppressed. What needs to be done to further this research and the multiple factors surrounding this type of research study, will be discussed in the next, concluding, section.

CONCLUSION

Future Research

Being that this was a pilot study, there is still much more to be done to refine the procedures and further the research. Trying multiple different types of observation techniques and materials might yield new and interesting results. In thinking about the multiple factors involved when observing children in the classroom and what high assessment scores could mean with children who don't necessarily seem at risk, research such as this is important. Understanding how children cope with not only daily stresses, but also past traumatic events as well as expectations put upon them by the adults in their lives, is crucial for this and future research in the field.

The Research Process

I came into this program wanting to help children be successful, especially those children who have been through more than the typically developing child. Through my academic career and personal interests, it became apparent to me that children who experience traumatic events or live in a toxic, stressful environment might need more support in the educational setting, to help them succeed and thrive. I felt that the first place to start would be to talk about how a brain works and functions normally, in order to contrast with how difficult certain tasks can be for a brain after a traumatic experience. To follow, I wanted to make sure that it was clear in the research how the brain learns

both typically and atypically. Because this research is so important to me, I wanted to make sure I covered as much as possible and connected the central elements, in an effort to make the message clear; children of trauma learn differently.

The research study portion of my work dealt mainly with observable behavior and predictability. The question became: can behavior predict a child's experience with traumatic events. The initial goal was to include three schools in three different socioeconomic areas. Three different classrooms would be observed from those three schools (the age range of the children would have to be no younger than 8 and no older than 11, which includes only fourth and fifth graders). Due to the amount of time it would take to conduct this research study, the preferable time of year would have been the beginning or middle of the academic term. However, this was not possible. The final, critical point is that of the assessment tool. Ideally, with the amount of classrooms and schools used in the study, there would be a good participant size, in order to have ranging results, however, the assessment used has sensitive items which adults and parents alike might find difficult for children to be exposed to. I recommend visiting your local school district office before conducting any research study or project, to insure transparency. The assessment tool itself (the Trauma Symptom Checklist for Children/ TSCC-A) was a critical piece and I believe it did the best job of showing which children were at risk or experiences significant trauma symptoms. I recommend this assessment tool for future research.

Factors for Consideration

During my research study process, it was the end of the academic year, I could only get ahold of one school, and there were only two classrooms that returned enough permission slips to conduct the observation portion of the study. There were also multiple factors involved along with the research, which should be taken into consideration for future use of this study method. Not only does the time of year matter to insure enough time, but also taking into account time of day, curriculum style, and teacher classroom management. Ages of the children and age-appropriate behaviors (typical development behaviors), population, environment, and any aids already implemented for extra support in the classroom, should also be taken into account. Finally, it is important to understand the effect of distractions. There are certain children who can still thrive in a classroom with many distractions, but there are also children who cannot. Distractedness or off-task/disruptive behavior does not equal a child's experience with trauma, but it is still important when thinking about how children learn differently.

What the Research Study Revealed

It was surprising to find that most of the children who I expected to have some traumatic symptoms, did not and some of the children that I didn't expect to have past traumatic experiences, did. I mentioned in the analysis section how dissociation was the most common coping strategy for people who experience traumatic events and in this

case, the same was also true. The two children from Class A (Student 3 and Student 7) were always observed doing their classwork, following instructions, and typically behaving. However, these two children scored high on the Trauma Symptom Checklist and in looking back at the observation notes, there were significant portions of time where they behaved in a dissociative manner. Student 3 and Student 7, along with a few other higher scoring (but not clinically significant scores) students, all had the dissociative scales marked higher than the others. These results suggest that it can be even more difficult to identify students with trauma symptoms. For future research, observation of dissociative behaviors might yield better and more accurate results.

