

EXPERIENCES OF STUDENTS WITH ATTENTION  
DEFICIT/HYPERACTIVITY DISORDER (ADHD) IN ONLINE LEARNING  
ENVIRONMENTS: A MULTI-CASE STUDY

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by

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DEFICIT/HYPERACTIVITY DISORDER (ADHD) IN ONLINE LEARNING  
ENVIRONMENTS: A MULTI-CASE STUDY

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## **DEDICATION**

This dissertation is dedicated to everyone who struggles with ADHD day in and day out, diagnosed or not. I hope today is a good ADHD day.

For Thomas Anthony.

## **ACKNOWLEDGEMENTS**

It has been said many times before, but it is worth repeating here. Although only one name goes onto a dissertation, it is far from a solo project. Many people have, directly and indirectly, made this project possible that it is impossible to recognize them all. I thank each one of them.

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## **ABSTRACT**

Students with attention deficit hyperactivity disorder (ADHD) have shared that online learning environments present barriers to learning, challenges, and opportunities. Many higher education institutions have incorporated online courses as part of the institution's course offerings. Furthermore, the onset of coronavirus in 2020 triggered a dramatic increase in online courses offerings at institutions, and students with ADHD were required to participate in an increased number of online courses. The guiding research question was how do students with ADHD experience the online learning environment? A multi-case study design was used. The bounded system for the study was students with ADHD enrolled in online courses. The four participants selected for the study were identified using unique criterion-based sampling. Each participant self-reported a diagnosis of ADHD and was enrolled in at least one online course during the study. Twelve in-depth interviews were conducted during the 2020 fall semester. Triangulation occurred using observation notes and documents consisting of reflective journals, transcripts of interviews and research meetings, and participant artifacts. The constant comparative analysis was used to develop themes for within- and cross-case analyses. Challenges faced by the participants when taking online courses far outweighed perceived benefits. Participants shared

strategies they used in their online courses and provided suggestions on changes in the design and teaching to reduce challenges they encountered in online courses. The research revealed a disconnect between the participants' learning needs and preferences, and attributes of their online learning environments. The findings have implications for the design, development, and teaching of inclusive online learning environments in higher education.

# **CHAPTER 1: INTRODUCTION**

## **Background**

Attention deficit hyperactivity disorder or ADHD is a neurobiological disorder exhibited through a continuous pattern of inattention, hyperactivity-impulsivity, or both that interferes with day-to-day functioning or development (National Institute of Mental Health [NIMH], 2019). ADHD has long been thought to be a disorder that primarily affects children, and by the time children reach adulthood, they outgrew their ADHD (Barkley, 1997; Brown, 2009, 2017). As a person matures, ADHD symptoms can change over time. In childhood, hyperactivity-impulsivity is the more predominant symptom (Zentall, 2006.) As a child progresses through school, inattentive symptoms may become more predominant, with hyperactivity expressed as restlessness, fidgeting, or stimming (Brown, 2017.) Stimming is an abbreviation for "self-stimulating behaviors" and describes any movement or action used to stimulate the senses. Actions typically consist of repetitive movements or sounds and serve different purposes for different people (Khan, 2021). Stimming may help reduce anxiety, sensory overload, or it just feels good. Stimming can help with emotional regulation and may also improve concentration and focus (Brown, 2017). While it is true that with mental and emotional maturity and experience with the disorder, individuals with ADHD may

exert greater control and management of their symptoms, for many, ADHD symptoms continue to be a persistent problem throughout their lives (Barkley, 2006; Brown, 2009, 2017). Adult ADHD exhibits mostly in the form of inattention, restlessness, and impulsivity (Brown 2009, 2017; Zentall, 2007).

Individuals with ADHD can be noticeably forgetful and disorganized. They manage their time poorly, lack persistence, and have difficulty sustaining focus (Barkley 1997a; Brown 2009, 2017.) Some individuals are in constant motion, fidgeting, tapping, talking, or walking around. They may do this in situations where it is inappropriate. Others may be prone to impulsivity. They make hasty decisions without considering potential consequences, especially long-term consequences, and they often seek immediate gratification or are incapable of delaying gratification (Brown, 2017.)

Many higher education institutions are experiencing increases in the number of students with ADHD in attendance (Allen & Seaman, 2014; O'Leary 2017; Schwarz, 2014). The reason for this increase may be two-fold. The first is a rise in the number of high school students with ADHD graduating high school and entering higher education institutions (Conrad & Bergey, 2014). Second, with the awareness that ADHD is a life-long disorder, many individuals receive their diagnosis while in college. While these individuals may have

exhibited ADHD symptoms in childhood and high school, the symptoms may have been milder, and family and school structures helped the individual manage those symptoms (Brown 2011, 2017). The newly found independence and self-reliance expected of college students may exacerbate ADHD symptoms to the point where symptoms are no longer manageable (Barkley, 1997). The individual seeks help, thus obtaining an official diagnosis.

The National Center for Education Statistics (NCES, 2016) defines distance or online learning as courses that are "primarily delivered using live, interactive audio or video conferencing, pre-recorded instructional videos, webcasts, ... or computer-based systems delivered over the Internet" and explicitly excludes "correspondence courses." The definition of online courses provided by NECS is broad. As such, courses may be offered in various modalities and still fall within the definition of an online course. The most common modalities for online courses are self-paced, hybrid, and online. Although all these courses are technically "online learning," as defined by NECS (2016), "online," in the context of a modality, refers to a particular type of online learning course with specific characteristics.

Regardless of modality, online courses provide students flexibility and convenience (Paechter & Maier, 2010). Students do not need to attend class in a set location on specific days and times.

Online programs provide students opportunities that may otherwise be unavailable to them. For example, due to physical or financial challenges, a student may not be able to move across the state, country, or halfway around the world to enroll in her/his dream program. Online programs allow students to attend from her/his hometown (Boling et al., 2012).

Five primary online course elements differentiate online modalities (See Table 1.) The five elements, in no particular order, are 1) enrollment schedule, 2) instructor-to-student interactions, 3) student-to-student interactions, 4) assignment due dates, and 5) course length (Baeten et al., 2013; Black, 2002; Kaufman, 2015; O'leary 2017; Tseng & Walsh, 2016).

**Table 1**

*Characteristics of Different Online Learning Modalities*

| Modality       | Enrollment Schedule                             | Instructor-Student Interaction                  | Student-Student Interaction                     | Assignment Due Dates                        | Course Length             | Physical Classroom Presence |
|----------------|---|---|---|---|---------------------------|-----------------------------|
| Self-paced     | Rolling enrollments Student can start anytime   | Little to none                                  | None  | Flexible, assignments due by end of course  | Ranges from 3 - 12 months | None                        |
| Instructor-led | Same as face-to-face courses at the institution | Moderate to high                                | Moderate to high                                | Fixed, typically weekly assignments are due | Institution's Semester    | None                        |
| Hybrid         | Same as face-to-face courses at the institution | High, often through physical classroom meetings | High, often through physical classroom meetings | Fixed, typically weekly assignments are due | Institution's Semester    | Required, limited           |



Many terms describe courses that primarily deliver content using computer-based systems and tools, online course (Black, 2002; Kaufman, 2015; O'leary, 2017), virtual learning environment (Rienties et al., 2016), Massive Open Online Course (MOOC; García-Peñalvo et al., 2018), e-learning course (Kent, 2015), web-based courses (Hara & Kling, 2001), and asynchronous courses (Northey et al., 2015) to name a few. This study uses the term "online learning environment." It is easy to limit the context of the term online course to a specific course site and the tools used within that course site. Learning takes place both inside and outside of a traditional classroom. The same is also true for online courses. The learning in an online course occurs both within the course site and outside of the course site (Kaufman, 2015; O'Leary, 2017). The term "online learning environment" encompasses not only the online course (the course site and tools) but also any other computer- or internet-based tools or websites students may use to achieve their learning goals. In some online courses, students may never need to leave the course site to achieve their learning goals. In other courses, whether intentionally designed that way or not, students must pursue other avenues to acquire content, information, or educational tools to meet learning goals.

Internationally recognized organizations like the Online Learning Consortium and Quality Matters have created research-based rubrics

outlining components of quality online courses. When intentionally designing an online course, instructors need to incorporate these components into their online courses. Intentionally designed online courses have a clean, organized structure that makes it easy for students to navigate and find needed resources and assessments (Chang & Tung, 2008; Joosten & Cusatis, 2019). Face-to-face instructors provide many verbal details and expectations in the classroom. The presence of instructors and students in the same physical space allows students to ask clarifying questions. Since the asynchronous exchange of information is frequently missing in online learning environments, providing students with clear, concise, detailed instructions on assignments and expectations on learning activities is critical (Boling et al., 2012). Instructions for learning activities should anticipate and answer all questions students may have about the activity and should be presented in text form for students, even if the instructions are provided verbally through a recorded video (Kauffman, 2015). Written instructions are easier to reference than video instruction.

Intentionally designed online courses typically have three types of interaction, student-content, student-student, and student-instructor. Student-content interaction is when the student is actively engaged in the course learning materials. Active engagement requires

students to *do* something with the content (Lumpkin et al., 2015). Taking notes and answering guiding questions while reading, taking embedded quizzes during recorded lectures or videos, and applying new knowledge through simulation software or practice in developing an outline are examples of active engagement activities. Students who sit back and watch a recorded lecture or read a book engage in passive activities (Lumpkin et al., 2015). In student-student interaction, students engage with one another. Instructors who incorporate discussion boards, group projects, peer-to-peer reviews, collaboration projects into their online courses provide student-to-student interaction (Joosten & Cusatis, 2019; Northey et al., 2015). The last type of interaction is student-instructor interaction. These types of interactions are direct interactions between the student and the instructor. Student-instructor interaction can take on many forms, such as exchanges via email or discussion boards, personal feedback on assessments, or the availability of synchronous sessions or meetings (Paechter & Maier, 2010).

Another component found in intentionally designed online courses is the use of a variety of learning activities (Paechter & Maier, 2010). It is difficult for students to stay engaged and motivated when an online course consists of a single textbook, a video lecture, or two, and assessments consist of weekly multiple-choice quizzes and a mid-

term and final multiple-choice exam. Providing various learning materials helps students stay engaged and allows diverse students to process information in a format that works best for them (Northey et al., 2015). Finally, intentionally designed courses strive to provide accessible material for all students. Accessible materials not only help students with disabilities, but many non-disabled students find accessible materials pragmatic (Joosten & Cusatis, 2019).

### **Statement of the Problem**

Students with disabilities have reported on the positive aspects that online learning environments offer; at the same time, they have pointed out the many challenges they face in these environments (Reaser et al., 2007). For example, while students find the convenience and flexibility of online learning environments appealing, the enormity of staying self-motivated, organized, and focused can be overwhelming obstacles (Haynie, 2014). The impaired executive functions of students with ADHD can intensify the complexities of online learning environments (Reaser et al., 2007, Haynie, 2014).

Higher education institutions commonly use student retention rates to evaluate the effectiveness of their traditional and online programs. Studies have shown that completion rates for online courses are consistently lower than for traditional courses (James et al., 2016; Herbert, 2006; Patterson & McFadden, 2009; Thistoll & Yates, 2016). With the already lower retention rates in online learning environments combined with evidence that completion rates for students with ADHD are 11% lower than their neurotypical counterparts (Horowitz et al., 2017), institutions must be proactive in maintaining high retention rates for their online programs. If higher education institutions want to maintain or improve their online program effectiveness, it is vital to understand the challenges Students with ADHD face in online learning programs.

### **Purpose and Research Questions**

The purpose of this study was to gain better insight into what supports or hinders learning for students with ADHD in online learning environments. These insights can help us 1) enhance self-understanding and promote opportunities for self-advocacy and self-help and 2) enable instructors to "see" their course through a student lens enabling them to incorporate elements into their online courses that promotes learning and avoids creating additional barriers to learning for student with ADHD. The central question that guided this study is: How do students with ADHD experience the online learning

environment. A subset of questions guided data collection within this broader central question. The subset of questions are as follows:

- What perceived challenges, if any, do students with ADHD encounter when taking online courses?
- What perceived benefits, if any, do students with ADHD experience in online learning environments?
- What strategies do students with ADHD use to succeed in online learning environments?

### **Need for the Study**

Two things, while unrelated, are happening at the same time in higher education institutions. The first is an increasing population of students with ADHD who are matriculating to higher education institutions. The second is the rise in the number of courses offered in online learning environments. These two events make it very important for instructional designers and faculty to design, develop, and teach courses in online learning environments that address the needs of students with ADHD.

This study is valuable to online faculty and instructors, students with ADHD, their academic advisors, and disabilities office staff by providing information that can assist them in providing academic guidance to students with ADHD seeking to take online

courses and establishing a basis for discussions on the practicability of a student with ADHD taking an online course. Additionally, instructional designers and faculty will continue to need research to efficiently design and implement effective and engaging online learning environments to meet the needs of diverse students, including those with ADHD.

### **Assumptions**

1. Students with ADHD find online learning environments challenging.
2. Participants in the study can articulate their experiences with ADHD and in online learning environments.
3. Participants in the study understand their ADHD, how to manage it, and how it affects their life, particularly in an academic setting.
4. Different online learning environments afford students with ADHD unique challenges and benefits.
5. Participants are thoughtful and honest in their responses to interview questions.

### **Limitations**

1. This case study focused on a limited number of cases at a specific university during the 2020 Fall semester. Study findings may not represent other students with ADHD enrolled in other

online learning environments or at other institutions. The findings are not meant to be generalized beyond the bounds of this particular case study.

2. This study was conducted during the coronavirus pandemic when almost all higher education institutions were required to rapidly switch to alternative teaching and learning course modalities in the middle of the 2020 Spring semester. Experiences in these "rapidly-switched" courses may not necessarily be indicative of online learning experiences in pre-or post-COVID-19 online courses and may influence the ability of participants to reflect on and respond to interview questions objectively.
3. The researcher's influence may have affected participants' responses to interview questions. The researcher attempted to account for this unintended influence by stating upfront the researcher's subjectivity and positionality and using extensive reflexive journaling to acknowledge this unintended influence.

### **Definition of Terms**

*Asynchronous Online Course* – students access learning materials at anytime from anywhere and connect with peers and instructors on their own schedule – learning the same things but at different times.

*Attention Deficit Hyperactivity Disorder (ADHD)* – a neurological disorder that impacts parts of the brain that aids in planning, focusing,



and executing tasks and is characterized by ongoing patterns of inattention and or hyperactivity-impulsivity that interferes with daily tasks.

*Executive Function* – brain functions essential for self-management, which including motivation, prioritizing tasks, focusing, shifting focus as needed, sustaining effort, managing emotions, and utilizing working memory.

*Hybrid course* - a course that combines face-to-face instruction with online instruction. The course frequently has fewer face-to-face meeting sessions with the balance of course content, engagement, and assessments offered online.

*Intentionally designed course* – a course specifically planned and developed to provide all instruction and interactions in an online format.

*Negative self-talk* – thoughts about oneself that are typically mean or negative and often limiting the ability to belief in oneself and one’s own ability and to reach one’s potential (Diamond, 2013)

*Neurotypical* – a term used to describe individuals of typical or normal developmental, intellectual, and cognitive abilities.

*Online learning environment* – an educational setting without a required physical place and time. Instructors and students are separated by space and time through digital devices (computers/smart

devices) and the internet to facilitate asynchronous and synchronous interactions.

*Stimming* – short for “self-stimulating behaviors” is stimulating the senses through repetitive actions or sounds and can be used in many ways based on the individual (Khan, 2021)

*Synchronous Online Course* – students and instructors are required to be online on specific day(s) and time(s) typically connecting via a virtual meeting platform – learning the same things at the same time.

## **CHAPTER 2: LITERATURE REVIEW**

### **Introduction**

The Diagnostic and Statistical Manual of Mental Disorders, Fifth Edition (DSM-V; American Psychiatric Association [APA], 2013) identifies ADHD as a neurobiological, developmental disorder characterized by age-inappropriate, pervasive, and persistent inattention which may or may not have a component of impulsivity and hyperactivity (APA, 2013). These issues present across multiple environments, such as school and home, impact both behavior and performance (Singh et al., 2015) and are exhibited across the life span (Barkley, 1997, 2006; APA, 2013).

Although considered a childhood disorder, approximately two to eight percent of young adults report clinically significant levels of ADHD symptoms (DuPaul et al., 2009). As ADHD becomes more recognized as a lifespan condition and not just a childhood disorder, the number of individuals with ADHD symptoms matriculating to colleges and universities is steadily increasing (Conrad & Bergey, 2014). In 2008, 19.1% of the students with learning disabilities enrolled in a four-year higher education program in the United States were diagnosed with ADHD, almost triple the percentage in 2000 (U.S. Government Accountability Office, [GOA], 2009). Indications are that

the increasing numbers of students with ADHD enrolling in higher education courses will persist for the foreseeable future.

At the same time, higher education institutions are continuously increasing the number of online programs offered to address increasing student demands for online learning environments (O'Leary, 2017). Student enrollment in online courses offered by higher education institutions has increased almost linearly in the past two decades (Allen & Seaman, 2015). In 2002, less than ten percent of all higher education students took at least one online course (Allen & Seaman, 2015). As of 2016, 31.6% of students enrolled in at least one online course, with almost half (14.9%) of those students enrolled exclusively in online courses (Seaman et al., 2018). As traditional public four-year institutions continue to offer online degrees and courses, enrollment in online courses is expected to increase for the foreseeable future (Lederman, 2018).

Online courses are often beneficial for students with disabilities as the physical barriers for students who are attached to medical equipment or have mobility issues are removed. Online courses may reduce the triggers for students suffering from social anxiety or specific phobias such as agoraphobia or panic disorders (Burgstahler et al., 2004). Some students find it easier to manage their symptoms in online learning environments (Raue & Lewis, 2011).

