SYMPTOM PROFILES AND SERVICE UTILIZATION AMONG COLLEGE STUDENTS WITH SYMPTOMS OF ATTENTION-DEFICIT/HYPERACTIVITY DISORDER

A Dissertation by

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Master of Arts, Wichita State University, 2020

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Submitted to the Department of Psychology
and the faculty of the Graduate School of
Wichita State University
in partial fulfillment of
the requirements for the degree of
Doctor of Philosophy

July 2023

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ACKNOWLEDGEMENTS

First, I would like to thank my family and friends for their endless support. I would especially like to thank my husband, Connor, whose unwavering love, humor, and encouragement helped me navigate this journey—I could not have done this without you, and I would not have wanted to do it with anyone else by my side.

I would also like to thank my advisor and chair, Dr. Samantha Slade, for her guidance, wisdom, and support she has offered to help me reach my professional and personal goals. I will forever be grateful that she accepted me into her lab and made me feel right at home. Thank you, also, to my committee members: Drs. C. Brendan Clark, Rhonda Lewis, Rachael Goodman-Williams, Zachary Blackhurst, and Jodi Fiorini. Your time and engagement in reading this document, as well as the thoughtful feedback and encouragement has been greatly appreciated.

ABSTRACT

College students with ADHD symptoms and co-occurring difficulties, like functional impairments and mood disorders, have complex symptom profiles marked by unique combinations of comorbid presentations. College students with ADHD often underutilize support services on campus. Subgroups characterized by multiple dimensions may differ in their treatment utilization, and identifying such subgroups is an important first step in enhancing treatment-related selection, implementation, and effectiveness. The purpose of the present study was to identify subgroups of college students with symptoms of ADHD and co-occurring difficulties using latent class analysis (LCA) and understand how service utilization behavior varied among these groups. A sample of 327 adult college students completed an online survey composed of measures to assess ADHD and internalizing symptoms, functional impairment, alcohol use, and service utilization. Based on the LCA, a three-class model was identified as the final solution; the three latent classes that were identified varied both by impairment levels and ADHD symptoms. The results are important in the following ways: ADHD was frequently comorbid with other internalizing disorders; college students reported moderate to high levels of functional impairment particularly in regard to work/school functioning; and students with differing levels of impairment and ADHD symptoms utilized services differently—often those with higher levels of impairment were more likely to utilize services. Discussion of implications, limitations to the study, and future research directions were also included.

TABLE OF CONTENTS

Chapter Page

I. INTRODUCTION 1

Purpose of the Study 3

II. LITERATURE REVIEW 4

What is ADHD? 4
History of ADHD 4
Prevalence 6
Progression of ADHD 7
Causes of ADHD 9
Genetic Risks 9
Environmental Factors 10
Neurobiological Factors 10
Co-occurring Difficulties 11
Emotion Dysregulation 11
Social Impairment 12
Academic Impairment 14
Problems in Daily Living Skills 15
Monetary Costs 16
Comorbid Psychological Disorders 17
Distinct Symptom Profiles among Individuals with ADHD 18
Summary 19
Interventions for College Students with ADHD 20
Medication Management 20
Non-pharmacological Interventions 22
Cognitive behavioral therapy. 22
Disability services. 24
Combined Treatment 25
Summary 26
Service Utilization 26
Medication Management 26
Counseling Services 28
Academic Supports 28
Factors that Influence Service Utilization 29
Demographic differences 29
Stigma 29
Comorbid Psychological Disorders 30
Co-Occurring Functional impairments 31
Summary 32
The Current Study 32

TABLE OF CONTENTS (continued)

Chapter Page

III. METHODOLOGY 36

Participants 36
Measures 38
ADHD Screener 38
Demographic Questionnaire 39
ADHD Symptoms 39
Functional Impairment 40
Internalizing Symptoms 40
Alcohol Use 41
Service Utilization 41
Procedures 42
Data Analysis Plan 43

IV. RESULTS 46

Research Question 1: What subgroups of college students with symptoms of ADHD and other co-occurring difficulties exist? 46
Research Question 2: Do demographic variables vary based on subgroup membership? 50
Research Question 3: Do subgroups identified by the latent class analysis vary in their service utilization behavior during college? 54
Summary of Results 57

V. DISCUSSION 59

Key Findings 59
Latent Classes 59
Demographic Variables 62
Service Utilization Behavior 64
Implications 66
Limitations 71
Conclusions 73

REFERENCES 74

APPENDICES 92

LIST OF TABLES

Table		Page
1.	Research question and analysis utilized	35
2.	Demographic characteristics	37
3.	Goodness of fit indicators for latent class models	47
4.	Logistic regression odds ratio results for the 3-class LCA with covariates and the moderate impairment with mild ADHD symptoms (Moderate with Mild ADHD/Class 3) as the reference group	53
5.	Descriptives of service utilization variables	54
6.	Comparisons of service utilization behavior across classes	56