To close, the important research question was whether observable behavior could be a predictor for past traumatic experiences. In this research study, because the focus was on off-task behaviors, the observations were not accurate in assuming which students have trauma symptoms. However, as I mentioned in the previous paragraph, perhaps focusing solely on dissociative behaviors will yield more accurate results. Overall, this pilot study revealed interesting, thought-provoking results that encourage the researcher to investigate further. I hope to continue working in this field in some capacity, exploring the many avenues of trauma research in relation to elementary school-aged children. If at all possible, I'd love to continue this study in varying settings and perhaps across time. I hope to discover more about how the brain responds to, copes, and changes when faced with traumatic experiences. I also hope that this thesis study, as a whole, serves as a vital message to parents, teachers, school administrators, and any other individuals working with children, that trauma can be damaging in many ways, especially when it comes to

how children cope with the stress and expectations of education in our society. This study is one that I hope will serve as a first step in supporting children that might otherwise be overlooked or fall through the cracks, in order for them to succeed and thrive.

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APPENDIX A

Assessment Tool: Trauma Symptom Checklist for Children-A (TSCC-A)

Name _____ Age _____ Sex _____ Identification No._____ Race _____ Date _____

	Never	Sometimes	Lots of times	Almost all of the time
1. Bad dreams or nightmares	0	1	2	3
2. Feeling afraid something bad might happen	0	1	2	3
3. Scary ideas or pictures just pop into my head	0	1	2	3
4. Pretending I am someone else	0	1	2	3
5. Arguing too much	0	1	2	3
6. Feeling lonely	0	1	2	3
7. Feeling sad or unhappy	0	1	2	3
8. Remembering things that happened that I didn't like	0	1	2	3
9. Going away in my mind, trying not to think	0	1	2	3
10. Remembering scary things	0	1	2	3
11. Wanting to yell and break things	0	1	2	3
12. Crying	0	1	2	3
13. Getting scared all of a sudden and don't know why	0	1	2	3
14. Getting mad and can't calm down	0	1	2	3
15. Feeling dizzy	0	1	2	3
16. Wanting to yell at people	0	1	2	3
17. Wanting to hurt myself	0	1	2	3
18. Wanting to hurt other people	0	1	2	3
19. Feeling scared of men	0	1	2	3
20. Feeling scared of women	0	1	2	3
21. Washing myself because I feel dirty on the inside	0	1	2	3
22. Feeling stupid or bad	0	1	2	3
23. Feeling like I did something wrong	0	1	2	3

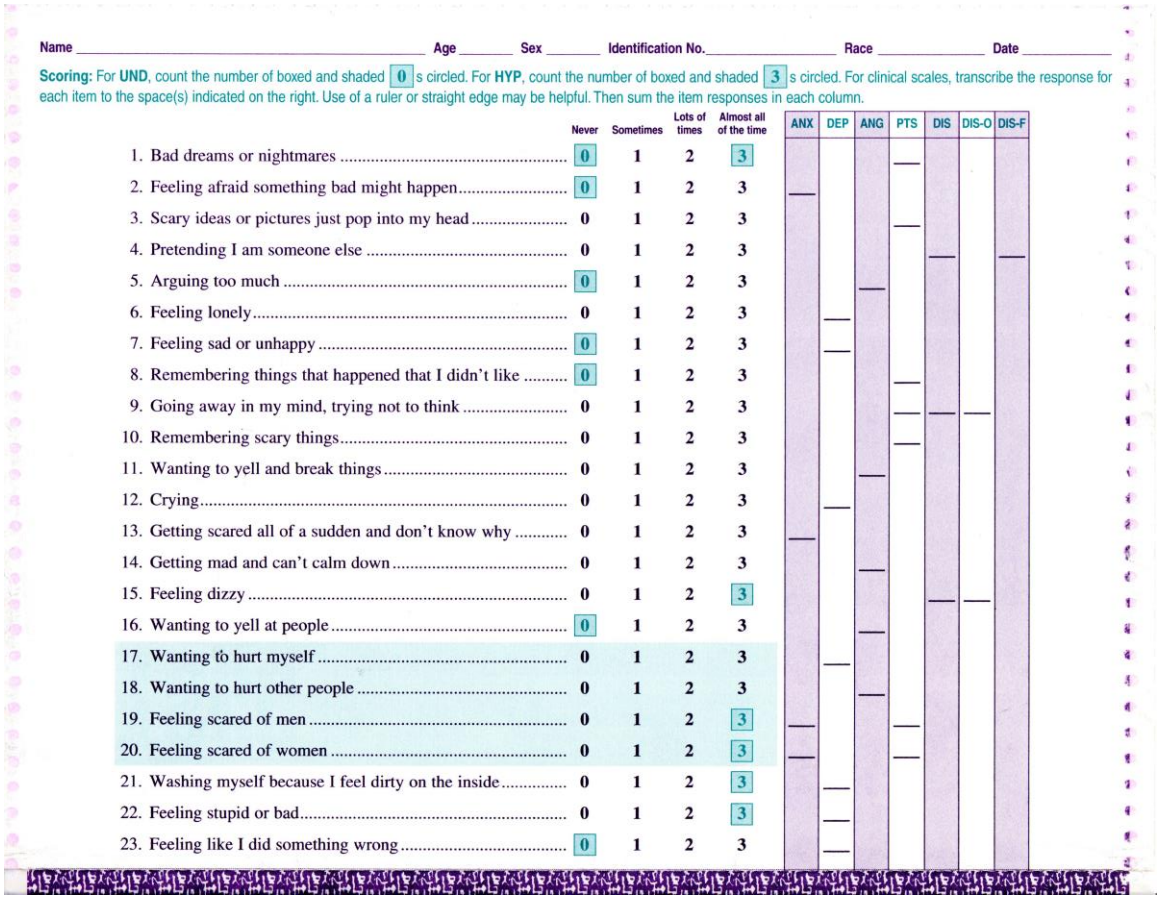
0 = Never
1 = Sometimes
2 = Lots of times
3 = Almost all of the time

