



A key challenge for diagnosing attention deficient hyperactivity disorder

Pollie Bith-Melander*; Timothy Nguyen; Sharon May; Lemny Perez; Amber Huynh

State University at Stanislaus, Dept of Social Work, USA

***Corresponding Author(s): Pollie Bith-Melander**

California State University at San Jose, Dept of Social Work, USA

Email: polliebith@gmail.com

Abstract

This research focused on a key challenge for diagnosing attention-deficit hyperactivity disorder (ADHD) among children and youth who exhibited clinical symptoms from experiencing traumatic events. The objective of this exploratory research was to gain a deeper understanding of the current challenges and barriers relating to assessments and treatments of children with a history of trauma and a putative diagnosis of ADHD. This research is taken from a sample of children who live in a poor-urban environment where violence is the daily norm. This research reviewed a representative sample of qualitative observations made by clinicians who worked with children in an urban school district in northern California, including secondary information of hand-written notes from past clinicians who previously worked in these same schools. This research framed using the concept of the flight-freeze response to violence; this perspective offers us insight into how we as human beings react and respond to threats and violence in our lives. We concluded that among our sample, a significant portion of those diagnosed with ADHD had past trauma and trauma symptoms, and that there was noticeable overlap of symptoms that could be attributed to either ADHD or anxiety spectrum, namely post-traumatic stress disorder (PTSD). Screening for trauma is critical for matters relating to the development of effective and appropriate interventions. We believe that conducting past family histories, and specifically conducting assessments of any history of past trauma, may help reduce the likelihood of misdiagnosing and may assist in being able to administer more effective treatments.

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Introduction

Childhood exposure to violence has been shown to have both short-term and long-term psychological problems that can lead to long-life impairment. Approximately one million children are exposed to abuse annually [1]. One in four high school students report engagement in at least one physical fight [2]. About 19% of those injured and 12% of the 19% of those youth had physical illnesses and developed some symptoms of PTSD [2]. More than

half (54%) of families in the U.S. population have been affected by some type of disaster [2]. Research on biological systems disrupted by “childhood trauma is consistent with the patterns of behavioral, cognitive, affective, and relationship symptoms”. Trauma has long-term impact and its manifestation can be detrimental to the health and well-being of an individual. The current assessment for ADHD precludes the assessment for trauma



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[1], which can have serious impact on interventions because of some of the similarities of clinical symptoms, namely anxiety spectrum disorders and specifically PTSD. A brief description on the biology of the biomarker of ADHD may offer some insight into the link or association between ADHD and the consequences/impact of trauma, which will be discussed below.

ADHD is characterized by inattention, hyperactivity, and impulsivity. Under the category of neurodevelopmental disorders, ADHD is one of the most frequently diagnosed among children and adults. The prevalence rate is approximately 5% in children and 2.5% in adults [3]. It is often described at the behavioral level but there is an association between brain structure and ADHD diagnosis [4]. The areas of the brain affected by ADHD are wide-reaching and include the frontal lobe, temporal lobe, limbic system, and cerebellum. The frontal lobe is responsible for executive functions that include sequencing, decision-making, attention, personality, problem solving, verbal expression, spontaneity, emotions, and movement initiation [5]. The functions of the temporal lobe include the spoken word, selective attention, sexuality, aggression, inhibitions, identification, categorization, facial recognition, and object location [6]. For example, the severity of ADHD symptoms was linked to decreased volumes of frontal and temporal grey matter, caudate, and cerebellar in children and adolescents [4]. The cerebellum is responsible for gross/fine motor skills, voluntary motor skills, balance/equilibrium, eye movement, coordination, and postural controls [7]. Specifically, the parts of the brain impacted by ADHD are associated with decreased cortical volume, surface area, and folding throughout the cerebral cortex [8]. There is evidence associated with “widespread micro- and macrostructural changes in the frontal, basal ganglia, anterior cingulate, temporal, and occipito-parietal regions” [4]. The associations between brain structure and ADHD symptoms in childhood were more widespread than ADHD symptoms in adulthood, which gives MRI results a predicting value of ADHD diagnosis at 83% accuracy [4]. This study demonstrates that there is a need to use a biomarker for ADHD for clinical assessment in young adults for further confirmation [4]. In short, brain anatomy provides us with a clue to understand and predict the occurrence of many other health/medical conditions, including ADHD.

