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A Snapshot Into ADHD: The Impact of Hyperfixations and Hyperfocus from Adolescence to Adulthood

Claire Huang[1]

[1]River Hill High School

ABSTRACT

Attention-deficit/hyperactivity disorder (ADHD) is characterized as a lack of attentional regulation rather than the inability to maintain attention (Groen et al., 2021). With the growing research on ADHD development, concepts such as a hyperfixation or hyperfocus have been used with mismatched definitions. Therefore, the first goal of this research was to help define what it means to hyperfixate and hyperfocus. Because people with ADHD under 25 years old are still developing executive functions, experiencing fluctuating symptoms, and facing fewer expectations of independence, which allows for more exploration of self-identity, the development of hyperfixations and hyperfocus can be more common among adolescents. Thus, the second goal of this research was to evaluate the hypothesis of hyperfixation and hyperfocus development in various age ranges. Data will be collected via an online questionnaire and one-on-one interviews, open to people of all ages. The participants will be asked to answer questions on their ability to focus as well as their experience with hobbies and interests. Each respondent will be evaluated separately based on age, gender, and whether they have an ADHD diagnosis. The data will then be analyzed to determine whether there is a relationship between hyperfixation/hyperfocus occurrence and age or other demographics. As one of the earliest studies on the topic of hyperfixations in the context of ADHD, this research will help advance the understanding of attentional processes in ADHD, which may shed light on future directions in this field.

Introduction

When a six-year-old child is diagnosed with the neurodevelopmental disorder attention-deficit/hyperactivity disorder (ADHD), their parents assume that the only behavior to expect from them is a consistent lack of focus and hyperactive behavior. However, they are surprised to see that the child has a tendency to latch onto newly discovered hobbies for weeks at a time and appear completely absorbed by that interest. The child also shows moments where their attention is so drawn to an activity, that even though the parents make several attempts to call for them, the child shows no reaction, as if they had not heard anything. As research into ADHD progresses, increasing our understanding of the functional impacts of the disorder in daily life, this information has been used to advance treatment, including medication and especially cognitive-behavioral therapy. Greater knowledge of ADHD has led those diagnosed to become more familiar with their own diagnosis and to notice more distinct details of how their everyday life is affected. Among the recent discoveries are two vastly similar yet completely different conditions associated with ADHD: hyperfixation and hyperfocus. Hyperfocus is a short, intense focus on a single or set of tasks. It is commonly confused with a hyperfixation, which is an intense, repetitive attachment to some form of hobby or content. Hyperfixation is a relatively new concept, but it is rather similar to special interests, a condition specific to autism. As it says in the name, a special interest is an intense passion focused on a subject, such as planes, watches, or even country music. Special interests are directly related to autism and can last from a few years to an entire lifetime (Singer, 2018), while hyperfixations are shorter, broader, and commonly associated with ADHD (ADDitude, 2022). How people with ADHD experience hyperfixations and hyperfocus greatly vary depending on personality and interests; some may not experience any at all. It is hypothesized that although they are unique occurrences that can drastically alter one's lifestyle, hyperfixations and hyperfocus tend to happen less after the brain reaches full maturity around the age of 25. People

with ADHD under 25 years old develop hyperfixations and hyperfocus more easily than people with ADHD over 25 because of developing executive functions, the fluctuation of symptoms, and fewer expectations of independence, allowing for more exploration of self-identity. The purpose of this paper is to inform the reader about the differences in ADHD development, how the brain and environment play a role in each individual experience, and why ADHD develops the way it does.

Literature Review

ADHD is a neurodevelopmental disorder associated with difficulty controlling attention, hyperactivity, and impulsivity. Those are known as the symptoms, which can lead to impairments. Symptoms are the biological manifestations of a disorder, while impairments are the consequences faced due to the symptoms. In other words, impairments are dependent on the environment a person is in. Meanwhile, symptoms remain the same regardless of a person's circumstances. The areas affected by ADHD are the frontal and motor cortex, which control attention, impulsivity, and motor activity, and the prefrontal cortex, which is linked with executive functions (Ballard et al., 1997).