On the other hand, online courses also present challenges for students. The lack of face-to-face social interactions with fellow students and the instructor can lead to feelings of isolation and fewer social interactions outside of class (Nortvig et al., 2018). Students may not have all the technical skills required to complete online courses successfully. Technical issues can occur, which can be time-consuming and frustrating (Muilenburg & Berge, 2005). Students in online courses frequently struggle with motivation, time management, and organization (Thistoll & Yates, 2016). Online courses can also encourage or reinforce poor study habits (Rakes & Dunn, 2010). Course retention rates in online courses are often lower than retention rates for traditional courses (Atchley et al., 2013; James et al., 2016; Patterson & McFadden, 2009).

The number of students diagnosed with ADHD entering college is rising (Schwarz, 2014; Allen & Seaman, 2014). With the increasing numbers of online courses offered, coupled with the rise of Students with ADHD enrolled in higher education, there will come a time when virtually every online course will have at least one student with ADHD (Hinshaw & Scheffler, 2014). Many students with ADHD will continue to seek online courses for the convenience and flexibility online courses offer or as an alternative learning environment. However,

online courses may not be the best option for students with ADHD (Linder et al., 2015).

## **ADHD**

In their seminal research on ADHD, Zentall & Zentall (1976) refuted the prevailing beliefs at the time that ADHD symptoms are a result of overstimulation in the environment and that the best way to counteract overactive behavior and off-task performance is to reduce environmental stimulation (Schrager et al., 1966; Wasserman et al., 1972). Instead, Zentall & Zentall (1976) proposed that individuals with ADHD need *higher* levels of stimulation than neurotypical individuals to maintain homeostasis (Zentall & Zentall, 1976, 1983). Homeostasis is the regulation of internal systems to maintain a stable and relatively constant condition. Individuals with ADHD strive to achieve optimal arousal levels, in this case, in the form of stimulation. Stimulation can be external (from the environment or time pressure) or internal (fatigue, hormone levels, intense emotions) (Zentall, 2007). When individuals find the optimal stimulation level, they are said to achieve homeostasis. When internal or external stimulation is not optimal, individuals will attempt to achieve homeostasis by increasing or decreasing their level of activity (Zentall, 2006, Zentall & Zentall, 1976, 1983).

ADHD individuals exhibit hyperactive (physical movement, excessive talking) and distractible behaviors (daydreaming, looking around), not because they are overstimulated, but rather because they are experiencing inadequate environmental sensory stimulation and are seeking additional stimulation. This stimulation can be external, internal, or both to acquire homeostasis (Zentall, 2006; Zentall & Zentall, 1976, 1983; Zentall & Meyer, 1987). Whether individuals with ADHD seek the stimulation externally or internally, under-aroused students look for something, anything, that is more colorful, bigger, brighter, moving, louder, or more emotional (positive or negative emotion) (Zentall, 2006; Zentall, 1993; Kercood et al., 2007; Kang and Zentall, 2011).

ADHD is a syndrome of executive function impairment (Barkley, 1997a, 1997b; Brown, 2017). Executive function is a set of mental skills which manage working memory, flexible thinking, and self-control. Executive function is required to do the following:

- Manage time
- Plan and Organize
- Pay attention
- Shift focus
- Remember details
- Multitask

- Control impulses
- Leverage past experiences

The dynamic interactive cognitive functions in the brain support executive function essential for self-management (Brown, 2017). Data from recent neuroscience research have shown that the impairments of ADHD are malfunctions in the neural networks and communications between various parts of the brain which support executive functions (Cortese et al., 2012). Executive functioning requires instantaneous interactions between the various parts of the brain to activate and rapidly coordinate many thoughts, memories, and actions (Barkley, 2006; Brown, 2009, 2017). Executive functions allow a person to recognize incomplete tasks, become sufficiently motivated to start, sustain effort and action to finish, and plan, organize, and manage tasks. For people with ADHD, executive function challenges are more numerous and severe than for neurotypical people (Rodden, 2021).

ADHD can result in maladaptive behaviors in the environment resulting in disruptions and academic underachievement by Students with ADHD. (Daily & Birchwood, 2010; Loe & Feldman, 2007). Many disciplines require solid foundational concepts and skills to build competencies to address more complex concepts and problems (Bryant et al., 2016). Foundational skills are often obtained through mundane learning tasks like repetitive practice and drills (Bryant et al.,



2016) that students with ADHD find incredibly challenging. Difficulty in learning foundational skills contributes to lower academic self-efficacy of many students with ADHD, who develop a perception of themselves as stupid, dumb, and less intelligent than classmates who appear to learn concepts and skills more efficiently (Kent et al., 2011; Mautone et al., 2005; Zentall, 2006). Lacking the foundational concepts and skills needed to support more complex concepts and problems, many students with ADHD continually fall further and further behind their peers academically as they progress through school (Bryant et al., 2016; Kent et al., 2011; Mautone et al., 2005).

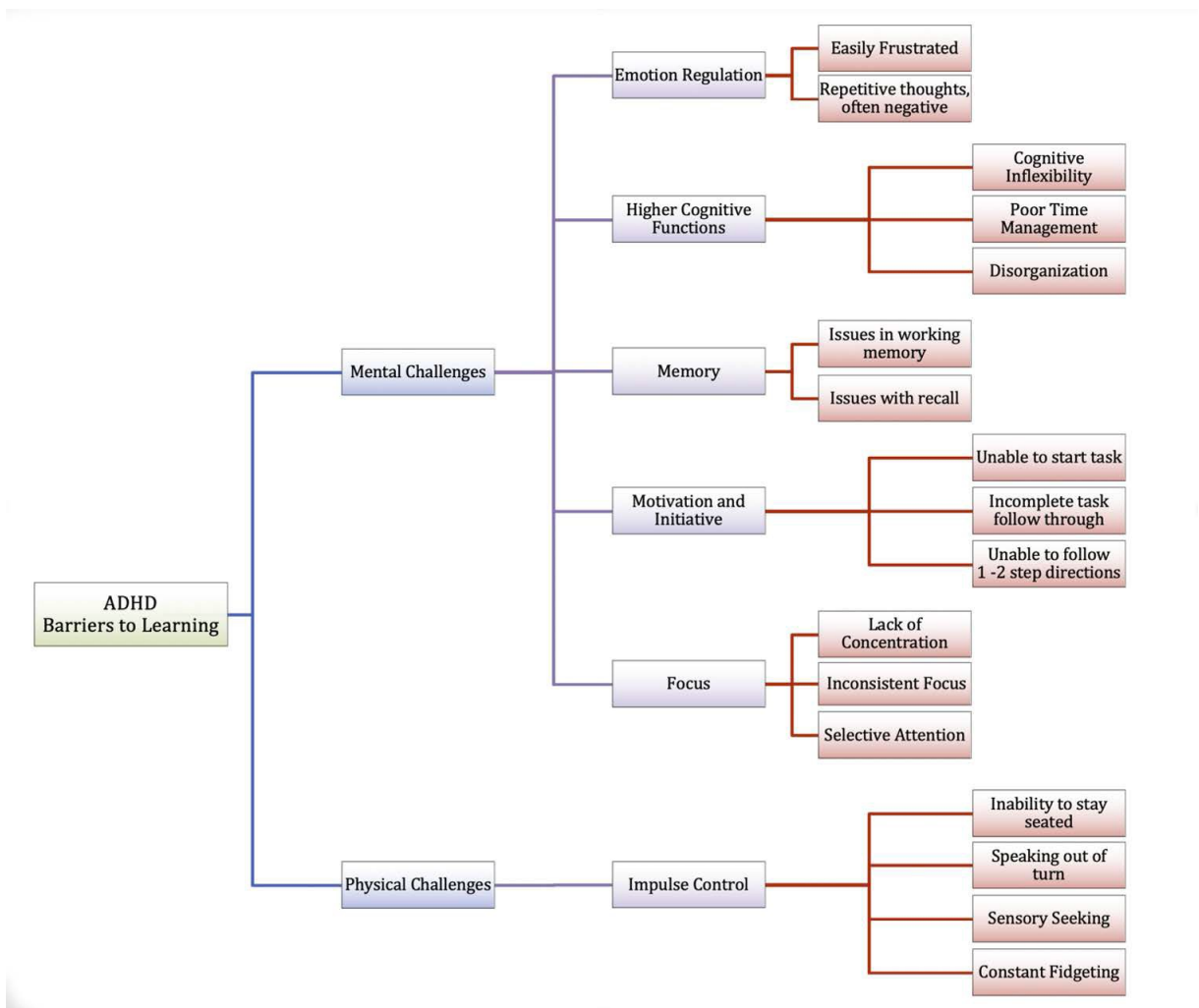
Studies consistently report that students with ADHD tend to academically underachieve even though they have average to above-average intelligence (Cooper & Bilton, 2013; Rogers et al., 2011; Kermani et al., 2016). Rogers et al. (2011) defined academic underachievement as performance that falls below expected based on normative age level and intelligence. As many as 80% of students with ADHD face academic problems (Zentall, 2006). Students with ADHD often spend more time on probation or suspension and have higher failure and dropout rates than their neurotypical peers (Barkley, 1997; Kent et al., 2011). ADHD is a disorder that can negatively affect academics and academic performance throughout a person's life.

## **ADHD Barriers to Learning**

ADHD can create many barriers to learning (see Figure 1). The ADHD barriers to learning are grouped into two main categories: mental and physical challenges. Mental challenges include difficulty in emotional regulation, higher cognitive functions, memory, motivation and initiative, and focus. Physical challenges are generally related to impulse control issues (Barkley, 2006; Brown, 2011, 2017). Some students with ADHD may have severe difficulties in one or two areas and little to no difficulty in other areas, whereas other students with ADHD may have light to severe difficulties across all areas. The following section offers a brief explanation of the barriers to learning, starting with the mental challenges.

**Figure 1**

*Barriers to learning faced by students with ADHD*



ADHD influences the ability of individuals to regulate emotions, especially impulsive reactions to frustration. They also struggle to manage anger, disappointment, desire, or worry and often find that these emotions take over their thinking, making it harder to think of anything else (Brown 2006, 2017). When these emotions take over their thinking, the thoughts are often repetitive and negative (Diamond, 2013; R. Kline, personal communication, January 13,

2020). When a student with ADHD becomes frustrated over a complicated problem or angry because they cannot find a particular resource, all thoughts concentrate on the emotion, and productivity halts. For people with ADHD, intense emotion can flood the brain, and they have a hard time putting it into perspective or putting it to the back of their minds to move on with what they need to do (Brown, 2017).

Higher cognitive functions such as time management, organization, and cognitive flexibility can be impaired by ADHD, creating learning barriers. Students with ADHD often have inordinately disorganized notebooks, backpacks, computer files, and workspaces (Brown, 2011, 2017). Students with ADHD may have difficulty prioritizing tasks and managing their time. Frequently, individuals with ADHD indicate that when they have multiple tasks to do, all tasks seem to be equally important. People with ADHD will often spend time on less important tasks that they find more interesting (Barkely, 2006; Brown, 2017; R. Kline, personal communication, January 13, 2020). For example, someone with ADHD might spend hours designing a graphic report cover when she/he has yet to start writing the report. Individuals with ADHD are notoriously bad at estimating how long tasks or projects will take and often find themselves scrambling at the

last minute to submit an assignment on time, which usually does not result in their best effort (Brown, 2017; Kent et al., 2011).

Cognitive flexibility is the ability to maintain multiple concepts simultaneously and shift internal attention between them (Amorim & Marques, 2018). Once a thought is interrupted, a person with ADHD has difficulty returning to the original thought. Students may be required to read an article while considering a concept or theory that they just learned. This type of task is challenging for the student with ADHD (R. Kline, personal communication, April 23, 2020).

Deficits in working memory are another way ADHD can create barriers to learning. Working memory allows individuals to keep one thing in mind while working on something else (Brown, 2017). Long-term or stored memories are typically not an issue for people with ADHD (Brown, 2011). People with ADHD struggle with short-term or working memory (Rogers et al., 2011).

Failure in working memory can manifest itself in many ways for an individual with ADHD. For example, someone with ADHD can read a page of text and understand every word but cannot recall it when prompted. This is especially true if the text is uninteresting to the person (Brown, 2006, 2017). Working memory also allows an individual to pull up various thoughts, memories, images, and information when it may be relevant to the task at hand. A person with

ADHD fails to bring that information to the forefront due to working memory deficits (Diamond, 2013). It is not uncommon for an individual with ADHD to perform poorly on a quiz or exam even though they studied hard and felt well-prepared (Rogers et al., 2011). It is not unusual for something to jog her/his memory and the information that was lost for the test comes rushing back. For people with ADHD, it is not that they failed to learn the information; instead, they failed to retrieve the learned information when needed (Brown, 2017).

Motivation and initiative are additional learning barriers that students with ADHD encounter. Chronic procrastination is also a significant challenge. People with ADHD find it extremely difficult to find the motivation to start a task, especially if that task is mundane or uninteresting to the individual (Niermann & Scheres, 2014). Once an individual with ADHD finally gets started on a task, it is difficult to follow through and complete the task. It is easy for a person with ADHD to stop in the middle of a task and start doing something else or to start daydreaming and forget what she/he was doing (R. Kline, personal communication, March 23, 2020). Additionally, due to issues with working memory, it is difficult for individuals with ADHD to follow verbal directions that have more than one or two steps (Brown, 2017). Students with ADHD struggle in classrooms where verbal instructions are given without a written version.

The inability to focus can create barriers to learning. People with ADHD have difficulty focusing on a single task or maintaining focus (Brown, 2017; Niermann & Scheres, 2014; Rogers et al., 2011). The mind of a person with ADHD continually drifts off with thoughts about things utterly unrelated to the focus she/he is trying to keep. The person with ADHD truly wants to focus on the task at hand. Initially, they can, but sooner or later, their mind will latch on to one of the many thoughts, images, and sounds going through their head, switching focus to the novel thought, sight, or sound. The person with ADHD eventually refocuses back to the original task at hand, but not before missing out on key information (Niermann & Scheres, 2014, Tucha et al., 2017). This becomes a perpetual cycle for the ADHD person of gaining and losing focus on the task at hand (Tucha et al., 2017). "People with ADHD often say that in their mind it is as though they have five different TV [television] stations, all coming in on one channel at the same time" (Brown, 2017, p. 16).

There is a daily struggle for Students with ADHD to stay organized, manage their time, be self-motivated and follow directions. These are the very skills students need to succeed in an online learning environment (Broadbent & Poon, 2015).

## **ADHD and Online Learning Environment**

Even though many students find online learning environments beneficial and feel it is a viable alternative to traditional courses, online learning environments can wreak havoc for students with ADHD (Madaus et al., 2011). Successful online students exhibit solid executive function skills. Neurotypical students are more likely to have the necessary organization, time management, follow-through, and self-motivation to do well in online learning environments (Broadbent & Poon, 2015). However, these are the critical skills that students with ADHD lack (O'Leary, 2017). Online learning environments often require students to take extra steps to access, organize, and understand the content, which can quickly overwhelm students with ADHD (Christensen, 2009).

Presenting tasks and activities that provide extra stimulation for students with ADHD helps to achieve and maintain homeostasis, allowing students with ADHD to better manage their physical activities and distractibility (de la Guía et al., 2015; Kang & Zentall, 2011). This suggests that students with ADHD would benefit from learning tasks presented in a format that provides additional stimulation through sound, colorful images and animations, and physical movement, which are types of stimulation that traditional learning tasks often lack. Without stimulating tasks, students with ADHD might turn to unwanted



behaviors or inappropriate coping strategies to obtain optimal arousal levels, which helps them maintain focus and stay on task (Friedman & Zametkin, 2010).

Challenges encountered by Students with ADHD in online courses can lead to additional anxiety and stress, which in turn can lower a student's satisfaction in their online course (Bolliger & Halupa, 2012). The following two sections will provide an overview of anxiety and student satisfaction, respectively, for higher education students, specifically for higher education students with ADHD.

### **Anxiety**

An estimated 20% to 30% of people diagnosed with ADHD also experience anxiety symptoms (Pravatt et al., 2015). Studies indicate that ADHD combined with anxiety contributes to working memory challenges, cognitive deficits, and issues with everyday life functions (Bruner et al., 2015). Most Students with ADHD already have higher anxiety levels than their neurotypical peers, even before enrolling in any online courses (Brown, 2017).

The unique demands associated with online learning may increase stressors for an already anxious person. Increased anxiety coupled with impaired executive functions in online learning environments can be very challenging for students with ADHD (Bolliger & Halupa, 2012; Brown, 2017).

Students with ADHD who are taking online courses not only have anxiety from the challenges of adapting to college life, but they also have added anxiety of navigating and managing their online courses (Brown, 2017; O'Leary, 2017). Research indicates that Students with ADHD have impaired executive function skills and that these are the very skills required to navigate online learning and successfully manage online coursework (Rogers et al., 2011). Research has shown that anxiety is one of the factors that can reduce course satisfaction, which is relevant to learning performance and success (Bolliger & Halupa, 2012).

Anxiety is a physiological and psychological state individuals experience cognitively, physically, emotionally, and behaviorally. Anxiety is a normal reaction experienced in the presence of a stressor and has two primary constructs: state anxiety and trait anxiety (Lau et al., 2006; Lindsey, 2014). State anxiety is most often associated with an external and environmental stressor which causes a temporary and fluid state of emotions in the individual (Spielberger, 2010). Trait anxiety is a relatively stable characteristic and is described as a general predisposition to identify mundane or everyday situations as stressors (Lau et al., 2006). While there may be several underlying factors associated with trait anxiety in college students (Sakin et al.,

2010), trait anxiety most often develops when an individual is super vigilant against stressors in the environment (Lau et al., 2006).

Anxiety presents as both physical and mental symptoms in all individuals (Lindsey, 2014). Physical symptoms of anxiety include thumping or irregular heartbeat, headaches and other body aches, rapid breathing, teeth grinding and jaw clenching, and nausea (Allgulander, 2006). Individuals with intense physical symptoms become physically ill and often seek medical attention. Mental symptoms include having a sense of dread, ruminations about bad experiences, circular unproductive thinking, wanting constant reassurances, and worrying that people are angry or upset with the individual (Allgulander, 2006; Lindsey, 2014). For individuals with ADHD, these feelings and thoughts can become overwhelming and so pervasive that the individual can think of little else (Brown, 2017).