Conceptual frameworks

This research study focuses on children who have clinical symptoms relating to or a diagnosis of ADHD to gain a deeper understanding of the current challenges and barriers involved in assessments and treatments. This section reviews the conceptual frameworks of the research study to shed light on issues affecting children who live in violent communities and who have ongoing challenges accessing government services.

Trauma

Trauma is defined as a deeply disturbing or distressing experience, which can include physical injury. Trauma can affect not only the individual but also the social fabric of a nation or culture. The criterion for trauma in the Diagnostic and Statistical Manual of Mental Disorders, Fifth Edition (DSM-5), is precise. According to the definition, trauma involves either direct exposure to an event or the witnessing of it in person. Cultural trauma, however, is more complex; cultural trauma is deeply rooted at the collective level in cases such as war, natural disaster, and genocide.

Trauma is transmissible from one generation to the next. Research has shown that the impact of child traumatic stress can last well beyond childhood. Trauma is a risk factor for nearly all behavioral health and substance use disorders. For example, child trauma survivors may experience the following: learning problems, increased use of health and mental health services, increased involvement with child welfare and juvenile justice systems, and long-term health problems such as diabetes and heart disease [2]. Childhood traumatic events are associated with both behavioral health and chronic physical health conditions. Furthermore, some of the long-term consequences include substance use (such as smoking, excessive alcohol use, and taking drugs), mental health conditions (such as depression, anxiety, or PTSD), and other risky behaviors (such as self-injury and risky sexual encounters). These risk factors have been linked with traumatic experiences, especially in childhood [9].

Childhood trauma

Childhood trauma involves the impact of extreme physical or psychological stressors that overwhelm a child’s ability to cope. Trauma occurs when children are exposed to any of a range of traumatic stressors, including sexual and physical assault, domestic violence, car accidents, shootings, war, and terrorism [10]. These experiences have a profound effect on a child’s development [11]. Trauma is an experience that can transform a child’s world. It is the “human brain that processes and internalizes traumatic experiences” [11]. It is also the brain that mediates emotional, cognitive, behavioral, social, and physiological functioning [11]. Understanding the development of the human brain can illuminate how a child responds to trauma and copes with traumatic events, both as a child and later in life as an adult. It is particularly important to understand why some children develop symptoms while others do not, how children deal with trauma, and how children’s brains respond to threats.

The brain is a complex system consisting of billions of neurons and tens of billions of glial cells designed to sense, process, store, perceive, and act on information from internal and external environments [11]. The internal environment consists of responses such as the hormonal signals associated with hunger [11]. The external environment includes the nervous system associated with visual, tactile, olfactory, and auditory senses [11]. The main part of the brain consists of working neurons, which are responsible for communicating with other neurons. Individual neurons are connected into networks, which are organized into systems, and these systems work together to mediate specific functions such as alerting when danger is imminent [11]. The frontal cortex is responsible for abstract thought processes, such as complex language, while the brain stem at the base of the brain is responsible for involuntary functions, such as heart-rate, blood pressure, and arousal states [11]. The middle part of the triune brain is the limbic system that is responsible for attachment, affect regulation, and aspects of emotion.

Fundamental to a child’s life is how she/he is impacted by trauma. Children are particularly vulnerable to adverse reactions to trauma as their brains are still developing and undergoing rapid developmental periods. In addition, they have limited coping skills and are dependent on their primary caretakers to protect them from experiencing trauma.