24. Feeling like things aren't real	0	1	2	3
25. Forgetting things, can't remember things	0	1	2	3
26. Feeling like I'm not in my body	0	1	2	3
27. Feeling nervous or jumpy inside	0	1	2	3
28. Feeling afraid	0	1	2	3
29. Can't stop thinking about something bad that happened to me	0	1	2	3
30. Getting into fights	0	1	2	3
31. Feeling mean	0	1	2	3
32. Pretending I'm somewhere else	0	1	2	3
33. Being afraid of the dark	0	1	2	3
34. Worrying about things	0	1	2	3
35. Feeling like nobody likes me	0	1	2	3
36. Remembering things I don't want to remember	0	1	2	3
37. My mind going empty or blank	0	1	2	3
38. Feeling like I hate people	0	1	2	3
39. Trying not to have any feelings	0	1	2	3
40. Feeling mad	0	1	2	3
41. Feeling afraid somebody will kill me	0	1	2	3
42. Wishing bad things had never happened	0	1	2	3
43. Wanting to kill myself	0	1	2	3
44. Daydreaming	0	1	2	3

0 = Never
1 = Sometimes
2 = Lots of times
3 = Almost all of the time

APPENDIX B

TSCC-A Scoring Form



Name _____ Age _____ Sex _____ Identification No._____ Race _____ Date _____

Scoring: For **UND**, count the number of boxed and shaded **0**s circled. For **HYP**, count the number of boxed and shaded **3**s circled. For clinical scales, transcribe the response for each item to the space(s) indicated on the right. Use of a ruler or straight edge may be helpful. Then sum the item responses in each column.

	Never	Sometimes	Lots of times	Almost all of the time
1. Bad dreams or nightmares	0	1	2	3
2. Feeling afraid something bad might happen	0	1	2	3
3. Scary ideas or pictures just pop into my head	0	1	2	3
4. Pretending I am someone else	0	1	2	3
5. Arguing too much	0	1	2	3
6. Feeling lonely	0	1	2	3
7. Feeling sad or unhappy	0	1	2	3
8. Remembering things that happened that I didn't like	0	1	2	3
9. Going away in my mind, trying not to think	0	1	2	3
10. Remembering scary things	0	1	2	3
11. Wanting to yell and break things	0	1	2	3
12. Crying	0	1	2	3
13. Getting scared all of a sudden and don't know why	0	1	2	3
14. Getting mad and can't calm down	0	1	2	3
15. Feeling dizzy	0	1	2	3
16. Wanting to yell at people	0	1	2	3
17. Wanting to hurt myself	0	1	2	3
18. Wanting to hurt other people	0	1	2	3
19. Feeling scared of men	0	1	2	3
20. Feeling scared of women	0	1	2	3
21. Washing myself because I feel dirty on the inside	0	1	2	3
22. Feeling stupid or bad	0	1	2	3
23. Feeling like I did something wrong	0	1	2	3