College students are at higher risk for anxiety because of the unique challenges associated with school and college life (Pravatt et al., 2015). All college students must adjust to living independently. They experience new social situations and must be self-motivated to attend classes and complete coursework. Students with ADHD often find adapting to these new demands particularly difficult (Shaw-Zirt et al., 2005). Compared with their neurotypical peers, students with ADHD often report a lower quality of life, negative dating patterns, and

troubled relationships with family members (Bruner et al., 2015). These factors contribute to a significant increase in anxiety for students with ADHD (Bruner et al., 2015; Shaw-Zirt et al., 2005).

A review of the literature reveals that Students with ADHD frequently have higher anxiety levels, independent of online course enrollment (Alexander and Harrison, 2013; Brown, 2017; Pravatt et al., 2015). Online courses have the potential to add stressors as students are required to take control of their learning, effectively manage time, stay organized and maintain motivation (Bruner et al., 2015).

### **Student Satisfaction**

Student satisfaction has been defined as a student's perceptions of their learning experience and the perceived value of their learning outcomes (Bolliger, 2004; Elliott & Shin, 2002; Ke & Kwak, 2013); and is a widely used indicator of successful learning (Driscoll et al., 2012). Student satisfaction is known to influence student motivation (Bolliger, 2004), attitude (McFarland & Hamilton, 2005), engagement, learning, performance, success (Bolliger & Halupa, 2012), and has proven to be a good predictor of retention (Astin, 1993).

Studies show that students who are more satisfied with a course do better and are more likely to complete the course. Students consistently report numerous factors that lead to higher satisfaction,

regardless of the learning environment (Bolliger & Halupa, 2012; Elliott & Shin, 2002; Nortvig et al., 2018). Research shows that one of the most important variables associated with student satisfaction is instructor responsiveness to students' needs (Herbert, 2006; Ke & Kwak, 2013). Students who perceived more engagement with the instructor indicated higher satisfaction than in courses where they perceived a lack of instructor interaction (Discoll et al., 2012). Lastly, students are more satisfied in courses that provide clear expectations and straightforward, concise instructions (Koffman, 2015).

Factors unique to online learning environments linked to student satisfaction are flexibility, student familiarity with technology, and the perceived value, or usefulness, of the learning experience (Bolliger & Halupa, 2012; Sahin & Shelly, 2008). In addition, course organization and structure, interactivity of the learning activities, and the reliability of the technology influence student satisfaction in online learning environments (Bolliger & Halupa, 2012; Bolinger et al., 2012; Chang & Tung, 2008; Kauffman, 2015; Paechter & Maier, 2010).

Just as it is vital to understand what students consider essential factors contributing to their online course satisfaction, it is equally important to understand the factors contributing to dissatisfaction (Hara & Kling, 2000). The antithesis of any factors related to student satisfaction in learning environments would lead to lower student

satisfaction. Additional factors related to reduced student satisfaction are feelings of isolation (Bolinger et al., 2012), frustrations associated with navigation and the technology used within the course, and a lack of responsiveness from the instructor (Sahin & Shelley, 2008). Bolliger & Halupa (2012) found that students who have higher trait anxiety or state anxiety tend to report lower course satisfaction. Students may have state anxiety related to taking tests, technology use, or online learning (Chang & Beilock, 2016).

Education studies commonly exclude students with ADHD (Allen et al., 2002; Koffman, 2015; Richardson et al., 2017). Students with ADHD experience more barriers to learning, have higher levels of anxiety, and face more challenges in online learning environments. Additionally, the factors that decrease course satisfaction affect students with ADHD much more than their neurotypical peers. It is vital to fully explore the factors contributing to the success of online students with ADHD.

## **CHAPTER 3: METHODOLOGY**

### **Purpose and Research Question**

The purpose of this study was to gain better insight into what supports or hinders learning for students with ADHD in online learning environments. The guiding question for this study was: how do students with ADHD experience online learning environments? In addition to the broader question, several sub- questions guide data collection and analysis. The sub-questions were

- What perceived challenges, if any, do students with ADHD encounter when taking online courses?
- What perceived benefits, if any, do students with ADHD experience in online learning environments?
- What strategies do students with ADHD use to succeed in online learning environments?

### **Research Design**

This study used a multicase design. In multicase studies, several instrumental bounded cases provide a deeper understanding and more insights than a single case can offer. Merriam (1998) defines case studies as “an intensive, holistic description and analysis of a bounded phenomenon” (p. xiii) and is particularly suited when the phenomenon and the context are so complex that they are impossible to separate (Yin, 2012). A case study attempts to describe and analyze a phenomenon in intricate and exhaustive detail over a period of time.

According to Merriam (1998), case studies have three defining characteristics: particularistic, descriptive, and heuristic. Case studies are particularistic in that they concentrate on a specific phenomenon, situation, event, or program. This focus on a particular phenomenon makes case studies an ideal design to study everyday practices that present questions, puzzling situations, or occurrences from a holistic viewpoint (Merriam, 1998). Descriptive means that case studies produce a thick (complete, literal description), rich description of the phenomenon that illustrates the complexity of the situation. Case studies are heuristic in that they elucidate an understanding of the phenomenon for the reader. They can affirm current understanding, discover new meaning, or expand the reader's experience.

Case study is an excellent choice when the researcher is attempting to answer "why" or "how" (Creswell & Poth, 2018; Merriam, 1998). They are also exceptionally well suited when the variables are so embedded in the phenomenon that they cannot be determined ahead of time. In addition, case studies "get[s] as close to the subject of interest as they possibly can, partly by means of direct observation in natural settings, partly by their access to subjective factors (thoughts, feelings, and desires)" (Bromley, 1986, p. 23). This study aims to further an understanding of the experience of Students with ADHD in online learning environments. In this bounded system, it



is difficult to predetermine what variables might be related to the online learning environment, ADHD, or individual to the participant. This study lends itself well to using a case study design.

This study is a multicase study that involves collecting and analyzing data from several independent yet related cases. In multicase studies, researchers typically describe each case in detail and identify themes within the case (within-case analysis); then, a thematic analysis across cases (cross-case analysis) is performed (Harling, 2012; Merriam, 1998). In this study, the case or bounded system was a student with ADHD in an online learning environment.

### **Positionality**

#### **Lived Experience**

In 2006, my son was diagnosed with ADHD along with various other learning disabilities. Since ADHD is a disorder that tends to run in families, I was subsequently tested and diagnosed with ADHD. The diagnosis of ADHD was a significant event in my life. It was a relief to discover a scientific basis for the constant struggles in my professional, academic, and daily life. My diagnosis allows me a deeper understanding of the struggles that my son and other students with ADHD face in academia.

I received my Master's degree in an online program when online degree programs were much less common. Additionally, this was

before my official diagnosis. As an online student with ADHD, I experienced firsthand the challenges that Students with ADHD face in an online course. It was easy for me to get distracted in the online course as instructors sent us to various websites and links outside of the course. Most courses had long-term projects with one due date; usually, long papers that were a significant portion of the course grade and very few, if any, short-term assignments.

### **Professional Experience**

For the past twelve years, I have been an instructional designer with a primary focus on transitioning traditional face-to-face courses to an online learning environment. Using a combination of research-based learning theories, best practices, and pedagogy/andragogy, I assist faculty in developing quality, engaging, and effective online learning environments. An important aspect of instructional design is to ensure that online learning environments meet government and institution accessibility requirements. Institutions are moving towards a proactive rather than a reactionary approach to accessibility in online courses. Institutions are pushing instructors to have accessible components in the online learning environments whether there is a documented student in the course or not.

My experience has shaped my worldview by developing an empathetic mindset in the experiences of individuals with ADHD and led to the decision to use the disability interpretive lens.

### **Sampling**

Researchers typically use qualitative methods to provide a depth of understanding, whereas researchers use quantitative methods for breadth of understanding. Additionally, the primary emphasis for qualitative methods is saturation, while quantitative methods are used when generalizability is the primary emphasis. Each methodology has different expectations and standards for determining how sample populations are selected and the number of participants required to achieve its aims (Palinkas et al., 2015, p. 534).

The researcher used purposeful sampling, a prevalent technique in qualitative research to select appropriate cases to include in the study. Purposeful sampling is used to select information-rich cases related to the phenomenon of interest to answer the research questions (Creswell & Poth, 2018; Merriam, 1998; Palinkas et al., 2015). Cases are selected based on the experience with or have considerable knowledge about the phenomenon of interest.

Purposeful sampling offers many designs to facilitate sample selection. The purposeful sampling design used to identify research participants in this study was unique criterion-based sampling. This

sampling strategy provided the researcher with the most information-rich cases for deeper insight and understanding of the phenomenon of interest (Creswell & Poth, 2018; Merriam, 1998). When using criterion-based selection, researchers first create a list of essential criteria to the study and then find participants who match the list of essential attributes (Merriam, 1998).

For this study, it was important to find college students with ADHD who were enrolled in an online course at the time of the study. The researcher was interested in learning about the experience of students with ADHD while they were learning in an online course. Although the researcher asked participants about previous online courses, the primary focus of this study was the participants' experience in courses that were ongoing during the study.

The criteria used to find participants for the study were as follows:

- Self-reported a diagnosis of ADHD/ADD
- Currently enrolled in an online course
- Speaks fluent English

Participants were recruited from a sampling pool that consisted of six 16-week online courses (see Table 2). These courses were selected as the sampling pool because they represent a variety of disciplines and had high enrollment numbers increasing the likelihood

that there would be students with ADHD enrolled in the course willing to participate.

**Table 2**

*Online Courses with Highest Enrollments*

| Course Number          | Course                                | Enroll<br>Cap | Students<br>Enrolled |
|------------------------|---------------------------------------|---------------|----------------------|
| CDS 2190               | Medical Terminology                   | 300           | 244                  |
| T_A_M 2200             | Science of Textiles                   | 400           | 165                  |
| ENGINR 2100            | Circuit Theory for Engineers          | 300           | 101                  |
| CMP_SC/ INFOTC<br>2830 | Web Application Dev 1                 | 400           | 98                   |
| PSYCH 2830             | Human-Companion Animal<br>Interaction | 100           | 86                   |
| PSYCH 3003             | Forensic Psychology                   | 75            | 73                   |

**Case Selection**

The researcher sent an initial email to the course instructors whose courses had 75 or more students enrolled. The initial email which explained the research project and sought permission to send recruitment emails to the students in their courses was sent during the first two weeks of the Fall semester. A follow-up email was sent approximately 7 - 10 days after the initial email if the instructor had not responded.

Once the instructor granted permission to send recruitment emails to the students, the researcher sent an email invitation to participate in a screening survey. Students received the first email invitation to participate during the first week of September. The

researcher had to send multiple rounds of emails to recruit participants.

The purpose of the screening survey was to identify students in an online course who self-reported having a diagnosis of ADHD. The researcher sought four to six participants. Creswell & Poth (2018) and Yin (2012) recommend limiting the number of cases included in a single multi-case study to no more than four or five independent cases. Any more than that and the level of case detail provided by the researcher becomes diluted (Creswell & Poth, 2018; Yin 2012).

The screening survey consisted of questions related to basic demographics, online course experience, whether or not the student had been diagnosed with ADHD, and whether they were willing to participate. Data from the screening survey was analyzed to determine which students met the criterion for inclusion in the study. Cases were selected based on the following inclusion criteria:

- Student self-reported a diagnosis of ADHD
- Student was enrolled in an online course
- Student agreed to participate in interviews and further data collection

## **Data Collection**

### **Interviews**

One of the principal sources of data for qualitative research is interviews. The primary purpose of interviews is to provide the researcher with a unique form of data. Interviews are used to find out what someone else may be thinking, feeling, or what their intentions might be, all of which are impossible to observe (Merriam, 1998). All interviews fit on a continuum of structure ranging from highly structured/standardized to unstructured/informal. Highly structured interviews are most often oral surveys that consist of questions with predetermined wording and order. In qualitative research, highly structured interviews are frequently used to collect socio-demographic data from respondents. A significant drawback of highly structured interviews is that they can elicit reactions from the researcher's preconceived notion of the world and fail to discover the respondent's perceptions and worldview (Merriam, 1998). At the other end of the continuum is unstructured/informal interviews. This type of interview structure is often used by experienced researchers and those unfamiliar with the phenomenon to formulate relevant questions. Unstructured/informal interviews can provide a researcher with enough information to develop questions for future interviews. Semi-structured interviews, which fall in the middle of the continuum, have

predetermined questions, unlike the unstructured interview; however, the questions are more flexible and less systematic than highly structured interviews (Merriam, 1998).

Merriam (1998) indicates that researchers frequently use all three types of interviews in data collection. Researchers collect some standardized information such as demographics. Respondents are also asked the same questions specifically targeted to provide data about integral areas of research interest. However, these questions may be worded differently or asked in a different order. At the end of the interview, the researcher may provide some time for an unstructured conversation where new insights and information may emerge.

This research study utilized all three types of interview formats. The researcher used highly structured questions to collect socio-demographic data (APPENDIX C), semi-structured questions to guide the researcher in exploring the phenomenon (APPENDIX D), and time allotted for the respondents to talk about whatever was on their mind related to the phenomenon.

The researcher met each participant three times over a 16-week semester, with each session lasting between 45 and 75 minutes. In-person sessions were not possible due to the coronavirus pandemic, and as a result, the researcher conducted all interview sessions via the



videoconferencing platform Zoom. The researcher took notes and, with permission from participants, recorded each interview session.

### **Observations**

Observations are another primary source of data in qualitative research. Observations differ from interviews in two distinct ways. First, observations take place in the natural field setting instead of a predetermined interview environment. Second, observations are firsthand accounts of the phenomenon, whereas interviews are secondhand accounts as perceived by the interviewee and are often recollections.

In observations, the researcher (or observer) observes and records the phenomenon in the field through the five senses (Creswell & Poth, 2018). Since it is impossible to record everything, many observations start broadly and then narrow to focus on the research question. The observer, to some degree, finds it virtually impossible not to be involved with the phenomenon under observation.

The degree to which an observer participates and observes falls within four main observation types: complete participant, participant as observer, observer as participant, and complete observer (Creswell & Poth, 2018; Merriam, 1998). "Complete participants" are fully engaged with the group being studied and often try to hide the role of the observer from the group so as not to impact natural group activity.

As a "participant as observer," the researcher engages with the group, and the group is aware of the researcher's role as observer. In the third type, "observer as participant," the researcher has reduced engagement with the group and is set apart from the group which knows it is under study. Finally, as a "complete observer," the researcher is removed from the group, and the group is unaware that they are under observation. The researcher in this study used the "observer as participant" type.

The observer as participant type allows the researcher to "observe and interact closely enough with members to establish an insider's identity without participating in those activities constituting the core group membership" (Merriam, 1998, p. 101). Participation may be required to gain an insider's understanding of the phenomenon, while observation is needed to describe it for outsiders. The challenge of researchers serving as both participant and observer is balancing participation with observation. If there is too much participation and less focus on observation, the researcher can lose an outsider's perspective. Conversely, the researcher may lack the "insider perspective" to fully describe the phenomenon with too little participation and more focus on observation.

Observations in this study were limited due to the coronavirus pandemic and restrictions on in-person meetings. The researcher was

able to observe the participants during interviews conducted via a videoconference platform. All interviews were recorded which allowed the researcher to return to the interviews and observe the participants' actions along with limited environmental information. All observations were recorded in the researcher's journal.

## **Documents**

Merriam (1998) describes documents as a broad range of written, visual, and physical materials relevant to the researcher's study. Documents for this study may either be in a physical (printed) or electronic format or both. This study used a reflective journal as the primary document source.

The purpose of a reflective research journal is to allow the researcher to record and articulate perceptions, reactions, assumptions, choices, and actions during the research process (Morrow & Smith, 2000.) Researchers use reflective journals to further examine their assumptions and goals and clarify their belief systems (Ortlipp, 2008).

The reflective journal used was a combination of a written journal and audio-video journals. The researcher used voice recordings to capture insights developed during data collection and analysis. Additionally, discussions with research advisors were recorded to capture the researcher's interpretations and perceptions and help

process what occurred during interviews. Data collection for each case occurred independently of the other cases in this multi-case study.

### **Data Analysis**

"Data analysis is the process of making sense out of data" (Merriam, 1998, p. 178). Merriam (1998) further explains that "making sense out of data involves consolidating, reducing, and interpreting what people have said and what the researcher has seen and read – it is the process of making meaning" (p. 178). Data analysis must align with the research goal and address the research question. The research question which guides this study is how do students with ADHD experience online learning environments?

While case studies use many basic strategies for analyzing data, some aspects of case studies affect data analysis (Merriam, 1998). First, case study is an in-depth, comprehensive description of a single, bounded system; communicating an understanding of the case is the primary focus of analyzing the data (Stake, 1978). Second, since one of the goals of a case study is to develop a deep understanding and create a rich, thick description of the phenomenon, data is collected through interviews, observations, documents, and artifacts. This wide range of data sources often presents what seems to be disparate, incompatible, and contradictory information during data analysis (Merriam, 1998).

Qualitative research uses data analysis strategies such as ethnographic, narrative, phenomenological, and content analysis, the constant comparative method, and analytic induction. This study used the constant comparative method for data analysis which constructs categories that reveal conceptual relationships (Merriam, 1998). As the name implies, researchers constantly compare a unit of data with another data unit in the same set or in another set. These comparisons gradually lead to proposed categories which are then compared to each other. Comparisons are constantly made within and between levels until a theory emerges.

Units of data, defined by Merriam (1998) as any significant or potentially significant piece of data, are sorted and grouped together based on common elements. For a piece of data to be considered a *unit of data*, it must possess two characteristics (Merriam, 1998). First, it must be heuristic. In other words, it should uncover information about the study and prompt the reader to think beyond that particular piece of data. Second, a unit of data should be the smallest piece of information that can be interpreted without any additional information except for a broad understanding of the phenomenon under study.