Overlapping clinical symptoms of Trauma and ADHD

Hyper-vigilance and dissociation, which are symptoms of trauma, can be mistaken for inattention. Impulsivity and hyper-

activity, symptoms of ADHD, can also be brought on by a trauma stress response in overdrive. These overlapping symptoms need to be carefully screened and identified for development of more effective interventions. Children who are diagnosed with ADHD might have difficulty managing their emotions or controlling their behavior and they could shift from one mood/behavior to the next in a very short period of time. Furthermore, various studies have shown evidence of different brain structures with people diagnosed with ADHD. These studies used structural magnetic resonance imaging (MRI) and discovered that there is a smaller size in the brain for people diagnosed with ADHD, especially in the prefrontal lobe, caudate, cerebellum, and cerebellar vermis compared to a normal brain [12,13,14,15]. On the other hand, in the case of trauma, the brain parts that are implicated in the stress response include the amygdala, hippocampus, and prefrontal cortex. In a stress situation or threat, a baby, for example, might cry or show discomfort in facial expression since she/he cannot talk; however, she/he would abandon these early stages alarm if she/he could not get a favorable (positive) response from caretakers. She/he instead would activate other functional responses.

Symptoms of Trauma and ADHD

Below is a list of some clinical symptoms associated with trauma. Children cannot specifically state that they are being triggered by trauma or that they would express that they need to see a therapist to sort out their emotions. They generally behave in ways that display some behavioral challenges or show physical signs. Here are some of these common characteristics:

- Feelings of fear, helplessness, uncertainty, vulnerability
- Increased arousal, edginess, agitation
- Avoidance of trauma
- Irritability, quick to anger
- Feelings of guilt or shame
- Dissociation, feelings of unreality or being outside of the body
- Continually feeling on alert for threat or danger
- Unusually reckless, aggressively reckless, or self-destructive

These are all possible symptoms of people who have experienced trauma. Which such clinical symptoms are relatively easier to detect in adults; however, children tend not to be able to express themselves in these terms. Sometimes they themselves may not understand or know how to describe what they are feeling. Instead of being able to express their feelings verbally, they instead tend to display their emotions through physiological reactions such as screaming, crying, or physical aggression.

Children who show some of the following symptoms are likely to have been diagnosed with ADHD:

- Difficulty sustaining attention
- Struggling to follow instructions
- Difficulty with organization
- Fidgeting or squirming
- Difficulty waiting or taking turns

- Talking excessively
- Losing things necessary for tasks or activities
- Interrupting or intruding upon others
- Yelling or fighting with classmates or a teacher
- Storming out of the classroom

These symptoms are generally proven to be somewhat mimicking both ADHD and those diagnosed with trauma:

- Difficulty concentrating
- Difficulty concentrating
- Easily distracted
- Often does not seem to listen
- Disorganization
- Hyperactivity
- Restlessness
- Difficulty sleeping

Most importantly, an experienced mental health clinician relies on past experiences when conducting assessments to minimize any overlapping symptoms. Some of this involves observations of a behavior in different settings as well as probing for answers if possible.

Method

The Project Question

We considered a major project question. 1) How we do ensure that the diagnosis of ADHD is the correct one?

Research has shown that both direct and historical trauma has long-term lasting impacts on the mental health and well-being of a population. Trauma is an event or process that can overwhelm the individual, family, and community, and hinder one's ability to cope in mind, body, soul, and spirit [16]. Many children who live in urban communities often experience violence (directly or indirectly) sometimes during the entire period of their upbringing. The effects of violence on the mental health of a population have important implications for overall well-being as well as livelihood.

Secondary Information

Secondary observational information (de-identified) came from clinical notes from clinicians who worked for a school district. There were descriptions of clinical symptoms, anecdotal accounts of challenges, barriers, and incomplete personal histories. The information was meant to present some patterns of diagnoses among clinicians. There are roughly ten common diagnoses being listed among school-aged children. Some details focused on treatment plans, progress or lack thereof after an intervention, and barriers and challenges expressed by clinicians through observations or other clinicians' observations. No names of staff were recorded in notes. Notes were handwritten or typed and in raw data form without analysis. Some of the cases of notes were closely analyzed to seek for patterns of histories of common personal experiences and exposure to violence; clinical symptoms that may not have been the result of exposure to violence but rather other factors (physiological, developmental issues, medical-induced, etc.) were highlighted

in this study to gain a deeper understanding of what happens to children who are diagnosed with ADHD but also have experienced severe traumatic events.