ANX	DEP	ANG	PTS	DIS	DIS-O	DIS-F
			1			
2						
			3			
				4		4
		5				
	6					
	7					
			8			
			9	9	9	
			10			
		11				
	12					
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		14				
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19			19			
20			20			
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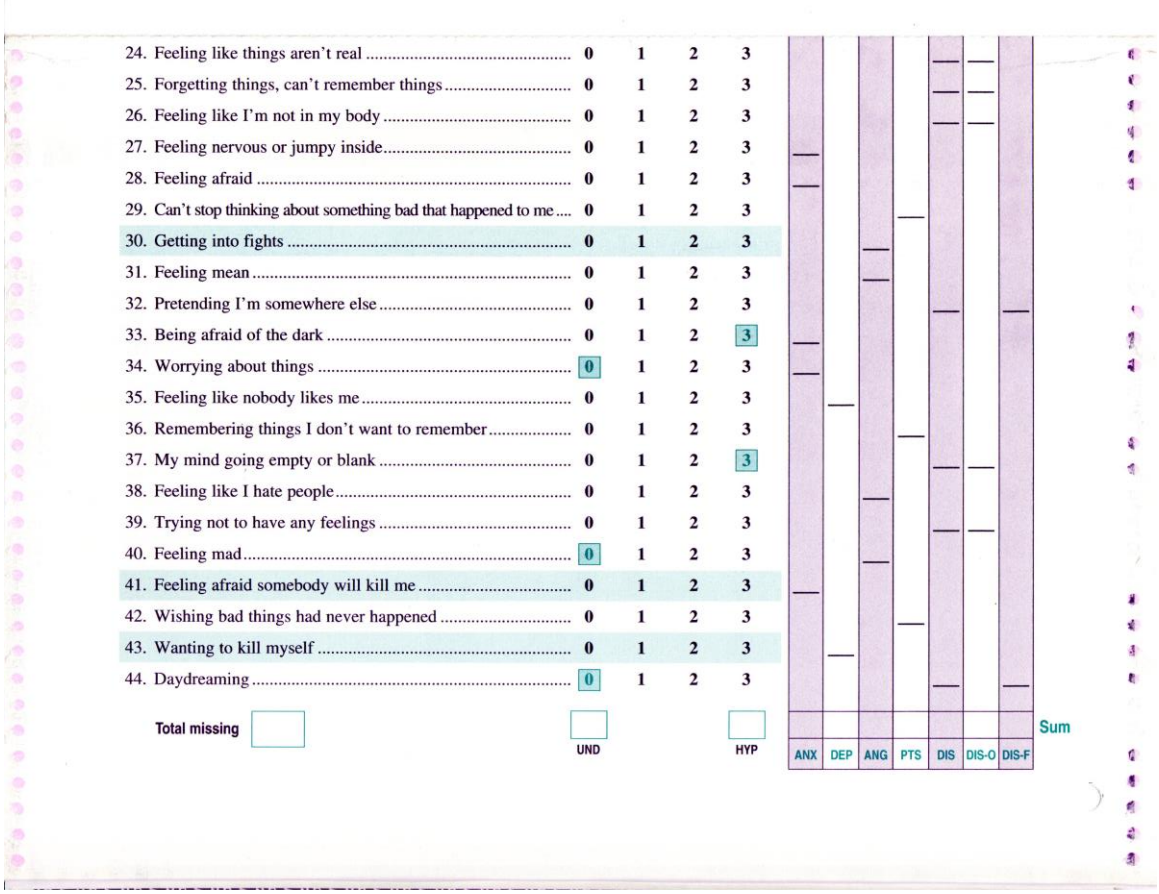
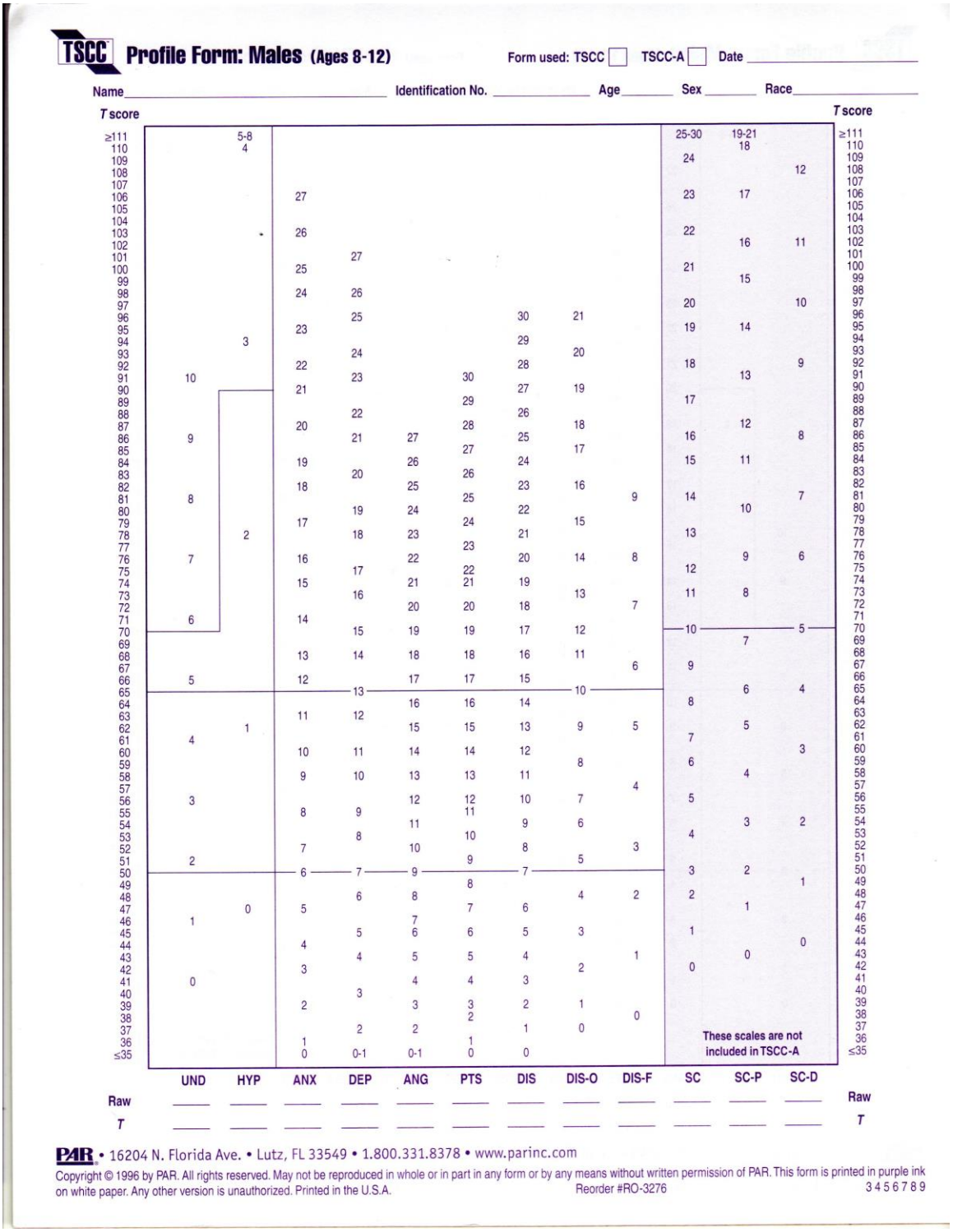
	22					
	23					