Merriam (1998) proposes a broad outline of the levels of analysis required for the constant comparative method. The first level of

analysis compresses and links data together to create a narrative that reveals the derived meaning of the phenomenon. The second level of analysis creates categories or themes that reveal recurring patterns across the data.

The third level of analysis consists of "making inferences, developing models, or generating theory" (Merriam, 1998, p 187). Models and theories are developed when the researcher realizes that the categories and themes do not tell the whole story. To complete the story, the researcher attempts to connect categories in some meaningful way.

The constant comparative method creates descriptive accounts, categories, and themes from the data (Merriam, 1998). At the heart of the constant comparative method is the continual comparison of units of data. Units of data are selected from the data set and placed into categories. As more units of data are uncovered, more categories are created. Newly created categories may require units of data to be shifted from one category to another. As constant comparative analysis continues, categories may be combined, and data units shift again (Merriam, 1998). Just as units of data are grouped based on common elements, categories can be sorted into groupings that have something in common, leading to the development of themes. The constant comparative method is very much an iterative process with

units of data, categories, and themes emerging and blending as the researcher gains deeper insights and understanding of the phenomenon (Merriam, 1998).

Since this was a multi-case study, there were two stages of analysis. The first was the within-case analysis, which analyzed each case independently. The second phase, the cross-case analysis, attempted to understand the prominent or significantly different themes across the cases (Merriam, 1998). This study used the constant comparative method in the within-case and cross-case analyses. Units of data, categories, and themes for each case in the study were derived independently. The cross-case analysis used the categories and themes from the individual cases to recognize patterns beyond the individual cases and allowed the researcher to establish an overarching explanation in which the individual cases with unique and varying details still fit (Merriam, 1998).

While Merriam (1998) outlines the creation and naming categories, describes systems for placing data into categories, and advises on developing theories, the researcher chooses the overall data analysis process based on the analytical method selected. Braun and Clarke (2014) provide a six-stage approach to thematic analysis to identify themes, sub-themes, and interconnections, which is the foundation of the constant comparative method. Braun and Clarke's

(2014) stages align with Merriam's general guidelines for data analysis and can govern the analysis of both within-case and cross-case analysis since there is little difference between the two (Merriam, 1998). The six stages of Braun & Clarke (2014) which guided this study were:

1. familiarize yourself with the data
2. generate initial codes [categories] and sub-categories
3. search for themes
4. review potential themes
5. define and name themes
6. merge and expand themes
7. produce the report

Merriam (1998) points out that data collection and data analysis are concurrent activities in qualitative research. The analysis starts with the first interview, observation, or document read. Analyzing data as it is collected provides insights and impressions to guide the next phase of data collection, which can prompt the refinement of questions, observations, and other data collection processes (Merriam, 1998; Yin, 2012). Data collection and analysis occurred concurrently in this study.



## **Validation Strategies**

All research is concerned with ethically providing reliable and valid information. Qualitative research can use many validation strategies to provide reliable and valid information (Creswell & Poth, 2018). While validity and reliability are important in qualitative research, these terms have been borrowed from quantitative research disciplines and may not best reflect the true nature of qualitative research. Lincoln and Guba (1985) proposed dependability and trustworthiness as alternate terms more congruent with qualitative research.

Whereas reliability, in quantitative research, refers to the degree to which research findings can be duplicated by outsiders, dependability, in qualitative research, is having outsiders agree that the results make sense based on the collected data. Dependability must be addressed throughout the study, from careful consideration of the study's design to data collection, analysis, interpretation, and finally, how findings are reported (Merriam, 1998). Merriam (1998) offers three strategies to enhance dependability: the investigator's position, triangulation, and an audit trail. The investigator's position provides the reader with information about the investigator's biases, assumptions, their relationship to the group under study, and the selection process of the participants. Triangulation is collecting data

from various sources and using multiple analysis methods. An audit trail provides a detailed description of how data were collected, how categories and themes were developed, and captures decisions made during the study. The researcher followed Merriam's strategies to enhance this study's dependability.

### **Generalizability**

External validity or generalizability is the extent to which the findings of one study may be applied to other situations. In quantitative studies, generalizability is ensured through random sampling and controlled sample size, controlled variables and conditions, and specified confidence levels (Creswell & Poth, 2018). Some argue that [quantitative] researchers can control so many of the factors that might influence outcomes that the results can only be applied to other highly controlled or artificial situations (Lincoln & Guba, 1985). Typically, the qualitative researcher is not as interested in finding out what is generally true for the many, as they are interested in understanding a particular phenomenon in depth. Therefore, qualitative researchers select a single case or small non-random sample specifically for the depth of information that it can provide (Merriam, 1998).

Many qualitative scholars (Cronbach, 1975; Erickson, 1986; Stake, 1978; Wilson, 1979; Walker, 1980) have suggested

reconceptualizing generalizability to better reflect the purpose of qualitative inquiry. Suggestions for reframing generalizability for qualitative studies include working hypothesis (Cronbach, 1975), concrete universals (Erickson, 1985), naturalistic generalization (Yin, 2012), and user or reader generalizability (Wilson, 1979; Walker, 1980). Again, Merriam does not advocate one generalizability concept over another; instead, she advocates that the researcher finds the concept of generalizability that best fits the researcher's construct of reality and the phenomenon under investigation.

The researcher selected reader generalizability for this study. Instead of the researcher generalizing findings, it is up to the reader to determine the extent to which the research findings apply to a particular situation or the people in those situations. Walker (1980) points out that it is up to the reader to determine what within the study is applicable to their particular situation and what is not. Even though the researcher is less concerned about generalization than the reader, the researcher has a duty to provide enough detailed information so that the reader can determine the studies' applicability within their situation.

Regardless of the conceptual generalizability, Merriam (1998) provides the following strategies to enhance the possibility of generalizing.

- *Rich, thick description* – provide enough detail so that readers can determine how closely the research situation matches their situation and if the findings can be applied.
- *Typicality category* – describe how typical or atypical the situation, program, or individual may be compared to others in the same class or situation so that readers can make comparisons to their situation.
- *Multisite (multi-case) design* – use multiple sites, cases, or situations to allow the reader a broad range of situations to which they can compare. This is especially important when there is wide diversity in the phenomenon.
- *Member checks* - taking data and tentative interpretations back to the members from which they were derived and asking if the interpretations are plausible.

In an effort to allow readers to assess the generalizability of the study to their personal situation, Merriam's strategies of rich, thick description, typicality category, member checks, and multi-case design were used in the study.

### **Advantages and Limitations of Case Study**

The case study design has both advantages and limitations. The case study allows for the investigation of complex social units with multiple variables and investigation into all aspects of the phenomenon

being studied. The case study includes all aspects without attempting to eliminate all variance in what is being studied and acknowledges the complexity of the human experience.

The holistic account of the case study allows the researcher to present all of the data, even when the data led to unanticipated conclusions. This allows for in-depth analysis into the phenomenon being studied and allows for discoveries during the data collection process which may inform further data collection or analysis. The reader of the case study is allowed to draw their own conclusions about the data that is presented and determines what can apply to their situation.

Alternatively, the case study is limited by the sensitivity and the integrity of the researcher, who is the primary instrument in data analysis and collection. The researcher often lacks formal training in observing subjects and interviewing. The researcher is responsible for determining the format in which the results are collected and presented. This lack of standardized format may produce reports which are difficult for the reader to process.

The perception of case studies is that they lack reliability, generalizability, and validity. Generalizability is often questioned because of a lack of random sampling and limited sample size. The inconsistency of employed analytical procedures can reduce

reliability. Validity is affected when the findings inaccurately reflect the data.

### **Data Management**

The researcher used pseudonyms and codes to protect participants' privacy. Codes to protect the participants' privacy and any linking identifiers were kept in a master codebook in a locked filing cabinet. The researcher stored de-identified electronic data on a password-protected computer and de-identified physical artifacts in a locked filing cabinet. All electronic and analog data and records, including interview recordings, will be kept for seven year and then destroyed. The researcher further secured all data by placing it in a locked office.

### **Ethical Consideration**

This study was reviewed by the University of Missouri's Institutional Research Board (IRB). All participants were asked to sign a Consent Form (APPENDIX B) prior to the first interview. The risks to participants in this study were minimal and did not include any more risks that the participants would otherwise encounter in everyday life. Possible risks to participants may include feelings of embarrassment or shame.

## **CHAPTER 4: FINDINGS**

### **Purpose and Central Issue Question**

The purpose of this study was to gain better insight into what supports or hinder learning for students with ADHD in online learning environments. These insights can help us 1) enhance self-understanding and promote opportunities for self-advocacy and self-help and 2) enable teachers to "see" their course through the lens of a student with ADHD and thereby incorporate elements into their online courses that promote learning and avoids creating additional barriers to learning. The central question that guides this study is: How do students with ADHD experience the online learning environment?

### **Outline of Findings**

This study was a multi-case study consisting of four similarly bounded cases which allowed a deeper understanding and more insights into a complex phenomenon than offered in a single case. This chapter presents the findings from extensive interviews, observations, and researcher notes. Although participants had unique experiences in their online learning environments, they also had similar experiences and often had conflicting views about online learning environments. Presenting the findings one case at a time would dilute the complexity and richness of the findings and oversimplify the case. The findings are

organized by research question and presented based on themes that emerged during data analysis to preserve the case's complexity.

Most of the findings are presented in quotes from the participants with minimal interpretation. Occasionally, bracketed [ ] words or phrases were added for clarification purposes only. Quotes are organized thematically and contextualized and presented unedited to allow the participants' voices to emerge. Broader findings that emerged from the study and addressed the guiding questions, in general, are discussed in Chapter Five. It should be noted that even though the findings presented are segmented into distinct themes and sections for clarity; they are often indistinguishably connected and overlapping. The study findings should be considered a holistic representation of the bounded system in question and read as such.

### **The Participants**

The participants of the study were given the pseudonyms, "Dean," "Ellyse," "Helen," and "Lynne," to preserve their anonymity. All study participants attended the same four-year land-grant university in the Midwest. Although people with ADHD all experience ADHD symptoms, the severity and how the symptoms manifest are unique to each person. Below, the reader is introduced to Dean, Ellyse, Helen, and Lynne, sharing their views of ADHD and how their ADHD symptoms manifest.



**Table 3***Participant Demographics*

| Participant Pseudonym | Identified Gender | Age When interviewed | Year      | Number of Online Courses Enrolled In | Total Length of Three Interviews | Missed Interviews |
|-----------------------|-------------------|----------------------|-----------|--------------------------------------|----------------------------------|-------------------|
| Dean                  | M                 | 20                   | Sophomore | 5                                    | 191 min                          | 4                 |
| Ellyse                | F                 | 20                   | Sophomore | 4                                    | 152 min                          | 2                 |
| Helen                 | F                 | 18                   | Freshman  | 5                                    | 147 min                          | 3                 |
| Lynne                 | F                 | 19                   | Sophomore | 5                                    | 127 min                          | 2                 |

**Dean**

Dean is a 20-year-old male Caucasian male and the only participant living on campus during the study. He is also a sophomore and enrolled in five online classes. Dean's ADHD diagnosis occurred at the age of six; "the idea that there was something abnormal about me when I was very young was obvious." Dean's diagnosis at such an early age made it difficult for him to articulate what having ADHD is like for him.

*I've had ADHD all my life. I have no idea if that's just the human experience or not. So, it's hard to describe how I'm different. When I've never been different. I don't know what other people live their life. So not getting a very useful answer. But I really have no idea if I'm just describing the human experience or not.*

He often prefaced or ended statements about his ADHD experiences with a statement along the lines of "I don't know, that just may be the

human experience. It is hard to know for sure.” Dean had no trouble articulating what he thinks of having ADHD.

*Having ADHD sucks. It's incomprehensible to someone who doesn't experience the ADHD. That's, it's that it's difficult to do things that most people consider simple. It's, it's especially difficult to read a book or a really long article or if I see four pages of a really small text font. It's like there's no way I can sit down and read for any length of period of time continuously. Um, I just can't do it. It's just my brain is not meant to do it. Writing too...I hate writing. You ask me something and I can talk about it no problem but tell me to write down what I know about something, and you can just forget. Like my thoughts get all jumbled because I can't type as fast as my thoughts are going so nothing makes sense.*

ADHD symptoms that Dean struggles with the most are his inattention, distractibility, and time management. Dean described one of his experiences with distraction:

*When you're not distracted by something in your environment you're distracted inside your head and distracted inside your head is you're not paying attention to anything. You, you're thinking about something else you zone out conversations, lectures, videos, just about everything. For me, I tend to get distracted in my head after I read something. If there's any writing, I will read the writing and I will think about the writing, like pop tarts. Sodium, so what do they mean sodium, like, yeah, the weirdest thoughts pop into your head as you're distracted inside your head.*

Dean shared that his inattention is most prevalent during conversations.

*I very frequently am not able to recall conversations that I just had. Not because I have a bad memory, just because I didn't pay attention to people when they talk, especially if they talk slow or slower than I like.*

His inattentiveness in conversations was evident during his interviews as Dean repeatedly asked for questions or statements to be repeated. Dean would often start to answer a question and then lose focus of the topic and go off on unrelated tangents. Eventually, he would circle back around and pick back up on his original thoughts. Dean frequently said, "I just remembered something that I was planning on saying." He also shared that "it happens a lot."

### **Ellyse**

Ellyse is a 20-year-old Caucasian woman living at home in her hometown at the time of the study. She is a sophomore enrolled in four online classes. Ellyse was diagnosed with ADHD at the end of 8th grade as she continually "struggled a lot in many classes but like I wasn't dumb." The testing and diagnosis helped Ellyse realize that her issues were not a lack of intellect but a difference in how her brain works. Even though Ellyse knows that she is intelligent, she continues to have issues with self-confidence. She shared, "I'm always thinking like, I'm so STUPID. When in reality, that is not true, my brain just doesn't learn the same way as everyone else. But, you know, some days I just feel stupid."

The main symptom that Ellyse deals with is inattention. She tends to daydream when she is not on medication. Her inattention in class was overlooked by teachers in the chaos of the classroom. Ellyse

also finds herself distracted in the middle of tasks, for example, getting sidetracked when going from one room to another. As Ellyse explained:

*I know that I have already forgotten [to take my meds] because my brain is kind of like going either 1000 miles a minute or just really slow. I don't really want to have the motivation to do anything. But when I'm on the medication, it's normal on doing all my work. I'm like, motivated to get up and do stuff, but it's, like, really obvious when I don't take the medicine that I didn't take it. And getting in my head about it is probably the last thing I should be doing.*

Ellyse further explains how her ADHD can impact getting simple tasks completed:

*So, I really will be going to do something like I have to go do laundry, which means I'm going downstairs. But if I'm going downstairs, I should probably take everyone's laundry. So, then I have to go into my sister's room and then when I entered her room, I saw how dirty it was. So, it would be nice to clean her room before I take the laundry down. Now that her room is getting clean, then I'm thirsty. So, I'm going to get some water, but now the dishes in the sink are dirty. So, I start to do the dishes and it leads to this whole other thing. When in reality, I was just supposed to be doing laundry. So, I think almost. It's just like people, I even I never realized how weird things like that are and then people are like, 'Why isn't the laundry done' and I'm like, 'Oh, well, Let me tell you what happened.*

Ellyse also struggles with needing extra, or simply different, explanations for concepts. This need makes her feel less intelligent than her classmates, and she finds it hard to get teachers to provide extra assistance. Ellyse shared

*I'll tell a teacher like I'm struggling and, but they're like 'What? Everyone else gets it.' And I'm, like, but I'm not everyone else.*

*So, if you could just teach it to me, that'd be great. Can you just help me out here?*

## **Helen**

Helen is an 18-year-old Caucasian female. She was enrolled in five online courses and living with her parents in her hometown at the time of the study. Helen was diagnosed with ADHD in 8th grade. The diagnosis made her realize that she was neurodivergent and that her brain works differently from others.

*Like, I thought I was just like, I thought everyone was like this. Um, so that was interesting to find out that, no, not everyone is like this. And like a lot of things started clicking to me, like, things that didn't really make sense in the past. Like when I was in class and I'd be, like, drawing and then sometimes, sometimes teachers would get mad at me because they thought I wasn't paying attention. But I knew that, I do, like, pay attention.*

Helen's ADHD acutely affects her executive function. Primarily she exhibits "executive dysfunction" in starting tasks, staying focused, and in her emotional regulation. According to Helen, she has "good ADHD days" and "bad ADHD days," and during one of her interviews, she shared, "Sorry, I am, like, really disorganized today. It is a bad ADHD day even though I took my meds." She further explained her "bad ADHD days:"

*A bad ADHD day, at least, that's how I describe it, because I don't really know how else to but it's a day or usually, I'm like highly emotional and I'm having a hard time focusing or doing Assignments and I just don't want to work and I feel a lot of executive dysfunction and Just really strange about working And failing. Like when I got questions wrong on my math home I got really upset and I was, like, sweating, and I was, like, really*

*flushed and I was like, I can't do this. And I didn't, I couldn't do anything. I'm not just a bad student. It's like something I'm actually struggling with, like, when I get bad grades. It's not like I'm saying, like, Oh, fuck this. I'm like, I'm, I can do it. You know, like my brain is - won't let me.*

*You know, it's like a big part of my brain is like, well, we're just not gonna. We don't feel like it. We're not doing it. And it's really harmful because it's not for obvious reasons. And it's really painful, you know, because I'm like, I know I have to do this. But I just can't make myself do it and it really sucks. Like it's something that, like, when my parents asked me to do or something. And I'm like, I can't do it. And they get mad at me because they think I'm just being lazy and I'm like, no. I'm sorry I really just can't, you know, it sucks. It's just like, I can't do anything that day.*

*And then there are those days where I'm, like, more emotionally heightened and I, like, can't really function because things affect me more negatively.*

Helen's bad ADHD days can really take a toll on her self-esteem and confidence.