Executive Function Development

Executive functions (EFs) are important for the development of problem-solving and time management skills; in particular, they manage a person's ability to plan, organize, and prioritize, initiate actions, self-inhibition, self-monitor behavior, shift attention, and overall working memory (Marks, 2020). A large part of ADHD symptoms stem from an impairment in EFs, and this is sometimes referred to as executive dysfunction. The two main EFs that people with ADHD struggle with are inhibition control and working memory (Banich et al., 2009). For example, personal restraint in regard to emotions, reactions, and behavior is weakened in ADHD. This is commonly displayed as impulsive behavior or actions and is a major part of self-inhibition. Inhibition can be divided into two parts: cognitive and behavioral. Cognitive inhibition is another term for selective attention, which is the ability to "tune out irrelevant stimuli" (Akin, 2019). Its relevance with ADHD lies in the fact that people with ADHD have difficulty with directing their attention on a singular task due to the constant distractions from other external stimuli. Behavioral inhibition relates to behavioral control. This is another aspect of inhibition that people with ADHD, particularly children, struggle to manage. For instance, resisting the urge to blurt out an answer or interrupt a private conversation can be hard to overcome. Behavioral inhibition is considered to be the central deficit in ADHD, and all of the other EFs are indirect effects of gaining more self-control (Barkley, 1997). Working memory, which was previously known as short-term memory, is the ability to keep and retrieve processed information from sensory stimuli. For example, the ability to hold a phone number in one's head before dialing it, or holding a grocery list in one's head while shopping. It is also associated with problem-solving and analytical thinking (Marks, 2020).

In ADHD, EFs are not only impaired, but also develop at a later rate than those who are neurotypical, or do not exhibit symptoms of a mental disorder. The prefrontal cortex is one of the last regions of the brain to fully develop, usually maturing in early adulthood, around between 20-30 years (Arnsten et al., 2019). The average prefrontal cortex already grows at a slower rate than the rest of the brain, and in people diagnosed with ADHD, there is a significant delay in its growth. A study discovered that ADHD and autism, another disability that affects EFs, have EF maturity rates that proceed at the same rate as typical people but begin developing at a later time, which puts them at an even bigger disadvantage (Fossum et al., 2021). Most people diagnosed with ADHD have a lack of cognitive or behavioral inhibition, a largely important EF, and can lead to struggles with controlling actions related to positive or negative emotions. Impairment in inhibition is also one of the main factors contributing to the difficulty in regulating attention, including sustaining attention on certain tasks and switching attention from one task to another when needed (Gargaro et al., 2015). In addition, since children with ADHD in particular have issues with inhibition and working memory (Moriguchi & Hiraki, 2013), they can be easily affected by new and exciting things and be captivated by them for

long periods of time and could essentially "jumpstart" them into a hyperfixation. Combined with impairments in the other domains of EFs, problems with attention and hyperactivity/impulsivity arise in ADHD.

Attentional Regulation and its Relation with Executive Functions

It is commonly known that people with ADHD struggle with focusing on one task, but since the issue is attentional regulation, it is hypothesized that they may also struggle with shifting their focus off of one task. Although there is currently little research into hyperfocus, studies on attentional control have determined that switching attention can be as troublesome as maintaining it. In research comparing the effects of ADHD and autism on attention, those who were diagnosed with ADHD or had ADHD as a comorbid disorder faced less difficulty maintaining attention and put a lot more effort in switching their focus from any sort of task requiring specialized attention, compared to those with just autism (Gargaro et al., 2015). One of the rare experiments on hyperfocus found that hyperfocus is uncontrolled and occurs if a task is either motivating or stressful enough to incite a response (Groen et al., 2021). For example, if a student has a project due the next day that they have not begun yet, they may hyperfocus on that assignment and complete it in a few hours. Or, a person may take interest in a certain book series and will hyperfocus on reading those books. When hyperfocus occurs from a personal interest, such as painting or watching a television show, it is highly likely that this activity is similarly motivating and the person is also hyperfixating on the activity.