Results

Secondary Information from Clinicians

All clinicians in the study stated that they frequently used the nine diagnoses listed in Table 1. They also stated that they struggled with their own values and professional code of ethics when conducting assessments. They realized that they were labeling children when they added a diagnosis to a treatment plan. They stated that they felt forced to do this because insurance companies and Medi-Cal billing required a diagnosis. Table 1 lists some of the disorders that were commonly diagnosed among the school-aged children in our sample, in order of frequency of diagnosis.

The diagnoses in Table 1 are listed in order based on clinicians’ response to the most common diagnoses used for these school-aged students in this urban school district. ADHD, for example, was ranked the number 1 common diagnosis used for their treatment plans. The primary author noticed in her caseload of clients a similar pattern in her own experience of diagnosing urban school-aged children when she was working as a clinician in her own caseload. ADHD was most commonly diagnosed, especially among male elementary school students, followed by anxiety spectrum and conduct disorder. Adjustment disorder ranked as the fourth most common diagnosis among these clinicians. Depression was fifth and various types of phobia were last but still considered to be a common diagnosis based on symptoms presented at the time of their assessments.

Table 1: Common youth diagnoses (DSM-IV and DSM-5) in this urban school district

Diagnosis	DSM-IV	DSM-5
Attention Deficit/Hyperactivity Disorder	314.01	59-60
F90.2 – Combined Presentation		
F90.0 – Predominately Inattentive Presentation		
F90.1 – Predominately Hyperactive/Impulsive Presentation	312.9	480
Disruptive, Impulse-Control, Conduct Disorder		
F91.9	300.02	222
Generalized Anxiety Disorder		
F41.1	312.81	469-471
Conduct Disorder		
F91.1 – Childhood Onset Type		
F91.2 – Adolescent Onset Type		
F91.9 – Unspecified Onset Type	309.0	286-287
Adjustment Disorder		
F42.21 – With Depressed Mood		
F43.22 – With Anxiety		
F43.23 – With Anxiety and Depressed Mood		
F43.24 – With Disturbance of Conduct		
F43.25 – With Mixed Disturbance of Emotions and Conduct	296.20	160-162
F43.20 – Unspecified		
Major Depressive Disorder		
F32.0 – Mild		
F32.1 – Moderate	300.4	168-169
F32.2 – Severe		
Persistent Depressive Disorder (Formerly Dysthymic Disorder)	300.23	118-119
F34.1		
Social Anxiety Disorder	300.29	116-117
F40.10		
Specific Phobia		
F40.218 – Animal		
F40.228 – Natural Environment		
F40.23x – Blood-injection Injury		
F40.248 – Situational		
F40.298 – Other		

Table 2: Common symptoms reported by three different types of clinicians

Common symptoms reported by a psychologist	Common symptoms reported by a clinical social worker	Common symptoms reported by a family/marriage therapist
Anxiety Anger Irritability Mood swings Depression Incontinence as a result of anxiety or stress Mild cognitive impairment as a result of depression Fear Denial Withdrawal	Anxiety/PTSD Depression DV/Trauma Attachment issues Anger Irritability Rejection Explosive disorder Depressed mood (Intermittent) emotional outbursts Fear	Anxiety Depression Guilt Self-blame Fear PTSD-like symptoms Abandonment Rejection Fear of it happening again

The results from Table 2 suggest that regardless of a clinician’s training, the identified underlying symptoms among this school-aged group were similar. The top three symptoms reported by these clinicians were anxiety, anxiety/PTSD, and depression. However, anxiety ranked top as the common symptom.

Other common symptoms reported by these clinicians included emotional dysregulation and associated symptoms such as attachment issues, mood swings, irritability, and guilt/self-blame. Conduct and related symptoms such as anger, rejection, denial, withdrawal, and abandonment were also reported as common symptoms. Fear was also reported by these three clinicians as a common clinical symptom among children in this urban school district.

Results

Case Vignettes

Data from these case vignettes came from old notes with all personal identifiers removed (i.e., name of a person, phone, student ID, address, or any other information that would make identifying individuals possible). These case vignettes are based on secondary data retrieved from hand-written notes from the urban school district. The district consists of many elementary schools, middle and high schools; therefore, it is unlikely that any single person would be able to decipher an individual based on the descriptions from these case vignettes.