*You know it's because of ADHD. When you think of it, you're like, oh, you just have a hard time focusing, but like, that's not all of it. It can be really hard on me, like, I can't focus, but I also can't, like, do anything. I can't work. I can't even like play video games. I'm just, like, so emotional or out of it and it sucks. And I just feel horrible. And I am like, I can't do this. So sometimes I stop and take a nap. And then I feel better, but, like a child, but whatever. It helps to just step back on days like that, but it's really hard to realize that it's uh probably ADHD. But it really seems like I'm just like, me being a bad person. Because sometimes I'm like I'm so bad that I like, why don't I want to work. I'm such a bad student I don't know. I literally have a learning disability. It's fine. It's not my fault. It's okay, but it is hard to escape that way of thinking.*

## **Lynne**

Lynne is a 19-year-old Caucasian female and a sophomore. Before the 2020 Fall semester, Lynne had never taken an

online course. At the time of the study, she lived in her hometown with her family and concurrently enrolled in five online courses. Given an option, Lynne would not have chosen to enroll in online courses. Unlike the other participants in the study, Lynne was newly diagnosed. She received her diagnosis nine months earlier, so she was still learning about and adapting to her diagnosis. The diagnosis helped Lynne understand things she had been doing. She said:

*I always thought that I was just not the best student, and, like, I always got decent grades, but I didn't put in much effort because I didn't want to. And I always felt like that was just something wrong with me and then I found out that I had, like, an actual, like a disorder. And I was like, that makes a whole lot of sense. Being diagnosed with ADHD really helped me be, like, this is an actual issue that I have, and I really need to, like, focus in on it and learn to manage it. And that kind of makes me feel better.*

Lynne shared that she is on medication to help manage her symptoms, and there is a significant difference when she is on meds versus when she is not. She explained the difference:

*When I'm not on my meds, I just, like, ramble for hours and talk superspeed or sometimes I just sit there and like everything is running through my head at like 100 miles a minute. On meds I don't talk as much because I can remember things better and I can hold on to little thoughts better than I had been which I find that interesting.*

Lynne described some of her ADHD symptoms:

*I'm the type of person with ADHD, where if a thought pops into my head, I have to say it or write it down or something to get it out of my head or I'll forget it, or it'll stay there all day and will drive me crazy.*

*And you know, ADHD can really suck. Yeah, just like the fidgeting. I feel like I'll find a speck on my laptop screen and I'll spend 10 minutes trying to scratch it off. Or like my nail is uneven and I'll spend 20 minutes filing it down. Just like the little things really tend to distract me and prevent me from getting the important stuff done.*

*I mean, there's the whole motivation issue and procrastination thing. I still have a very big issue with the procrastination even with meds. That's always been like a huge problem with me. Um, I don't really know how to not procrastinate at this point, because I've been doing it for so long. It's just a bad habit that I kind of still I'm trying to figure out how to get out of.*

## **Findings**

### **Research Question One: What perceived challenges, if any, do students with ADHD encounter when taking online courses?**

All the research participants expressed that online learning is difficult and, given a choice, they would not choose to take an online course. The participants' challenges and frustrations in online courses were constantly mentioned throughout the interviews regardless of the topic discussed. Dean stated, "I don't like it. I don't like the whole online thing. It's, it's been a struggle. Grades aren't as good as they've all always been. It's just so hard." Helen shared the same feelings, "...I thought online might be harder [than in-person classes]; I just didn't realize how much harder." She later explained:

*Online has really affected my mental state. Like it's made me a lot more emotional on, like, especially on bad ADHD days when I'm just really not feeling good. I'm like, especially sad, and it's really hard. So, it could be partly because of COVID that I'm struggling a bit more, but I*



*don't know; I think online is the biggest part. But I mean, all I can say is I'm out here trying my best, things are a lot different than I'm used to, but my ADHD makes it harder than probably what everyone else is doing.*

Ellyse expressed another sentiment common to participants when she shared:

*What makes this, like, really frustrating is that I didn't choose to be in online classes. Like, when I registered for my classes last spring, they were all to be in person, and then they, like, all just got moved to online. Yeah, it really sucks. Thinking about it now, I don't know; I don't think I would take another online class if I can help it.*

### **Managing my time**

Universally, participants mentioned that one of the biggest challenges was managing their time in an online learning environment. Participants frequently talked about losing track of time, *their tendency to procrastinate*, and underestimating or overestimating the amount of time needed to complete tasks. Lynne said, "Time goes by either very slowly, or very quickly. And I always forget what time it is."

Time management challenges were evident by the number of missed interview appointments by the participants who "just completely forgot about it." Every participant missed at least one scheduled interview, with most missing two or more. Even though participants received electronic meeting invites in their university emails and reminder texts the day of the interview. According to

participants, they just did not "know what happened. "it was on the calendar," and "I set an alarm, but for some reason, it didn't work."

Another component of time management is accurately estimating the amount of time a particular task will take. To some extent, all the participants had trouble accurately estimating time. Lynne provided a representative example:

*One of my biggest challenges is really just getting my stuff done, because like I know when it's all due. And I know that I have things to do, but, like, I feel like sometimes I will either overestimate or underestimate how much time I need to work on an assignment. So like I had a giant binder due, I had this whole thing due, [assigned] like two, three weeks ago, I think maybe like a month ago for my textiles and materials class, and I totally forgot about it, and I was like, oh, okay. It's midnight. I'll be fine. She told us that we should probably start it two weeks before it was due. And I ended up having to finish it while I was at work because I completely underestimated how much time I was going to need to do it. And I really thought I wasn't going to be able to turn it in. But yeah, I feel like that's one of my biggest issues.*

Participants agreed that being on campus and attending in-person classes provided the structure and the forced time commitments participants needed to feel productive. Attending classes forces the participants to get the day started and keep them moving from one class to another. Online classes did not provide a strict daily structure, which created a challenge for the participants. Ellyse explained it like this:

*I would say like figuring out, uh, one of the hardest parts was trying to figure out the workload because I just didn't have a schedule, literally any schedule. I didn't do my laundry at the same time; I didn't have, like, breakfast at the same time; or wake up at the same time or do any of that. Whereas last semester, it was every single day. I had a class, at least one, and they started at like 9 AM, and so I was out doing stuff, I was eating, doing this and this and this, and come back to laundry, go do homework, go out with friends for dinner, and come back to finish [homework.] So those were all things I could count on, like, it helped me time when I do things, which I guess, I got a little bit too comfortable in doing. I can't count on those things now, which makes it hard to get anything done.*

Helen and Dean unknowingly registered for a self-paced course that exacerbated their time management struggles. Helen further describes her struggles with time management in self-paced courses:

*It's just hard because I have to hold myself accountable for everything. And it, I don't know, it's just easier when I have concrete due dates and not like all of this is due on this date. It's easier if it's like there's this [assignment] and it's due then. And then this [assignment] is due then, instead of, like, you've 20 chapters due, like three months from now, you know? I don't know; I just can't find the time to do it because I have so much time to do it. Like, doesn't really make sense, I know, but that is how it works.*

Dean, never shy when expressing his opinions or how he felt, said:

*Blatantly stupid [of self-paced courses]! It is hard enough managing my time and getting crap done with weekly due dates, let alone not having anything to do for weeks on end. Ridiculous if you ask me. But no one did so here we are.*

### **Avoiding distractions**

Participants shared how much easier it was to be distracted in their online classes than when attending in-person classes. Without the instructor's physical presence or the social pressure of classmates who might "catch [them] being distracted," participants let themselves become more distracted in their online courses. Lynne and Helen both described the struggles with distractibility and how they can be distracted in their online courses. Lynne revealed:

*When I'm in person, I feel like I sat down, and I automatically started getting my stuff ready and like taking notes and like getting in the zone to be ready for this class in person. For my current [online] classes, I just kind of sit down on my bed and open my laptop and let it kind of happen. I don't, like, really get ready or anything, like I do in-person.*

*So, yeah, um, I'm definitely more distracted. But that's just because I'm just looking at my laptop, and I don't have other people around me, and none of us have our cameras on. So, but yeah, it's too easy to surf on my laptop, play on my phone, and no one sees me do it.*

Helen highlighted how she is more easily distracted in her online courses:

*I'm easily distracted because I've got my phone next to me. And because none of us have our cameras on - nobody would know if I'm on my phone.*

*And so I'm definitely on my phone, more than I was in person, because in person I like I was never on my phone in class, unless I was like switching the songs that I had in one air pod because music helps me work better. I just skipped a song, put my phone back.*

*But now I'm just constantly doing anything that I can that's not my schoolwork like, um, well, my, my phone. I*

*literally organized my bookshelf one day during a class, even though I already had it organized. I was putting laundry away. I find any little task that I already need to do that I just haven't done yet. And that's when I decide to do it when I should be doing Zoom or homework.*

The above excerpts provide some examples of external distractions that participants face. Participants also talked about internal distractions such as intrusive thoughts. Participants would stop focusing on their primary tasks and devote their attention to what was going on inside their heads. Participants frequently referred to this internal distraction as "zoning out." Dean commented that "sometimes I get so lost in my head I don't hear a word what's being said or notice anything around me." Lynne shared her struggles with internal distractions:

*I kind of just stop hearing my professor talking. Um, it's just I completely block it out, and then when I realized I've been zoning out, I snapped back in. I'm just like, how long have I not been listening, and what are we talking about right now. Why are we talking about chickens in History?*

"Zoning out" is not an issue specific to online courses. It can happen anywhere and occur in their in-person classes as well. The difference between zoning out in online versus in-person courses is the length of time they are zoned out. Lynne described it best when she shared:

*I definitely did it [zone out] in person, but it wasn't as bad as it is for online classes. I'm like, I mean, if I just was not in the headspace to be in [my online] class that day I*

*would completely zone out and put in my headphones or just not pay attention.*

*But I feel like most of the time in in-person classes, I was completely focused and, like, zone out once or twice without thinking about it and quickly snap back in and continue doing my work. But online, it's just like I zone out, and I don't know how long I've been zoned out for.*

## **Staying motivated**

Each participant admitted that motivation, regardless of the course's modality, was a problem, and finding motivation was not any easier outside their courses. Dean said, "I have always had a hard time starting or putting much effort into things simply because I didn't want to." Participants agreed that online courses made motivation even more difficult. Helen shared, "I've been doing, like, as best as I could but, like motivations really hard to, um, it's very, is very hard to motivate myself this semester."

It was not until Lynne took an online course that she realized how bad her motivation could be, stating:  

*I noticed the whole motivation thing has really become very clear to me because of my online class. Just because, you know, I'm staying in one, pretty much just my house all day. Um, and so like I never really noticed how bad my motivation was for things until this semester.*

All participants indicated that having a required meeting time, whether to go to the classroom or get a cup of coffee, greatly helped with motivation. It would "jump start" them. Lynne discussed that

having "someplace to be" and "at a specific time" was needed to motivate her. She said,

*It's hard, like, making myself get on Zoom calls and like, getting the motivation to actually get on the Zoom calls because that's one of my biggest issues. I don't have the motivation to do it. Um, and, like, on campus I, it helped a lot having a place to go to, at a certain time and being around all these people. And, like, because I knew I had to go there and if I was there, I was going to take notes and, like, actually pay attention, but now that I'm doing it from the comfort of my bed, I have no motivation to do it.*

Ellyse also expressed the need to have a reason to get out and be somewhere at an appointed time so she can get "into the right mindset." She explained:

*Whereas, if I just wake up and it's like, Oh, we have a Zoom call today. You don't have to show up though, it's like, Okay, I want to show up and.. and so it's kind of like, yeah, if I don't do it. My mind isn't like, I guess, prepared. It's still in that like sleeping mode. We don't have to do anything today mode. So, it definitely needs a little jumpstart to get me going.*

*I would even say like if I made appointments to go like workout or something. That is still enough motivation, whether it's for class or not, like, doing something that makes me like physically leave the room is like a big help to me. I think especially the semester.*

### **Interacting virtually**

Participants expressed frustration with virtual interactions in their online courses throughout the interviews, particularly during synchronous online lectures. Participants used the term "Zoom" to reference synchronous meetings. Ellyse and Lynne agreed that one of

the things they disliked about their Zoom sessions was that instructors talked too fast. Lynne compares Zoom and in-person lectures:

*In face-to-face classes, my professors, they tended to talk pretty quickly. But there was always the, you know, we were able to raise our hands, and like ask them to repeat something. But while you're in Zoom and everybody's got their cameras off, and we're muted, and the only way to ask them to repeat something is through the chat that they never check. It's worse. I hate Zoom. Um...yeah.*

Ellyse explained that she gets lost when her instructors talk too fast during synchronous Zoom sessions. She said,

*And I really don't know why; my professor just talked really fast. Also, and it's very hard for me to, like, understand everything when it's all just being thrown at me at once, through a computer. Um, but yeah, it is really easy to, like, zone out. I really wish they would slow down.*

Dean shared his thoughts on synchronous sessions:

*It's the dumbest thing ever if you have everyone get into a Zoom meeting and then mute everyone. No questions or answer very few questions. Questions that could be answered by emails.*

Unlike Ellyse, Dean found the synchronous sessions easier when the instructors talked fast. He said, "I get really bored if they [instructors] talk normal or even worse, really slow. I just can't. It's easier to Zoom when the professors talk fast."

Participants also found that when synchronous sessions did have student interactions, such as asking questions and making comments, the experience could be frustrating. Ellyse explains how she handles



asking questions in synchronous sessions and the frustration when classmates are not as courteous:

*I'm actually pretty open about just speaking as long as I'll wait for the teacher to like, stop, the little green box, and made sure like, that people in my classes are good about it if they're not speaking it's on mute. So with someone's queuing up a question. You'll see someone's mic go on, and you're like, Okay, they're going to talk; next, I'll get in line out for them and turned on. When I can tell they're almost done speaking, but I've been in a couple of Zoom right, that doesn't happen. And we're talking over each other, and it's different to talk over someone in a call than it is in person because I don't hear a single word you're saying because everything I'm saying is canceling it out over Zoom. I feel I miss a lot of important information because of that.*

Lynne talked about the benefit of being able to approach an instructor with questions in the moment; otherwise, if she waits until later to ask, the question will be forgotten:

*You can raise your hand in class or wait until the very end and just ask the teacher, walk with them to their next class, and it would be done right then in there. Whereas now [online], you might not write it down to ask later and then if you forget it could be days before you realize you had to ask something and then it's email back and forth. And even then, they still want to know what you mean and the context has been lost.*

Participants often found it hard to connect with their professors virtually. Helen commented, "I wish I could have a relationship with my professors. It's kind of hard to do that when I hardly ever see them." Some of the participants explained that establishing relationships with their professors "made it easier to explain my ADHD

and why I do, like, some of the things I do, why I need it a certain way." Ellyse shared:

*I love it if teachers were like we could meet once a week in person. If you really didn't understand it or you really couldn't connect through the screen. But if that was ever like an option. I would ask the teacher: Is there any way we could literally just meet in person, like it has to be in person. I'm sorry. I have ADHD, like you just don't understand it doesn't work the same over the phone, um, or through a computer screen.*

### **Finding course content and assignments**

In an in-person course, instructors often provide guidance during each class meeting on what students will be doing during that class session, instructions on preparing for the next class session, reminders of upcoming assignments, and other helpful prompts to students. These types of interactions are missing in online courses, and students rely on the online course design to help guide them through the learning.

Participants frequently mentioned that the organization and structure of their course sites were burdensome. Participants often found the organization of course sites confusing, making it difficult to find important information. Lynne found "it really frustrating when I have to click all around in Canvas to figure out what I need to do and the stuff I need to do it." She was not the only one to encounter this challenge. Dean felt that many of his course sites were "totally disorganized." The perceived lack of organization in the course sites

was very demotivating for participants “to even want to try to figure out what needs to be done and do it.”

Dean shared that he wanted to put time and effort into doing his assignments instead of looking in the course site for the assignments or the information needed to complete tasks.

*I have to like, check, put so much effort into checking how, what if I even have work that shouldn't be something that you put effort into like. That should be something you know it should, you know, that's not something that you should have to put that's not where the effort should be put is knowing if you have work.*

*Honestly, just put a link on the syllabus on the site. Organize it chronologically. Here's week six, here's all of the work for week six. Take me to what I need to do and to what I need to read. Don't put it in different places, don't have a quiz tab, a module tab and it's separate website for the textbook.*

### **Needing social support**

The lack of in-person social interactions with instructors and other students was a struggle for all participants. Participants rely on relationships with instructors and other students to provide the social pressure and motivation needed to succeed in their courses.

Participants missed the social support network that organically occurs in an in-person course. Although many participants could and sometimes did interact with other students virtually, “it just isn’t the same.” Ellyse explained the importance of those interactions:

*But now I'm like, at home, alone, and I don't have, like, resources. And it's hard for me to, like, reach out to people now*

*because I'm like, I don't know if I need help, or if I'm just like, not looking in the right place.*

*But like when I'm doing my schoolwork, and stuff I need to be around a lot of people. Because, like, I've learned that to get my stuff done faster and better and, like, make sure it's done, I need to be around a lot of people, because I feel self-conscious if I don't get it all done.*

**Research Question Two: What perceived benefits, if any, do students with ADHD experience in online learning environments?**

**Referencing recorded lectures**

All participants talked about how they often found themselves “zoning out” during synchronous and asynchronous (recorded) Zoom lectures. Depending on the duration and intensity of the “zone out”, participants reported they would “snap back into lectures without knowing how long I had been zoned out or what the heck my teacher was talking about. I would be completely lost.” The ability to go back and review recorded materials was seen as a “huge plus when taking online classes.” In discussing digital materials, Lynne found that recorded lectures were a double-edged sword for her:

*I noticed that I probably have to focus less in the moment only because I know that I can go back to it should I miss something. Whereas before [in person classes] it wasn't. They didn't also Panopto it and put it up. It was just in person and if I didn't have a friend in the class and they didn't show up then I just completely missed it. But, and that [information from the lecture] was just completely yeah out the window. So I guess that's maybe a big key factor. I just don't have to think about it as much, but also with video I can go back, if I miss something*

*or if I heard them say something that wasn't on the screen. Um, so I guess like it's a negative and the positive moments like that. I can go back and do it. But then also, it doesn't force me to sit there and listen to them say it the first time.*

Like Lynne, Helen took advantage of recorded lectures to review material she did not understand or missed while “zoned out.” Helen also liked how one of her instructors used VoiceThread for lectures to break up the lecture material and make it interactive. Helen explained:

*I like the VoiceThread because she'll post the entire lecture split up into like three parts or so in our modules and we have to answer specific questions within the voice threads, just to make sure that we're understanding the topic. And that way I can, like, go back and re-listen to different parts that I don't entirely understand but on Zoom and in-person lectures. It's very difficult.*

Dean “hate[s] synchronous lectures, I love recorded lectures.”