Even though neurotypical people can hyperfocus on a task, it is less common and usually does not occur at the same severity as hyperfocus from ADHD. A study concluded that children with ADHD have higher levels of videogame addiction, proposing that the stimulation satisfies the hyperactive, impulsive, and inattentive parts of ADHD, thus keeping them playing (Masi et al., 2021). However, it could be argued that this supposed videogame addiction is actually a hyperfixation, so the reason why hyperfixations are more common in those with ADHD is because the topic they are hyperfixating on is stimulating their brain. In addition, this "stimulation" from videogames may be what causes the ADHD brain to latch onto during hyperfocus. EFs, a crucial part of humans' problem-solving skills, strengthen the slowest, which is why people do not reach full mental maturity until adulthood. In ADHD, the area of the brain that controls EFs - the prefrontal cortex - develops at a later rate, leaving them impaired, but not stagnant, since they will gradually improve. Because hyperfocus and hyperfixations are related to the lack of self-inhibition and attentional control, as executive functioning progresses, their occurrence will decrease over time.

Changes in ADHD Symptoms Over Time

ADHD symptoms fluctuate over time, but they show a gradual trend of disappearing as people grow older. Whereas inattentive symptoms tend to persist throughout the lifespan (early childhood through adulthood) in most individuals with ADHD, hyperactive-impulsive symptoms are often most prominent in early childhood and start to decline and/or become less impairing starting in late adolescence. Indeed, developmental studies have found that hyperactivity-impulsivity tends to disappear the most, while inattention persists in most individuals (Friedman et al., 2015). The loss of hyperactive symptoms or impairments is correlated with stronger control over self-inhibition, which indicates that hyperfocus rates may decrease as well. However, it is important to consider that inattentive symptoms often persist. This may be because as people grow up, they face more "demands for attention" - like paying taxes, attending college, and maintaining a steady career - that result in inattentive symptoms staying but not hyperactivity (Oddo, 2021). These attentional demands lead to greater impairment and therefore reduce the chances of inattentive symptoms from remissing.

ADHD remission refers to the lessening in the severity of symptoms and shows how the disorder oscillates over time, particularly after childhood. According to brain scans of adult ADHD patients, remission of many symptoms, particularly hyperactivity/impulsivity is quite common as individuals go from adolescence to adulthood (Friedman et al., 2015). Still, it is important to consider that remission does not mean a full recovery, for there are a rare number of cases where a patient completely recuperates. Another study found that most people who met full criteria

for remission did not actually fully recover from ADHD- they instead experienced a fluctuation of symptoms. This is speculated to be due to genetic and environmental factors (Sibley et al., 2021). Although remission is difficult to predict sometimes, there is a clear trend that signifies a decrease in ADHD symptoms as one ages. Seeing that remission rates are higher after the transition to adulthood, combined with an understanding that EFs finish developing in early adulthood, it would be logical to assume that rates of hyperfixations and hyperfocus, which are related to ADHD symptoms and EFs, would go down as well. Hyperfixations and hyperfocus cannot be directly traced to inattention or hyperactivity-impulsivity because every person has different experiences with them, but it can be concluded that the disappearance of one area of ADHD symptoms will, at the very least, impact how much someone hyperfixates or hyperfocuses.

Development of Self-Identity

Early childhood and adolescence are common struggle periods where the tricky process of discovering one's identity can help one live a more fulfilling life as an adult. Self-identity in itself includes finding out interests, social preferences, emotional experiences, and what contributes to a successful wellbeing. During this age, adolescents are also developing their self-concept, which becomes more complex and abstract as they learn more about themselves (Dvorsky, 2016). This includes the opposite as well- experience is what helps them to learn what does not work for them. Adolescents with ADHD face what are, arguably, their greatest challenges in areas such as academics and social life. They may take medication or attend cognitive-behavioral therapy to lessen the burden of school, which helps them develop strategies for controlling and sustaining attention; however, adolescents are still able to learn these skills without receiving medical or behavioral treatment. This gradual management of attentional control is one of the main factors leading to eventual ADHD symptom remission, so as adolescents transition into adulthood, there would be less instances where they would go into an uncontrolled state of hyperfocus. In addition, there are higher societal expectations for adults: they must be independent, have some sort of career, and handle a greater amount of emotional responsibilities than children. Early childhood and adolescence is the time to explore personal passions, and for those with ADHD, is also when a hyperfixation is most likely to develop.