24. Feeling like things aren't real	0	1	2	3							
25. Forgetting things, can't remember things	0	1	2	3							
26. Feeling like I'm not in my body	0	1	2	3							
27. Feeling nervous or jumpy inside	0	1	2	3							
28. Feeling afraid	0	1	2	3							
29. Can't stop thinking about something bad that happened to me	0	1	2	3							
30. Getting into fights	0	1	2	3							
31. Feeling mean	0	1	2	3							
32. Pretending I'm somewhere else	0	1	2	3							
33. Being afraid of the dark	0	1	2	3							
34. Worrying about things	0	1	2	3							
35. Feeling like nobody likes me	0	1	2	3							
36. Remembering things I don't want to remember	0	1	2	3							
37. My mind going empty or blank	0	1	2	3							
38. Feeling like I hate people	0	1	2	3							
39. Trying not to have any feelings	0	1	2	3							
40. Feeling mad	0	1	2	3							
41. Feeling afraid somebody will kill me	0	1	2	3							
42. Wishing bad things had never happened	0	1	2	3							
43. Wanting to kill myself	0	1	2	3							
44. Daydreaming	0	1	2	3							
Total missing	UND			HYP	ANX	DEP	ANG	PTS	DIS	DIS-O	DIS-F

Sum

APPENDIX C



TSCC Profile Form: Males (Ages 8-12)

Form used: TSCC ☐ TSCC-A ☐ Date _____

Name _____ Identification No. _____ Age _____ Sex _____ Race _____

T score

UND	HYP	ANX	DEP	ANG	PTS	DIS	DIS-O	DIS-F	SC	SC-P	SC-D
Raw											
T											

These scales are not included in TSCC-A

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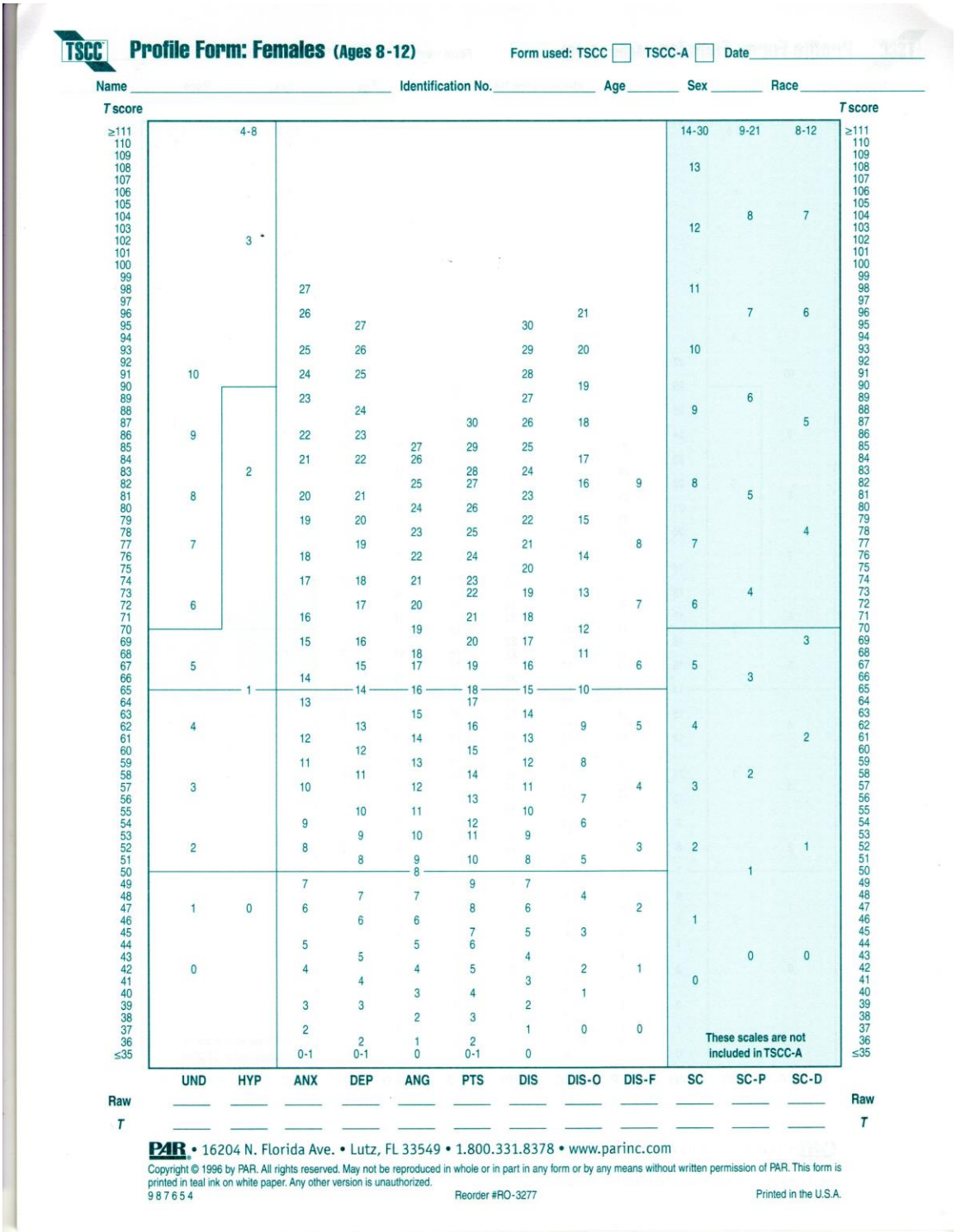
3 4 5 6 7 8 9