Although Dean also used recorded materials to go back and review, the biggest advantage for him was his ability to control the speed of video because “people talk too slow in their lectures.” He shared:

*Um, but I do find that if you're just listening to a video of someone talking and speed them up two times speed. I don't know why it works, but it's the one thing that, like, I can do one task on and as if I'm doing two is just going really fast. I guess maybe it's just, it's so much. I don't know. I don't know why. Maybe it's just like a whole other task and you're entirely for your brain to it's like okay these are the words that I'm hearing. It's like okay slow that down, comprehend it. Like you're because you think about it, behind the script. So you're comprehending the language behind what you're listening to it.*

*Um, I guess it's just it's just harder to get distracted [watching double speed videos]. If you know that any moment that you*

*look away you're going to miss so much content. Twice as much. I've no idea why it works but probably for multiple reasons it's very effective. I'm, I'm very comfortable listening to people talk about this fast talking really, really fast. You can't do that with Zoom lectures or in class which sucks because it really helps.*

## **Finding environments**

Participants often commented on the significance of their environment and its impact on their motivation. The fact that participants were not tied down to a physical location and could “be anywhere” to do schoolwork was mentioned as an advantage. Helen liked the idea that she could “change locations on a whim or if I get stuck.”

Since most online course resources were in a digital format, participants shared that this made it easier to change their environment when the current “environment was no longer working for me.”

For Helen, “freedom and flexibility” meant being able to “find the spot that works best” for her to focus. Whereas for Lynne, flexibility that online courses afforded her in her daily schedule:

*On campus I had to plan out everything every minute of my day, or I wasn't going to get anything done because I had so many people that I knew around me all the time. And like I, um my roommate is like my best friend. And so, if we were together, nothing got done.*

*But, like, with online I don't have to do that. I can, just whenever I feel like I need to be doing something I can just do it and like there's no distractions and I don't have to have*

*everything planned out because most days I don't have [in-person or synchronous] class. And well, because I only have Zoom meetings on Tuesdays and Thursdays every week. Every other day is pretty much just free for me to do whatever. And so like, I can just kind of get on my laptop one day and just do whatever I want and like, do as much homework as I feel like. And because most of my assignments are due at midnight.*

*If I have any time throughout the day to do it. And so I'll just like I'll be doing something I'll be watching TV or something and then I'm like, oh, homework and I sit down and I do my homework. And then I'm done.*

Dean also regarded the flexibility within his daily/weekly schedule as a benefit of online courses. He shared that the flexibility of "picking your own hours" to do schoolwork was "the only virtue of online courses. You, know, can do it whenever you want. There's less pressure. Okay, same work, less pressure, more flexibility." Dean expounded:

*It's just the whole idea of picking your own hours that I like. You have a week to do it every week. That's how its structured and which just gives more time. It's just less pressure and also you pick your own hours. There's no time obligation well sometimes there's time obligations, but there's no, I can't have class in the morning. You can. You'll never say that, never said that this semester. Can't do that tonight I have class in the morning. Can't stay up tonight, I got class in the morning. Oh, I've missed so many parties last semester because I had class in the morning with 8am Monday classes. Right. But never say that anymore. It's you pick your own hours. That is a luxury very few people have. Um, this is the dream and I'd rather, I'd rather as an adult be able to pick my own hours than to be wealthy on a schedule that someone else picks for me.*

## Personalizing learning

Participants found online courses allowed them to “have the time to do the things that help me learn stuff better.” In-person lectures offered only one form of content delivery and placed time constraints on learning the material. If a participant was “having an especially bad ADHD day, that information is just lost.” In online courses, participants could follow up or research information while they still had “the questions in my head” or review recorded lectures.

Lynne explained how online courses benefited her learning:

*I feel like me having to understand it on my own and finding ways that helped me understand things better is more of an advantage [of online courses]. And I feel like I have more time to do that. Okay, rather than sitting in the classroom all day and just not understanding anything that's going on. And then just going back to my dorm and falling asleep. Because I'm already on my laptop for these Zoom meetings. If I don't understand something and they're only, like, an hour I have - I'm already on my computer and I already have the questions in my head that I can just go and research all of it. So, it seems more independent and kind of helps me understand things better.*

Helen, who has always struggled with math, was surprised to find that she was actually doing better in her online math course than when she took an in-person math course. Helen attributed her success, in part, to the fact that she could use the digital resources in ways that helped her learn better. She shared:

*Honestly, it's strange, but I've been doing better in online math than in-person math. I don't know how to say it like I think it's because like the way that it's working online is really helpful for me. The fact that I can do questions over and over again on, like, the homework until I get it is really nice. And, like, sometimes the module I'm using has like, a little like, a question*



*help button where like, it gives you an example problem that's, like, basically the same but with different numbers and shows you, like, the step by step. So, I can figure out the problem because a lot of the time. I'm like, I know what to do, but I just can't remember it. I'm like, it's not like I just forgot it. It's just like, for some reason I can't access it. So, I need, like, a reminder, and then I'm like, oh, okay, and then I can do it. So that helps a lot. And like I can't really do that in, like in person math class cuz sometimes [in an in-person class] it might be considered like cheating. But I'm not like getting the answer to the question, I'm getting how to figure it out*

### **Reducing social anxiety**

Most of the participants shared having some degree of generalized social anxiety. Interacting with classmates and teachers in their face-to-face courses where “you have to talk and interact with people you would rather not” was a source of anxiety for participants. Although Ellyse was initially concerned about her anxiety in online courses, she discovered that it was less of an issue than she thought it would be:

*I think the online almost made me think it was going to be really anxiety inducing, even more so than in person. And that was wrong because you aren't having to deal with anybody, whereas in [face-to-face] class, you have to go see random people to chime in. That's anxious.*

Helen shared that in face-to-face courses, the thought of disappointing her teachers was a constant source of anxiety for her. Helen explained that even though teachers never expressed their disappointment in her, she “just thought I could see it in their faces or by their body language.” The perceived visual clues for Helen

in her face-to-face classes were missing in her online courses, thereby reducing her social anxiety. Helen shared:

*In online classes, I don't have the anxiety of, like, disappointing, like my teacher. I don't really struggle with that very often but like, I don't like the idea of, like making someone feel bad. Like for me, or like disappointed in me and If I do that, I'm like, I don't have to see their disappointment. I don't have to worry about what they think. Because it's submitted. It's online. It's done. It doesn't matter anymore.*

Some of Helen's social anxiety also stems from being self-conscious when physically around other people, as she explained:

Online is good because there's less of the social aspect. So I don't really have to worry about, like, the things I would worry about in regular school where I'm like, are they looking at me, or whatever. Now it's like no one can see me. I'm on my laptop, whatever. Doesn't matter. But like that's not like a huge problem for me anymore so it is kind of nice to not worry about that.

Participants shared that group work and peer-reviews were easier in online classes because they “did not have to see those people in person.” Lynne explained:

*Yeah, I feel like it in person, group work is really hit or miss with how it can go, but I feel like online it works very well because you don't really have to go through the awkwardness of seeing this person, face to face, you can just text through the whole thing.*

Helen also found the peer-review process easier in her online courses. At times, Helen struggled with the in-person review process, “especially when paired with someone annoying.” The online peer-

review process allowed Helen to avoid uncomfortable peer-review interactions and reduce some of her social anxiety.

*I also like how easy peer review is now. Like you can just send it to them and then they read it and they send it back with comments and there's not a lot of like, wondering who you're going to be partnered with or like she'll get along. It doesn't matter. They just read your stuff and go and lots and is because last year I got paired with someone that I really don't like, it was really annoying. Working on her paper, but There was none of that. It's just you do it and it's done. And I like that about it.*

Although participants appreciated not having to interact with classmates in person and that lack of interaction eased their social anxiety, Lynne appreciated having the opportunity to work with others in her online classes:

*We can have a discussion thread that only the two of us can access. And so you still get the, like, feeling of working with someone else on an assignment, but you don't actually have to like, see them in person, which I like. Especially if it's going to be an online class, like I'd still like to work with other people.*

### **Research Question Three: What strategies do students with ADHD use to navigate online learning environments?**

Whether diagnosed as a child or just recently diagnosed, all participants have developed strategies and resources to help them manage the challenges that ADHD presents to them in their personal, professional, and academic lives. Many of the strategies are used by all the participants, while others are specific to the participant. Each has found ways to best manage their particular symptoms.

## Creating designated workspace

All participants talked about the "need to have a certain special space just to do work." Most participants tried to create or find a space "with as few distractions as possible." For example, Ellyse shared that "a good clean room makes me want to, like, do work. I guess it's like everything's clean. I have nothing here to do. I can focus on everything else." Helen used her bedroom as her "workspace." Unlike Ellyse, who can do "work anywhere in her room," Helen has a "designated workspace" in her room that works best for her. She explained:

*Um, well. it's sounds like something that wouldn't really be a strategy for other people, but like it is for me like being in my room and not like outside or on my bed like Being at my desk and working is helpful for me because it's like my designated workspace. Like, I don't do work anywhere else really*

*They're have been like a couple times, or I'm in the living room. And I'm like, Oh, shit. I have an assignment so that I do it, but like You know, I, this is where I sit down and I do my schoolwork, and it's not my bed. Well like, also I sleep there. It's my desk where I sit and I do my work and it just helps keep me focused*

*And like, there's not anything else I can really do here [at her desk]. I mean there is but like, I don't go to my desk to do them. And I'm like, I will play video games here. I'm like okay schoolwork or drawing. That's like the two things I do so it helps keep me like keep on task.*

Lynne described her "designated workspace:"

*I feel like the student union has become like my place to do my work and like get it all done because, you know, I found my comfy chairs. I have my coffee. It's a, it's a place that's like right*

*in the middle of campus and all of my classes are the same amount of time away from that location. And so like I had been very comfortable doing my school work there.*

## **Taking breaks**

Working in long, uninterrupted stretches of time proved very difficult for participants. Whether wanted or not, the ADHD brain will take a break. Participants noted that they often did not realize that they were “on a break” during these unintentional mental breaks and more easily lost track of time. Many participants incorporated intentional breaks into their tasks to avoid losing focus at inopportune times and exert more control over the break. Planning intentional breaks helped provide a “refreshed, clear mind,” making it easier to focus and get back to work. Lynne explained her unintentional mind breaks:

*I don't like it when my brain decides it wants a break on its own, I may space out, start reorganizing my desk, uh, surfing the net without really realizing what I am doing. The next thing I know, it is, like, 3 hours later and I don't remember what [schoolwork] I was working on or where I left off. It can be really frustrating. I just wasted all that time; I could have just been done by now.*

Helen further explains:

*I also, like, I take breaks, because I know like my brain doesn't work that I can just sit down and do it work for six hours straight. You know, I don't think anyone's brain works like that. And if I let myself get bored and get tired of stuff, which was something I struggled with in online High School for the brief period I had it. Where I'd be like, I have to do this, like, I'm not going to do it later. I know nothing to do it over, sort of, like, push myself to do it. And then I get a bad grade on it because I'm not, like, focusing any more.*

*So now I'm, like, I'll let myself work and then at some point, I'll be like, I'm bored. I need a break and then I'll go do something else for a little bit and come back and I'm, like, Okay. Great. Let's get started. And it really helps give my brain, like, a restart so that I'm, like, ready to work, basically. My breaks can be, like, five to ten minutes or up to, like, 30 minutes I usually try not to take a break, for more than, like, an hour because like I know, like, once I've done something for an hour I don't want to stop you know if it's something enjoyable. But I give it a break between class. Yeah. Usually it's like 30 minutes at most. If I'm, like, eating lunch. It might be a little longer, since I'm, like, hanging out with my family too, but it's usually just a few minutes.*

## **Managing Distractions**

One thing that all participants agreed on is that they needed help to focus on their “primary task.” Participants had many strategies that helped them focus. Many strategies involved some physical activity. Helen shared that her strategy was to draw or doodle while listening to lectures:

*I'd be, like, drawing and then sometimes, sometimes teachers would get mad at me, but I do, like, pay attention. I'm, like, it just, it helps me focus - drawing. It's, like, it seems, like, it would distract you, but it really helps me focus like listening. So during, like, lectures and stuff that helps me to just do little doodles, or a color in a sketch or something. It's very relaxing and helps me focus.*

Lynne uses repetitive movement and sound as a strategy to help her focus. She shared:

*I fidget all the time. It helps me focus. All the time when I was the kid. I was the kid in middle school that people would get on to me about clicking my pen. And tap my*

*pencil against my, against the table all the time. Or, like I just said doing, like, this with my pen, like, constantly. Yes, I have my air pods case in my hand constantly just be, like, opening and closing it. Yeah, pretty much any little thing I can find I can get my hands on that'll keep my hands busy I grab it. I use them to, like, listen to my lectures and stuff like that. I usually, I have a pencil just kind of going okay, yeah.*

Lynne was frequently observed engaging in repetitive movements that created sound. Lynne was frequently observed repeatedly opening and snapping shut her earbud case during multiple interviews and engaging in other repetitive movements.

Music has always been a big part of Lynne's life, and she has adapted music as another strategy to focus, as she explained:

*Um, but another thing that helps a lot, helps me manage it a lot is music. Just because, like, when I was little, I figured out that listening to music helped me focus better just because I had background noise. And that's kind of followed me through even while I'm on medication and that still helps me focus a lot and like manage my ADHD symptoms. So that's the main one.*

*I figured out things that helped me focus more and because music has always been like a big part of my life like me and my dad are very similar in that way, like music is what ties me to different memories and stuff. like I already had such a big connection to music, and I loved it so much. I just listened to music when I was doing my schoolwork, and it helps me focus more and that just kind of continued on to even now, like if I'm doing an assignment, I cannot have it be silent. I need, like, a YouTube video playing in the background, or I need Songs playing or like I have the Harry Potter soundtrack playing. Most of the time, because there's no words and there's nothing for me to focus on. So I'm automatically, like, I've got this noise in the background, but I'm focused on my work.*

Text is a huge visual distraction for Dean, and he shared that “the one thing that I do avoid in my room is having writing on the walls, and no posters.” Lynne, on the other hand, uses social pressure to help with focus, choosing to study with another person or in a public location:

*Yeah, I feel like it was, like, studying with another person that's helpful because I'm really bad about studying on my own. There's someone else, they're holding me accountable for not getting distracted, which I appreciate, and I feel like it's the same reason I like to do my homework in public. I feel like if I don't get it done. And if I don't do it. I just look ridiculous. And like, I'm just sitting there doing absolutely nothing on my laptop for two hours.*

Most participants considered distractions, whether internal or external, to be an issue to avoid or control. Dean had a unique perspective on distractions. He views “distractions as an event.” Dean accepts that it is inevitable that he will become distracted and, unlike other participants, does not try to fight or control it.

*Well, I'm kind of a bit of more of the opinion that it's [distractions] uh okay. It's like I've said before, distraction is an event. You cannot prevent it. You can only make it more bearable or useful. So, always having either something to do or listen to that will not compromise your advocacy on the primary task to let you be distracted but still productive.*

Dean further shared how he finds ways to leverage his distractibility so that it doesn't interfere with productivity:



*Second thing that's useful is getting distracted on something else that is important and that's what the second monitor is for the second monitor always has something important. When I'm doing something important on the first monitor. Although when I say important it's not it's not always school important.*

*I do have distractions on my desk. I don't do stress balls and stuff. I do dice. Yeah, I do dice. Natural 20 [dice] seriously, natural 20. Yeah, just roll, just roll the dice every now and then. That's why I play Dungeons and Dragons. I like rolling dice, um, I do have a few distractions on my desk and they're all Dungeons and Dragons related oddly enough. It's my dice and my campaign book, all my team and my players handbook. That is one thing I can, if I'm like I said reading is a secondary task. And The players handbook, in particular, because it's not it's not a story. It's not a narrative. If it doesn't have to be absorbed in any particular order. So I can just open up to a particular random page and go, oh yeah, I wonder what blink does. That's a spell that I plan to you. It's a very good spell. To use sometimes You can just open up to random pages you can be like hermit. Now, I'm not gonna play a hermit noble. Yeah. Let's see what the noble background gives me So it's, it's nice. It's like meant to be distracted with this book.*

## **Tracking tasks**

Participants shared that another strategy they used was constantly checking applications such as Canvas and email. Participants used Canvas to track learning activities and work that needed to be done, keep themselves on schedule, avoid missing assignments, and find out what they were supposed to do next. Some participants used Canvas calendar or the to-do list feature or a combination of these tools. As Lynne explained:

*I feel like the main one [strategy] is just kind of, I'm just me constantly checking canvas, because then everything is in my head. And like I will know how many assignments. I have due that day and for what class they are due. Or like if I have a lab*

*due, I'll know like I have a lab due tomorrow, or I have a lab do next week or something. And so then I know, like, I need to set aside a certain amount of time to get that done like the day before it's due or so. Canvas has the one to-do page that has all of my assignments listed from, like, due soonest to when I have more time to do it. It just really helps me stay on track.*

Helen shared an issue with the strategy "I like to use Canvas to help me stay on top of my assignments. However, not all of my teachers put everything that's due into Canvas ahead of time." Helen, Ellyse, and Lynn all recognized this as a shortcoming of this strategy.