Case 1

Sexual Assault, Drugs, and Gang Violence

This case concerns a 17-year-old female (Table 3) who was in 11th grade in age but whose school credits were the equivalent of 9th grade. She had an IEP and was diagnosed with ADHD and mood disorder. The youth had prescriptions for both diagnoses. She lived with both parents who worked full-time jobs; the family characterized as lower middle-class. Two years earlier, when youth was in junior high school, she experienced two traumatic events. 1) She was drugged and raped by ex-boyfriend.) She discovered her best friend’s body (a suicide). The clinical notes describe the youth stating that she could not close her eyes at night and confessed to not taking her medications; instead she would keep them under her tongue. She said she “refused to take her meds because they made her sick in the stomach.” Youth never received any support for loss/grief after the suicide of her friend or the rape by her ex-boyfriend. Some of the symptoms noted included excessive crying, hearing voices telling her to kill herself, and feeling guilty over the death of her best friend.

Assessments were made using the Beck Depression Inventory (BDI) and the PTSD Checklist (civilian version from the VA). On the Beck Depression Inventory, she scored 52, which meant the youth was extremely depressed. On the PTSD Checklist she scored 77, which indicated high severity in symptoms relating to PTSD. The youth continued to see a psychologist as late as two years ago when the youth was in 11th grade.

Table 3: A Case of Sexual Assault, Drugs, & Gang Violence

Identifying Information	Reasons for Referral	Clinical Info/Interventions
Latina Female 17 y/o 11 th grade in age but school credits shown to be in the 9 th grade	Truancy Substance use Defiant behavior	Had IEP Was diagnosed with mood disorder On meds for mood disorder ADHD Psychosis Suicidal ideation Anger, substance use

Case 2

Refugee Past

Case 2 documents a kindergartener, a Southeast Asian female who was born in the U.S. and whose mother died in a car accident when she was six years old (Table 4). Her mother was a refugee from Southeast Asia. Her mother became pregnant with the girl while dating another man and decided to run off with this new man who was not the child’s biological father. The child never met her father who lived out of state. Before arriving in the U.S., the mother had suffered serious trauma in her home country during the war in Southeast Asia and in the refugee camps before the child was born; she had symptoms of PTSD and had never sought help. The mother was five years old when the war broke out in Southeast Asia and caused the collapse of the country to the communist rule. Like many Southeast Asian refugees, her mother survived the Vietnam War and the atrocities that killed a third of the population.

Prior to car accident, the six-year-old girl never had any trauma experiences and lived with both parents in a home and was never seen by a counselor to address her symptoms; however, school staff had noted possible signs of. However, the child was never seen by a mental health professional to deal with these symptoms. PTSD in the child. She was more alert, edgy, and sen-

sitive than the average kid her age, especially to sounds.

A school counselor sought this primary author’s opinions on this case since she is a Southeast Asian herself and a clinician. The counselor’s report detailed the child’s experiences for six months while she was still attending the same elementary school. The six-year-old kindergartener lost her mother to a car accident. Both the mother and the mother’s boyfriend were killed. The child was described as quiet and timid. Some adults described her as shy and studious. The girl and her mother lived with the family of her mother’s boyfriend. After her mother and the boyfriend died, the child continued to live with the boyfriend’s family in the same room that her and her mother’s boyfriend stayed. For the first six months, her teacher thought that things were back to normal. She was studying hard and followed instructions. She never voiced her opinions. The only sign that the teacher reported was that the child no longer displayed any emotions. She was stoic and was startled easily when touched. She also started to change at home. She preferred wearing black clothes and chose black ink to write. She switched between screaming and being silent. The school was told that her biological father was informed and agreed to take her in. She would be moving to another state once her paperwork was complete.