For many individuals with the disorder, not all aspects of ADHD are negative, and many experience positive aspects in their life as a direct result of their ADHD symptoms. ADHD has helped people with brainstorming new ideas, navigating outside their comfort zone, adapting to new environments, staying passionate, and being resilient to challenges from others (Mahamane, 2015). This open-minded perspective is what pushes children to find new things that pique their interest, thus leading to a hyperfixation. Although adults can share this behavior, their increased responsibilities can hold them back from being able to delve into their curiosities. Their financial and social independence allows them to explore a larger variety of opportunities, but their duties as members of society hold greater importance. Erik Erikson's Eight Stages of Psychosocial Development lays out a model for how humans develop socially, ranging from childbirth all the way to death. One prominent stage of this model is adolescence, which is from early teens to early twenties. The main "crisis" being faced by those in this age group is identity versus role confusion. This is the stage where humans struggle the greatest with learning about who they are and what they are going to do in the future. Following adolescence, the stages of adulthood do not list identity development as one of the main issues. After all, most adults who are in their mid-twenties to their forties do not prioritize discovering new interests and acting on them; young children and adolescents typically are the ones constantly exploring and learning (Orenstein, 2022).

Often, the lack of time adults have reduces their ability to pursue passions outside of their career or education; therefore, their learning can be narrower than childrens', and they tend to remain with what they are already familiar with. While increased attentional demand in adulthood may cause instances of stress-induced hyperfocus, there are less opportunities for adults to hyperfixate on something, whereas children and adolescents are constantly exposed to new, external stimuli that can capture their attention. After reaching adulthood, people are more likely to be satisfied with the way they are living their life, while adolescents are especially lost in their search to figure out their identity

and purpose. It is important to consider that there is currently minimal research into the field of hyperfocus, and even less in the topic of hyperfixations. Although there is strong evidence to suggest that rates of hyperfixations and hyperfocusing decrease as the ADHD brain learns, adapts, and matures, further research is needed to study the process behind a hyperfocus session or hyperfixation. Future efforts should also explore the potential similarities in special interests across autism and ADHD literature.

Conclusion

ADHD is a heterogeneous disorder, meaning that individual experiences with it largely vary based on genes and environment (Dvorsky et al., 2016). Genetically, the brain develops by interacting with the environment in a way that makes each person unique. Some may face more inattentive symptoms, while others may struggle with hyperactivity. Moreover, some individuals with ADHD experience impaired social, academic, and family functioning while others might experience impairment in only one or some of those domains (Dvorsky et al., 2016). While genetics may play a big role in symptom presentations, environmental factors significantly impact the different impairments people with ADHD experience (Sibley et al., 2021). Certain environments may prove to be challenging to one person but not an issue to another. It is extremely important to recognize that every ADHD experience is a different one, and generalizing the mental condition would only worsen the social stigma already surrounding it. A hyperfixation is an intense passion on an activity or hobby, while hyperfocus is a state of intense focus on a set of tasks. Both occur more commonly and at a more severe level in ADHD. They are not necessarily good or bad because they are merely results of executive dysfunction that change the way certain things are viewed. In order to improve treatment plans and the wellness of people with ADHD, they must be taken into consideration due to their connection with ADHD symptoms and executive functions. However, it should be acknowledged that few studies have thoroughly studied hyperfocus, and hyperfixations are more of a mainstream topic rather than scientific. There lacks a proper definition for either term, so defining these terminologies would be an important next step in this research field.

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