In addition to consistently checking Canvas, Lynne always has her email open in a browser tab to help her stay on top of course communications:

*I always keep a tab or at least I always try to keep a tab of my email open on my laptop so that when I get an email, I don't miss it. Because when I was in high school, I did have a lot of problems, like, missing emails, not like a lot of problems. But you know, I would occasionally miss some because I wouldn't check my email every day. And in college. I get a lot more emails, but usually they aren't very important, but I like to know that they're coming in anyway. So, I keep a tab open so it, like, sends me a notification. And usually when I'm doing schoolwork. I keep most of my tabs just school related and I try not to, like, get off topic.*

Study participants were all diagnosed with ADHD and, as a result, had a commonality in the symptoms they experienced. The expression of ADHD symptoms and the impact on each participant is unique to the individual. Through candid sharing by the participants, the previous findings paint a picture of the online experience for students with ADHD. While each participant shared different

experiences and management techniques, strong themes emerged during the research study, and the insights from these findings provided a foundation for discussion and recommendations.

## **CHAPTER 5: DISCUSSION AND RECOMMENDATIONS**

This chapter aims to address the findings of the three research questions: a) What perceived challenges, if any, do students with ADHD encounter when taking online courses, b) What perceived benefits, if any, do students with ADHD experience in online learning environments? and c) What strategies do students with ADHD use to navigate online learning environments? through the disability interpretive lens. The discussion focuses on the experience of students with ADHD in online courses and recommendations for online course design and teaching, as well as future research.

### **Learning with ADHD**

It is vital to understand how ADHD impacts students in online courses. ADHD is widely known and referenced in popular culture, but many people do not adequately understand this disorder and how it affects those who have it. ADHD has many misconceptions, and many individuals lack an understanding of the symptoms and the behaviors caused by the symptoms. ADHD is different for each person; symptoms manifest differently, and individuals mitigate them differently. However, common themes emerged from the participants' experiences through the research process.

Participants described experiences in their online courses that highlighted the struggles and the increased anxiety they felt in online

courses compared to in-seat courses. Individuals with ADHD struggle daily with executive dysfunction making simple daily activities difficult, contributing to higher anxiety levels than their neurotypical peers (Brown, 2017). The additional challenges faced by students with ADHD when taking online courses can further compound their anxiety and impact student motivation and success (Bolliger & Halupa, 2012).

Another common theme among the participants was the concept of a "good" ADHD day versus a "bad" ADHD day. The participants recognized whether it was a good or bad day but could not control or choose what type of day they would be having. The behaviors caused by ADHD are symptoms of the disorder, and like symptoms for other disorders, individuals do not have control over them. In much the same way that a person with Parkinson's disease does not control their limb tremors, a person with ADHD does not control their symptoms. While medications, therapies, and strategies can help mitigate symptoms in both, the underlying cause of the symptoms remains and never really goes away. The student with disabilities may have a good day where their symptoms do not affect them as much, requiring less support but still needing support, nonetheless.

Participants shared some of their challenges when asking for support in their learning. Accommodations for physical disabilities are commonplace, like ensuring an accessible desk in the classroom to

accommodate a student who uses a wheelchair or providing an interpreter for a deaf student. Most instructors would recognize the need for these accommodations and provide them without considering it to be coddling or hand holding. Optimizing online courses through design and teaching practices that benefit students with ADHD should be viewed similarly. All are mitigation strategies that help a student with a disability succeed in the course.

No one would point out to a person in a wheelchair that they struggle to get through a door because they are not using their legs. Conversely, many people do not think twice about pointing out shortcomings caused by ADHD, "you're not focusing," "you're so disorganized," "you're always late." It is obvious to see the effort a person in a wheelchair puts into overcoming a barrier, for example, something falling out of reach, blocked by stairs up to a door, or a door not wide enough to get a wheelchair through. When a person with ADHD encounters a barrier, the struggle is internal, and few can see or understand how hard that person is working to overcome their challenges. Instead, students with ADHD are told to focus more, try harder, and sit still. These comments can be discouraging and frustrating for students with ADHD and lead to self-incrimination and negative self-talk.

The participants in this study were willing to self-identify and share their diagnoses and experiences with the researcher. However, many students with ADHD do not share so freely. They may not register with an institution's disability office or may be reluctant to share their diagnosis. Reluctance to share may result from experiencing negative responses from instructors or peers. Due to misconceptions about ADHD, it is not uncommon for people to disbelieve someone when they report ADHD.

Participants shared times when they asked for mitigation support. The instructor mentioned that the participant did not need support because they were not disruptive and got good grades. One participant was told, "you have like a B minus in class, like, you're obviously learning just fine. So, you don't need all this extra stuff like I've seen that you don't need it."

ADHD, like other mental disorders, is an invisible disability. A student with a physical disability may have an easier time asking for and receiving accommodations. The student with an invisible disability has difficulty getting instructors and peers to recognize that they need additional support. Pushback from their community can increase self-doubt in students with ADHD and result in a reluctance to recognize and seek the needed support to succeed.

With approximately 8% of adults diagnosed with ADHD (NIMH, 2021), it is reasonable to expect that one or more students in a given online course will have ADHD. Instructors may not be able to identify their students with ADHD since many students with ADHD do not register with the disabilities office or self-identify with the instructor. Intentionally designing and teaching online courses that support students with ADHD helps all students succeed, whether or not they are neurotypical.

Participants shared that they often heard things like, "and "all you have to do is try harder. You're just not trying hard enough." Typical behaviors of students with ADHD are unintentional, and the students/individuals cannot decide to stop having symptoms or stop needing mitigation strategies. It is difficult for neurotypical people to comprehend the struggles individuals with ADHD have in doing the simplest of everyday tasks.

The participants all struggled with the format of synchronous online courses. The participants found it valuable to interrupt the instructor during a lecture to ask questions and clarify concepts that they did not understand. Participants shared that the online format made interrupting the instructor more difficult. Sometimes, by the time the question was asked, the participant had forgotten the question or lost the lecture thread. It is not unusual to say something



to a person with ADHD, and seconds later, they have forgotten what was said. This is not necessarily due to lack of attention or not hearing the person but rather due to their poor working memory. Students with ADHD have difficulty retaining the short bursts of information required to maintain a focused conversation. This is one of the reasons students with ADHD struggle to follow simple verbal instructions, especially if those instructions are multi-step (Brown, 2017).

As one participant shared, she often encountered this problem when working on math homework, "I know what to do, but I just can't remember it. I'm like, it's not like I just forgot it. It's just like I know it is there, for some reason I can't access it right then." Students with ADHD do not fail to learn information; they fail to retrieve information when needed for a specific task such as an assignment, quiz, or exam (Brown, 2011, 2017).

Participants commented on the various times that they submitted late assignments or missed assignments altogether, procrastinated on projects, showed up late for class, or missed appointments. This was observed first-hand when all participants missed one or more of their interview appointments, even after receiving reminders from the researcher. Individuals with ADHD are often late for appointments, class, and turning in assignments, not because they do not care or think it is not essential, but due to their

executive dysfunction's impact on working memory, time management, and organization.

One participant discussed the aggravation of spending more time locating the assignment instructions and deadlines than they spend completing the assignments due to a poorly organized or structured course site. They would prefer one place to go to find all the needed information. People with ADHD are inherently disorganized primarily due to their executive dysfunction. Workspaces, backpack packs, and personal spaces are typically messy and chaotic, creating an environment that makes it easy to lose track of or misplace essential items. Participants struggled with finding the proper information in their online courses.

Executive functioning also allows an individual to regulate negative emotions such as disappointment, frustration, anger, and worry. Participants commented that they could become frustrated, angry, and more anxious when they have difficulties in class, often due to their poor working memory or lack of time management and organizational skills. It was not uncommon for these feelings to develop into repetitive negative self-talk for the participants. As the negative feelings increase, so does the negative self-talk, and the negative self-talk reinforces the negative feelings, generating a harmful cycle that may be hard to break. Examples of negative self-talk participants

share included: "I am a bad student," "It is so easy for everyone," "I am awful at math," "It takes me forever to learn anything," "There's gonna be a lot of railroads today," "I just can't do it, I'll never be able to do it," and "Why bother, I'll just mess it up again" and "ADHD sucks."

These emotions can be overwhelming and difficult for individuals with ADHD to process and move past (Brown, 2017). Something that seems trivial to neurotypical people may completely throw off the day for a person with ADHD. One of the participants shared how she spent hours looking for a top that did not get put away where she thought, which threw off the rest of her day and put her in a state where the only thing she is thinking of is "where is that top?" She was unable to move on to other tasks. A neurotypical person might look for five minutes then decide to wear a different top and go on with their day. The participant's feelings and thoughts became so overwhelming and pervasive that she could think of little else. This situation and resulting intruding thought patterns could turn a typical ADHD day into a "bad" ADHD day.

All participants in this study admitted to varying degrees of anxiety and specifically mentioned their online courses as a significant source of anxiety. The constant grappling with poor executive function skills can lead to increased anxiety. Participants commented that the

constant checking of the course site, the inability to connect with instructors and ask for help, frustration with feeling like they were missing something, and "constant searching for what needs to be done" added to their stress and anxiety. None of this was surprising since anxiety disorders are comorbid in approximately 32% of college students diagnosed with ADHD (Anastopoulos, et al., 2018, Prevatt, et al., 2015), and students with ADHD in an online course tend to have yet even higher levels of anxiety as reported by Brown (2017). High anxiety levels can make emotional regulation all that more difficult.

Depression and ADHD also frequently co-occur with studies reporting depression in individuals with ADHD ranging from 18.6% to 53.3% (Katzman, et. al., 2017). Participants in the study spoke openly about their anxiety, in general, and specifically related to their online courses. However, they did not reference depression, even though depression and anxiety in students increased significantly due to the Covid-19 pandemic (Pragholapati, 2020). It is unclear whether this omission was due to stigmas surrounding depression or depression was not part of the participants' experience.

The participants were aware that their ADHD contributed to sub-optimal performance in their course but often lacked the self-regulation to change their thought patterns and behaviors to improve their performance. Their poor performance led to frustration and

disappointment in themselves, which started unproductive thought patterns and negatively impacted their motivation. This lack of motivation further inhibited their ability to succeed in their online classes.

Students with ADHD live with their symptoms inside and outside the classroom. The participants were keenly aware of their differences from their neurotypical peers, commenting on how they struggled to complete tasks that it seemed like their friends and classmates appeared to accomplish effortlessly. This awareness of their struggles would again start negative self-talk, leading to higher anxiety, demotivation, and reduced productivity.

The student with ADHD is not the only one aware of the differences. ADHD symptoms can be visible to other students, such as stimming/fidgeting, zoning out, and poor time sense/time management. Several participants commented that many of their instructors and peers perceived ADHD symptoms as "personal flaws" and had common misconceptions of the disorder, leaving the participants feeling judged. One participant said, "I just wish more people but especially my teachers knew more about ADHD and understood it better. It would be really nice if, when I like, I let my teacher know that I have ADHD. They, like, they would take some time to learn what it really is. You know not what they think it is, even

if it means just talking with me to understand what my ADHD is like for me."

The participants shared that a task (reading, lecture, a conversation, homework, writing) may begin as somewhat interesting, but then they quickly become bored with the task. "My mind is going 1000 miles per hour" with new thoughts constantly intruding. They all struggled to maintain focus in these situations and often found their thoughts wandering to more interesting or exciting topics. When they focused back on the original task, they did not know how long they had been off-task. The participants referred to this phenomenon as "zoning out." The ADHD brain needs interesting input all the time, the critical word being interesting, and is constantly seeking stimulation whether in the form of physical or mental sensory input.

Many participants shared that "conversations and lectures can be especially challenging." Individuals with ADHD can easily lose a conversation thread and may not register what is said. During interviews, several participants shared that they would often think about something different or what they wanted to say next during lectures and miss important context or cues. If the person with ADHD or the instructor does not plan for or create breaks, the ADHD brain may take a break automatically and at an inopportune time. Focus

strategies may also aid in helping students with ADHD concentrate during conversations and lectures.

The researcher frequently observed participants engaging in focus strategies during interviews, often in the form of stimming or fidgeting. For example, one of the participants stimmed by clicking their AirPods case open and closed, one created miniature D&D figures out of random materials on their desk, and another drew pictures while talking with the researcher. Neurotypical people may view these activities as rude or as an indication of boredom/lack of interest and ask the person with ADHD to stop the activity. Unfortunately, this request can have the opposite effect on the desired outcome. The ADHD brain deprived of physical focusing strategies may turn to mental stimulation by daydreaming or zoning out.

A surprising outcome of this research was that the synchronous online lectures, the most structured part of some courses, were beneficial to the participants. Still, they universally expressed dislike for the online synchronous lectures. The synchronous zoom lectures provided structure in the same way as the in-seat classes did and that the asynchronous classes did not. The structure of logging in at a particular time and day helps establish a routine around learning and doing coursework as well as jump-starting their day. The requirements of logging in to the synchronous lectures and participating in the

course site helped provide motivation to keep up with the coursework. However, they intensely disliked the format and restrictions of the required meeting time. One participant expressed that the only benefit of an online course is having the freedom and flexibility to do your work when it's convenient for you; being required to meet at a specific place and time defeats that advantage.

All participants found it hard to focus on the synchronous lectures and participate in the discussions. The need to pay attention to who was about to ask a question took the participants' focus away from the discussion and presented information. Participants would often forget their questions if there were long delays between when they thought of a question and the opportunity to ask it. Another aspect that may have added to the difficulty of attending zoom lectures was the inability to use focus strategies when instructors required students to be on camera during class. For example, one of the participants mentioned that they would fold clothes, pick up their room, or reorganize shelves during lectures which helped them focus. The use of focus strategies on camera could have been perceived as inattention or distraction by classmates and instructors.

The participants found the freedom of online courses appealing; however, online courses are not the best fit for them. Their executive function deficits put them at a considerable disadvantage in the



relatively unstructured online courses. The participants found motivation in their relationships with instructors but found it challenging to connect with their instructors in the online environment. As one participant stated, "if you have ADHD, there are a lot of things that you should know before you take an online course" (APPENDIX E). Designing online courses to provide more structure and use best practices would help mitigate these disadvantages for students with ADHD.

### **Recommendations for Supporting Students with ADHD**

During the interviews all the participants shared the many struggles they experienced in their online courses. They found the format and structure of the online course to be challenging, along with some of the instructors' teaching practices. The participants shared simple suggestions for changes that would better support their learning (APPENDIX F). Many of these suggestions are supported by research and quality course design principles.

The participants used routine, structure, and reminders in different ways to help compensate for poor working memory. For example, several participants used the routine of going to a specific room in the house or place on campus at a specific time/day to study. When one participant was sitting at her desk in her room, she knew it was time to "go to school." She only accessed her classes and studied

while sitting at her desk. Another participant used her bedroom as the designated location for coursework. Students with ADHD need to find a location that supports their ability to focus and learn in online courses. This location could be a coffee shop, a place on campus, or an area in their home. The location itself is not essential; it is the routine of going to that location to do coursework and only coursework.

Participants believed that it was necessary to maintain routine and structure, even if they were not as productive as they wanted. Another strategy used was calendar reminders and constant checking of course sites, emails, and announcements. Implementing these strategies on their own was not always successful. Online instructors can help their students with ADHD by establishing routines and structure within the course and building in reminders.

In face-to-face courses, the meeting time and place help provide routine. Instructors often reinforce routine and provide structure within the classroom, along with reminders. Often, instructors let students know what to expect to be doing that day/week at the beginning of class. At the end of class, they will let students know what to accomplish before the next class period and remind them of upcoming major assignments and important due dates. Sometimes these reminders can occur as often as two to four times a week, depending

on how often the class meets. This type of in-class structure and these frequent, little reminders are often missing in online courses.

Providing, at a minimum, weekly reminders of coming assignments to online students would help keep students with ADHD on track and may reduce the number of late or missing assignments. Some participants expressed that it would have helped them to have incremental reminders for major assignments to keep them on track and help prevent procrastination. Instructors and course designers can help students stay on track by providing reminders starting two to three weeks prior to the due date and more frequently as the due date approaches.

Several participants commented on feeling frustrated when they had to look in multiple places in the course site to find needed information, including but not limited to course content, assignments, and due dates. One participant complained of spending more time looking for assignment details and due dates than they spent completing the coursework.

A course site with a student-centric focus can help reduce student frustration caused by hunting for needed information. Course sites that use well-established online course design principles group all materials students need for a particular learning unit in one area (Palloff & Pratt, 2007). When students go to that area, they know they

can find everything they need to complete learning activities and assessments.

Participants found it easier to stay on top of coursework in courses that provided a detailed "course schedule" table listing all learning activities and assessments with corresponding dues. The course schedule or table of activities can be placed in the syllabus or as a web page in the course site but preferably in both locations to accommodate different learning needs. Note that a course schedule table does not negate the need for frequent reminders, as previously discussed.

Students with ADHD often become overwhelmed and have increased anxiety levels from high-stakes assessments in the form of major or long-term projects. Instructors who scaffold large projects by implementing incremental dues dates may allow students with ADHD to maintain manageable anxiety levels and avoid feeling overwhelmed. Students with ADHD benefit by reducing the ability to procrastinate on the overall project to the very last minute.

Not accepting late work or a lack of established late work policy was another source of frustration for the participants. Providing a clear, detailed late work policy explains the consequences of late submissions to students upfront. This gives the student with ADHD the opportunity to get assignments in and not worry about getting a zero

and may help reduce the negative emotional consequences of performing poorly in the course.

Multiple participants reported asking for an extension on an assignment. The instructor denied the extensions because they did not recognize that the need stemmed from an executive functioning deficit. If a student with ADHD asks for an extension on an assignment, this should not be seen as a failing on the student's part. Requesting an extension is a function of the student recognizing that they need additional time to complete the assignment and negotiating that with the proper authority. In a professional setting, negotiating deadlines is a common practice. Communicating the challenges and negotiating for an extension is an accepted practice in the workplace and a valuable life skill and should not be discouraged in a learning environment.