TSCC **Profile Form: Females (Ages 8-12)** Form used: TSCC ☐ TSCC-A ☐ Date _____

Name _____ Identification No. _____ Age _____ Sex _____ Race _____

T score	UND	HYP	ANX	DEP	ANG	PTS	DIS	DIS-O	DIS-F	SC	SC-P	SC-D	T score
≥111		4-8								14-30	9-21	8-12	≥111
110													110
109													109
108										13			108
107													107
106													106
105													105
104											8	7	104
103										12			103
102		3											102
101													101
100													100
99													99
98			27							11			98
97													97
96			26					21			7	6	96
95				27			30						95
94													94
93			25	26			29	20		10			93
92													92
91	10		24	25			28						91
90								19					90
89			23				27				6		89
88				24						9			88
87						30	26	18				5	87
86	9		22	23									86
85					27	29	25						85
84			21	22	26			17					84
83		2				28	24						83
82					25	27		16	9	8			82
81	8		20	21			23				5		81
80					24	26							80
79			19	20			22	15					79
78					23	25						4	78
77	7			19			21		8	7			77
76			18		22	24		14					76
75							20						75
74			17	18	21	23							74
73						22	19	13			4		73
72	6			17	20				7	6			72
71			16			21	18						71
70					19			12					70
69			15	16		20	17					3	69
68					18			11					68
67	5			15	17	19	16		6	5			67
66			14								3		66
65		1		14	16	18	15	10					65
64			13			17							64
63					15		14						63
62	4			13		16		9	5	4			62
61			12		14		13					2	61
60				12		15							60
59			11		13		12	8					59
58				11		14					2		58
57	3		10		12		11		4	3			57
56						13		7					56
55				10	11		10						55
54			9			12		6					54
53				9	10	11	9						53
52	2		8						3	2		1	52
51				8	9	10	8	5					51
50					8						1		50
49			7			9	7						49
48				7	7			4					48
47	1	0	6			8	6		2				47
46				6	6					1			46
45						7	5	3					45
44			5		5	6							44
43				5			4				0	0	43
42	0		4		4	5		2	1				42
41				4			3			0			41
40					3	4		1					40
39			3	3			2						39
38					2	3							38
37			2				1	0	0				37
36				2	1	2				These scales are not included in TSCC-A			36
≤35			0-1	0-1	0	0-1	0						≤35
Raw													Raw
T													T

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