Table 4: Refugee Past

Identifying Information	Reasons for Referral	Clinical Info/Interventions
Female Southeast Asian 6 years old	Signs of ADHD from school counselor but not fully assessed No reaction No response No engagement in class/at home	Prior to the experience – known to have anxiety issues (edgy/unfocused) Post news of deaths -Went silent -Stoic -Mood swing (laughing quickly/crying)

Discussion

The results from this analysis seem to suggest two common patterns relating to the social environments of our research sample and the occurrence of clinical symptoms. One pattern is the common past experiences of trauma among the individuals in this study; nearly all had experienced trauma of one kind or another. The second pattern is that ADHD was the most frequently given diagnosis among this group of traumatized young people. These results provide us with clear evidence that experiencing trauma make it a major challenge for the diagnosis of ADHD due to the overlapping symptoms. What we can conclude from these results is that screening for PTSD is critical for matters relating to the development of effective and appropriate interventions, however. Every person who has a diagnosis of ADHD also should be screened for trauma and/or anxiety spectrum, specifically PTSD. Furthermore, conducting past family histories, and specifically conducting assessments of any history of past trauma of an individual, may help in developing a more effective treatment plan for those who are diagnosed with ADHD.

The one fact we know that can offer insight for both ADHD and trauma is that both affect the same part of the brain, the prefrontal lobe/cortex. This area of the brain is responsible for executive functions relating to the ability to differentiate among conflicting thoughts, such as determining good and bad, better and best, and whether something is the same and/or different, as well as the ability to realize and weigh future consequences

of current/immediate actions, work toward a specific and concrete goal, predict outcomes, have expectations that are based on actions, and exercise social control. Fundamentally, it is the part of the brain that can suppress urges or irrational thoughts. This is the part of the brain that controls the rational mind of a human being and prevents an individual from acting in ways that might lead to socially unacceptable outcomes.

One final point about this is that we know that there is ample evidence on how our brains react to violence/trauma and how the brain is altered when we are met with repeated traumatic experiences. The earlier the exposure to trauma the more likely this altered brain will become more permanent. This change is in a state of use-dependent fashion where there is no part of the brain that can change without being activated first. In a non-use state such as sleep, the brain is not used and therefore is not activated to take on an experience. On the other hand, when a person is faced with a traumatic experience, the brain is more likely to be activated to record that experience. In the case of trauma or when a person is in a persistent state of fear, the brain function becomes impaired and lacks the capacity to access or benefit from meaningful social, emotional, and cognitive experiences.

Limitations

This research was limited in time and scope. One major limitation was the lack of MRI images. This would have informed us of the underlying neuro-pathophysiology of this group and

provided more conclusive evidence. Instead, we relied on observational information for our analysis. While the latter offered some insight and clues, it was not possible to make any sound conclusion. Observations were conducted but limited to group recreational activities in large spaces such as auditoriums, stadiums, theaters, and playgrounds. None of these observations related to any specific participants. The observations focused on school environments and whether such locations were subject to violence. Because of time limitation, I (primary author) did not have the opportunity to observe group dynamics or individual interactions with known diagnoses. In addition, the hand-written or typed notes were in the form of raw data that was initially compiled without a research study in mind, and therefore posed some analysis challenges.

Conclusion

Further systematic observation is needed to fully understand the complexity of making an assessment and diagnosis of ADHD in an urban community that is faced with ongoing trauma. We recommend that data collection on both ADHD and trauma be approached in a prospective longitudinal research study with a referent group.

What we do know is that this type of poor urban youth community has, and will no doubt continue to experience a plethora of trauma, and that many of their parents have grown up in a similar environment with similar experiences of trauma. Therefore, reason tells us that there is a high degree of probability that some of these children may have clinical symptoms of anxiety spectrum disorders in general, and PTSD in particular, because of their exposure to (repeated) and often generational trauma.

Past trauma may play a role in ADHD but the question remains how do we know for sure that those children who are truly having symptoms of ADHD are not because of past trauma? Some children may be more prone to experience symptoms from trauma than others. What is relevant is the sheer amount of trauma found among this population that has received other diagnoses, most prominently ADHD. What is also evident is the need to further study the symptoms for both ADHD and those are impacted by trauma, and how our brains are wired to adapt to changing circumstances, to more effectively treat those suffering from trauma.

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