All the participants spoke of the importance of taking mental breaks. Incorporating breaks in the lecture keeps the ADHD brain focused on the lecture or discussion. During lectures, a short pause followed by the question, "Is everyone with me?" may be enough to bring students with ADHD back from a mental break or prevent the mental break from happening.

Regardless of modality, research has shown that students retain information better when instructors break lectures into short segments

or chunks of content (Greer et al., 2013). Chunking a lecture allows students to process the current information before introducing new information. By chunking, instructors incorporate "mind breaks" into their lectures for the ADHD brain. For example, instructors or course designers can create several mini-lectures in an asynchronous course instead of one long video.

As discussed earlier, all participants utilized focus strategies during interviews and talked about various techniques to keep themselves focused. As long as the focus strategy is not disruptive, students with ADHD should be allowed to apply these strategies during class. In a face-to-face class, the student with ADHD may be drawing/doodling, knitting/crocheting, pen twirling, leg bouncing, or employing a fidget device. Students with ADHD may engage in the same focus strategies they would employ when attending a synchronous online lecture as they do during their face-to-face lectures. However, participants also reported re-organizing their desks, sorting/folding clothes, or doing general light housekeeping during their online courses.

Participants who were required to be on camera felt self-conscious engaging in their focus strategies during class. The pressure to be on camera sometimes inhibited their ability to maintain mental focus on the lecture. Many people believe that the only way a student

can focus in a synchronous lecture is by sitting still and looking into the camera. Students are aware of this belief and will comply. However, the student with ADHD will appear to be attentive when sitting still in front of a camera when they are really "zoning out" and missing content. Camera policies may result in the student expending mental energy to appear attentive rather than using their strategies to focus. A student who has their camera on and is looking into it is not necessarily engaged in the course material. A way to reduce the pressure for students with ADHD is to allow students to choose whether to have their cameras on and use other methods to monitor engagement.

A better way to determine student engagement during lectures is to incorporate active learning techniques. Polls and quizzes embedded in the lecture can provide knowledge checks for both the instructor and students. Seeking feedback from the students on pacing lets the instructor know if the students are keeping up with the information provided. Interspersing class discussions with lectures, either as a class or in small groups, helps chunk the material and provides a more stimulating learning environment.

Participants regularly commented on how much direct communication from instructors influenced their motivation in the course. The participants felt "seen" and a personal connection was

created along with accountability when they knew their instructor was "watching" them. Reaching out through a short email after a student with ADHD has a late or missed assignment or has a noticeable decline in performance is a way to establish a personal connection. Additionally, this puts the student on alert that the instructor has noticed them, and the student is being held accountable.

Emotional regulation is difficult for students with ADHD. They tend to focus on negative emotions and their perceived shortcomings; offering positive reinforcement may benefit their self-esteem and motivation in the class. Instructor interaction with a student with ADHD may help provide external validation, improve confidence, and increase the student's motivation to perform well in the course. A simple check-in email or assignment feedback may help get students with ADHD out of their heads and interrupt negative thought patterns.

One participant mentioned their realization that it was typical for them to perform poorly on exams and tests but that they did well in other parts of the course. They felt that they knew the material but did not have a way to prove it. Incorporating different types of assessments into the course can help diverse students demonstrate knowledge of the course content. Low-stakes assessments such as knowledge checks, daily reflections or journaling, and higher-stakes



assessments such as group projects, papers, presentations, or case studies are all examples of alternatives to exams and tests.

Course design principles that benefit students with ADHD are also beneficial to their neurotypical peers. Characteristics such as instructor interaction and course organization and structure directly correlate to student success and satisfaction in the course. Making courses better for students with ADHD will make them better for all students in ways that correlate to increased student success and retention (Greer et al., 2013).

### **Recommendations for Future Research**

This multi-case study provided insight into how students with ADHD experience online learning environments in a large Midwest university. This study also raised additional questions that warrant future research. For example, a future study should explore how students with ADHD who elect to take online courses experience online learning environments. This research occurred at an unprecedented time in higher education, during the height of the coronavirus pandemic. The pandemic forced higher education institutions to close campuses, suspend face-to-face courses and only offer courses in an online format. Many instructors and students were ill-equipped to move to remote teaching and learning. None of the participants in this

study had chosen to enroll in online courses; face-to-face courses were not an option.

Another area of study could be the relationship between anxiety and student performance and satisfaction of students with ADHD in online learning environments. Several participants spoke of having anxiety and how taking online courses increased their anxiety. Prevatt, et al., (2015) estimate that anxiety is comorbid in 20 - 30% of adults with ADHD.

This study revealed that the participants experienced varying challenges in their online courses related to their ADHD. More than one participant commented that it seemed like they were teaching themselves in their online courses. Students in online courses must take more ownership of their learning which can increase stressors for already stressed students. More research is needed to understand the extent to which the challenges that ADHD presents for students influence their success in online courses.

This research was conducted based on the student's perspective of online learning environments. Exploring the instructor's perspective warrants further research. For example, more research is needed to study the instructors' challenges in implementing sound teaching practices in their courses. The results of this study strongly indicate

that the online courses the participants were enrolled in lacked these best practices.

Another needed area of study is exploring the attitude of instructors towards teaching courses in an online format. This research was from the student perspective and several commented on the level of instructor engagement in the course and how it affected the participants' engagement in the course. One of the participants commented that she is more engaged and does better in courses where the participant perceives that the instructor likes teaching and is enthusiastic about the subject. More insight is needed from the instructor perspective.

Additionally, further exploration of instructors' attitudes towards and perceptions regarding students with ADHD would add to the literature. Researching instructors' perspectives towards accommodations for students could help remove or reduce barriers to learning for students with ADHD. Further research is needed to understand the efficacy of interventions that may benefit students with ADHD in online courses.

## APPENDIX A

### **Project Title:** Students in Online Courses

Hi,

As we begin the Fall semester, we hope you will take a few minutes to participate in a research study and answer a few questions about students who are enrolled in online courses at MU. You are receiving this survey request because you are currently enrolled in a fully online course.

You must be 18 years old or older to participate and your participation is completely voluntary. If you agree to participate, you may choose not to answer any question. You may leave the survey at any time without consequences to you. Your responses to this survey are anonymous unless you choose to self-identify.

If you have questions or concerns about this initiative or this research study survey, please contact the PI of the study, Cathryn Friel at [frielc@missouri.edu](mailto:frielc@missouri.edu) and (573) 882.7123

If you want to talk privately about your rights or any issues related to your participation in this study, you can contact University of Missouri Research Participant Advocacy by calling 888-280-5002 (a free call) or emailing [MUResearchRPA@missouri.edu](mailto:MUResearchRPA@missouri.edu).

**The survey can be accessed here: <<Insert link here>>>.** If clicking on the link does not take you to the survey, please try copying the URL into your browser.

Thank you for your participation,

Cathryn Friel

## APPENDIX B

### Consent to Participate in a Research Study

The purpose of this research is to learn what things may help or hinder students with ADHD when taking online courses. Information uncovered in this study may help faculty design, develop, and teach online courses that better address the needs of students with ADHD. This study may also provide important information to help parents, advisors, and students with ADHD determine if online courses are an appropriate format.

If you agree, you will be asked to take a survey, participate in 2 -3 interviews lasting between 30 – 40 minutes, and an observation session. Interviews will either be conducted in-person where COVID protocols will be in place or through virtual Zoom sessions. You may decide the format of the interviews, Zoom or in-person. We are also requesting access to student information, assignment grades and overall course grades for only the online course you are currently enrolled.

You must be 18 years old or older to participate and your participation is completely voluntary. If you agree to participate, you may choose not to answer any question. You may leave the study at any time without consequences to you. Participating in the study will subject you to no risks greater than those you normally encounter in everyday life.

All of your responses will be kept anonymous. Only members of the research group will see your responses, but no one will be able to identify you as the respondent. Instructors will not have access to any of this information.

If you have questions or concerns about this initiative or this research study survey, please contact:

Cathryn Friel at [frielc@missouri.edu](mailto:frielc@missouri.edu) and (573) 882.7123

If you want to talk privately about your rights or any issues related to your participation in this study, you can contact University of Missouri Research Participant Advocacy by calling 888-280-5002 (a free call), or emailing [MUResearchRPA@missouri.edu](mailto:MUResearchRPA@missouri.edu).

You will be given a copy of this consent form. Please keep it where you can find it easily. It will help you to remember what we discussed today.

**Signature of Participant**

**Consent to Participate in Research**

By signing my name below, I confirm the following:

- I have read/had read to me this entire consent form.
- All of my questions were answered to my satisfaction.
- The study’s purpose, procedures/activities, potential risks and possible benefits were explained to me.
- I voluntarily agree to take part in this research study. I have been told that I can stop at any time.

|                            |             |
|----------------------------|-------------|
|                            |             |
| <b>Subject’s Signature</b> | <b>Date</b> |

## APPENDIX C

### Recruitment (Screening) Survey

1. How do you identify your gender?
  - a. Male
  - b. Female
  - c. Other, please specify:
  - d. Prefer not to answer
  
2. Which category below includes your age?
  - a. 17-18
  - b. 19-20
  - c. 21-22
  - d. 23-24
  - e. 25-26
  - f. Over 27
  
3. Are you African American or Black, Asian, American Indian or Alaskan Native, Asian, Caucasian, Latino or Hispanic, Native Hawaiian or other Pacific Islander, or some other race?
  - a. African American or Black
  - b. Asian
  - c. American Indian or Alaskan Native
  - d. Caucasian
  - e. Latino or Hispanic
  - f. Native Hawaiian or other Pacific Islander
  - g. Other, please specify:
  - h. Prefer not to say
  
4. Which of the following categories best describes your working status?
  - a. Not employed
  - b. Employed, working 1-10 hours per week
  - c. Employed, working 11-20 hours per week
  - d. Employed, working 21-30 hours per week or more hours per week
  - e. Employed, working 30 - 40 hours per week or more hours per week
  - f. Prefer not to say
  
5. Have you taken any online courses with other institutions?

- a. Yes
  - b. No
  - c. Prefer not to say
6. Including this course, how many online courses have you taken at this or any other institution? Please do not include self-paced courses you have taken.
- a. 1 (one)
  - b. 2 (two)
  - c. 3 (three)
  - d. 4 (four)
  - e. More than 4 (four)
7. Have you ever been formally diagnosed with any of the following?
- a. Asperger's Syndrome
  - b. Attention Deficit/Hyperactivity Disorder (ADHD)
  - c. Attention Deficit Disorder (ADD)
  - d. Auditory Processing Disorder (APD)
  - e. Brain Injury
  - f. Learning Disability (Dyscalculia, Dysgraphia, Dyslexia, Written Expression Disorder)
  - g. Obsessive-Compulsive Disorder (OCD)
  - h. Post-traumatic Stress Disorder (PTSD)
  - i. I have never been diagnosed with any of the above

(Skip to end of survey if the answer for #5 is "i")

8. Who made your diagnosis?
- a. Psychiatrist
  - b. Psychologist
  - c. Physician
  - d. Nurse Practitioner
  - e. Social Worker
  - f. Other Licensed Counselor or Therapist (occupational therapist, speech and language therapist, marriage, or family therapist)
9. Would you be willing to participate further in this study? Further participation may include 2 -3 short interviews and another short survey.
- a. Yes, I am interested in participating further.
  - b. No, thank you.



- c. Maybe, I would like to learn more about what further participation would involve.

(Skip question #8 if the answer for #7 is "b")

10. Please provide the following contact information to receive information about participating further in the study.

- a. Name \_\_\_\_\_
- b. Email \_\_\_\_\_  Preferred method
- c. Phone \_\_\_\_\_  Preferred method

## APPENDIX D

### Semi-Structured Interview Protocol

**Interviewer:** Cathryn Friel

**Participant Pseudonym:**

**Date and Time of Interview:**

**Location of Interview:**

#### **Instructions**

Good morning (afternoon). My name is Cathryn Friel. Thank you for meeting with me. I am doing this study because I would like to hear about your experiences and perceptions of taking an online course. I would like for you to be honest about your experience and feel comfortable saying what you really think and how you really feel.

*(Video recording instructions)*. If it is okay with you, I will be recording our conversation. This is so that I can get all the details but at the same time be able to carry on an attentive conversation with you. I assure you that all your comments will remain confidential. I will be compiling a report which will contain all participant comments without any reference to any one individual.

#### **Interview Questions**

##### *General/Ice Breakers*

Tell me something about yourself (family, hobbies, interests, job).

Why did you choose MU?

##### *ADHD in General*

Tell me about when you first learned that you had ADHD.

Can you describe for me what it is like having ADHD?

How has having ADHD affected your life – home, school, relationships?

Tell me about strategies or techniques you use to manage your ADHD symptoms.

How do your instructors or classmates react when they learn you have ADHD?

### *ADHD and Online Courses*

Why did you decide to take an online course?

Tell me what you have noticed about taking online courses when you have ADHD.

What factors do you think contribute to/hinder your success when taking an online course?

What is your biggest challenge(s) in your online course(s)?

Based on your experiences, what, if any, advantages are there in taking an online course?

Based on your experiences, what, if any, disadvantages are there in taking an online course?

Think back to a course that you did well in. Why do you think you were so successful in that course?

Can you describe the effectiveness of any academic accommodations that you may have received or are currently receiving for your online course(s)?

Can you explain any differences there may be between accommodations you receive in your online course and face-to-face course?

Tell me about the best/weakest online course you have taken. What made it work/not work for you.

Describe your ideal online course.

What advice would you give a fellow student with ADHD who is thinking about taking an online course for the first time?

### *Studying*

Can you walk me through a typical study session for your online course?

How do you feel when you get ready to study/are studying for your online course?

*Describe your ideal study environment.*

What things help/hinder you when you are studying?

How do you approach large projects?

How do you feel when you are about to begin a large project/working on a large project?

Reflect on when you have your most productive study sessions. Why do you think/what makes those times [are] so productive for you?

*Final thoughts*

If you could advise your professors when they are creating their online courses, what advice would you give them?

What else would you like to share?

What would you like the world to know about having ADHD and taking online courses?

You mentioned ....., can you tell me more/give an example/describe a situation when...

You talked about....., what usually happens then?

## APPENDIX E

### things to consider

# BEFORE YOU ENROLL

in an  **online course** **ADHD EDITION**

The convenience and flexibility of online courses make them very appealing to many students, but are they right for you, the student with ADHD?

Online courses often require students to take more responsibility for their learning which means taking extra steps to manage, organize, and understand course content and activities.

### Motivation

An online course will require you to have higher levels of self-motivation. You don't have the physical presence of your instructors and peers to help keep you motivated.



### Organization & Planning

You will need to gather all the information from the course site to complete your assignments and determine the best way to work through everything.



Online courses typically do not have set meeting times so you will have to create your own schedule and routines to work through the course materials and do the homework assignments.

### Prioritization

Many online courses have all the course materials available at the beginning of the semester, so you will need to determine the best order to complete course work and activities. You will also need to balance online course work with in-seat course work.

ADHD disrupts normal functions in the area of the brain that controls executive function.

What is executive function?

It's the part of the brain that helps you:

- Organize & Plan
- Pay attention
- Prioritize
- Shift focus
- Remember details
- Manage Time
- Use past experiences
- Regulate your emotions

# SUPPORTING online learners

## ADHD EDITION



### What is ADHD\*?

ADHD disrupts normal functions in the area of the brain that controls executive function.

**What is executive function?** It is the part of the brain that helps students to:

- Prioritize
- Manage time
- Organize & Plan
- Remember details
- Pay attention
- Shift and stay focused
- Use past experiences
- Regulate their emotions

ADHD results in unintentional behaviors that can be perceived as the student being lazy, rude, or uninterested in the course.

### You can help students with ADHD succeed by:



- Grouping all materials students need for a particular unit in one place
- Posting a detailed course schedule of activities with due dates



- Chunking recorded lectures & materials
- Incorporating different types of assessments
- Using multiple assessments throughout the semester



- Making personal connections which help motivate students with ADHD



- Providing frequent and regular reminders for course activities and assignments
- Scaffolding large projects with incremental due dates
- Accepting late work as outlined in a detailed late work policy

ADHD is an invisible disability. You may or may not be aware that you have ADHD students in your course!

\*Attention-Deficit/Hyperactivity Disorder (ADHD)

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## **VITA**

Cathryn Friel was born in Kansas City, Missouri, when she moved with her family to Columbia, Missouri, at the age of four. After completing high school at David H. Hickman High School in Columbia in 1981, she pursued her undergraduate degree at Truman State University in Kirksville, Missouri, earning a Bachelor of Science in Business Administration with a minor in Marketing in 1986.

After graduation, Kathryn lived and worked in Missouri, Illinois, and Indiana holding various positions in the private sector. In 2000, Kathryn moved back to Columbia, Missouri, to be with family. The Division of Information Technology (DoIT) at the University of Missouri – System hired Kathryn as a Storage Area Network Manager. Kathryn held several positions in the DoIT, including System Administrator, Business Analyst, and Database Administrator.

In 2002, Kathryn decided to go back to school to earn a graduate degree from Missouri State University, Springfield, Missouri. Kathryn's primary reason for choosing Missouri State was because, at the time, Missouri State was one of the few institutions offering graduate degrees in a hybrid online format. As she continued to work full-time at the University of Missouri while attending Missouri State, earning her Master of Science in Computer Information Systems in

2004, Cathryn needed the flexibility that the hybrid-online format afforded her.

While working for the University of Missouri, Cathryn was also an adjunct faculty member for Columbia College, a four-year private higher education institution located in Columbia, Missouri. Cathryn taught undergraduate computer science courses in the Department of Computer Science and Mathematics from 2008 until 2021.

From 2010 until the present, Cathryn has worked as an Instructional Designer at the University of Missouri. Although Cathryn provides instructional design services for instructors regardless of course modality, her passion and expertise lie in designing and developing online courses. Additionally, Cathryn has been working with higher education institutions around the country as an instructional design consultant since 2019.