LIST OF FIGURES

Figure Page

1. Information criteria for unconditional latent class models……47

2. Item probability plots of latent class candidate models……48

3. Probability plot for parent income covariate……53

CHAPTER I

INTRODUCTION

Attention-deficit/hyperactivity disorder (ADHD) is a neuropsychological disorder marked by deficits in the executive functioning system with three different subtypes: predominantly inattentive, predominantly hyperactive/impulsive, and combined (American Psychological Association [APA], 2013). ADHD is highly heritable, and its onset occurs in childhood, though symptoms persist throughout adulthood (Barkley, 1997). These symptoms can have a significant negative impact on individuals' social, academic, and occupational functioning across the lifespan.

The college years represent a unique period of time in which young adults navigate the transition between adolescence and early adulthood. This transition can be particularly difficult for college students with ADHD who face a "perfect storm" of academic, social, and psychological challenges in college (Anastopoulos & King, 2015; Vasko et al., 2020). College students with ADHD tend to have difficulty with time management, concentration, planning and decision-making, and regulating their behaviors (Canu et al., 2021). Furthermore, they tend to have lower self-esteem and poorer social skills compared to same-aged peers (Shaw-Zirt et al., 2005). Together, these problems often culminate to lower grades and premature drop out, lower occupational achievement, reduced social adjustment, and comorbid psychological disorders, such as anxiety, depression, and substance use (Antshel, 2020; Cherkasova et al., 2022; DuPaul et al., 2021; Weyandt & DuPaul, 2013).

Both psychopharmacological and non-pharmacological treatments are effective in the management of ADHD (Shier et al., 2013; Sibley et al., 2014). In some cases, students with ADHD may have increased levels of support from families and teachers prior to college, though

the transition to college usually comes at the expense of losing some of these supports and interventions (Canu et al., 2021). College campuses aim to provide support for students with ADHD through resources such as medication management, counseling, and disability services for academic accommodations. Unfortunately, college students with ADHD are unlikely to seek out these supports for reasons such as being unaware of accommodations, not seeing help as necessary or feeling like they do not need services, and low motivation to access services due to increased levels of impairment (Chew et al., 2009; Green & Rabiner, 2012; Lefler et al., 2016). Although promising interventions exist for students with ADHD, they are limited in effectiveness if the population they intend to serve does not utilize them.

Because ADHD is a complex disorder with different symptom structures, it is helpful to consider symptom profiles that might result in different patterns of service utilization. For example, factors that might influence service utilization include whether students have co-occurring functional impairments, mood disorders, and level of ADHD symptom severity (Weyandt et al., 2013; Vasko et al., 2020). Students with comorbid social deficits, for example, might avoid disability and/or counseling services if they are required to navigate multiple social interactions or exhibit assertiveness to advocate for themselves. Alternatively, students may use one service to cope with symptoms (e.g., medication), but not utilize all services available to fully thrive. Students with poor academic functioning or severe inattentive symptoms may be more likely to utilize certain types of services (e.g., disability) due to external pressures or mandates from the university. In sum, there are a variety of interacting factors that combine to produce unique symptom profiles that likely impact service utilization behaviors in college students with ADHD symptoms.

Purpose of the Study

The purpose of this study was to identify subgroups of college students with ADHD symptoms and co-occurring difficulties through a latent class analysis (LCA) and evaluate how service utilization behavior varied among these groups. Identifying these subgroups is an important first step to ensure students are being served with treatments that best match their needs. Currently, to this author's knowledge, there have been no attempts to explore service utilization behavior by symptom profile of ADHD among college students. The results of this study can be used to identify groups that might need more focused intervention and support early on, and groups that might need a multi-faceted approach to help reduce functional impairments.

CHAPTER II

LITERATURE REVIEW

What is ADHD?

Attention-deficit/hyperactivity disorder (ADHD) is a neuropsychological disorder marked by deficits in the executive functioning system with three different subtypes: predominantly inattentive, predominantly hyperactive/impulsive, and combined (American Psychological Association [APA], 2013). Inattentive symptoms include making careless mistakes, having difficulty paying attention or listening, being disorganized, and being easily distracted or forgetful. Children may also experience hyperactivity and impulsivity with symptoms such as fidgeting, difficulty sitting still, being unable to play quietly, and talking excessively. Children might blurt out answers, interrupt others, and struggle in social situations that require waiting their turn to speak (APA, 2013). ADHD has an early onset and is commonly diagnosed in childhood. The *Diagnostic and Statistical Manual of Mental Disorders* (5th ed.; *DSM-5*; APA, 2013) specifies that these symptoms must a) be present before the age of 12, b) be present in two or more settings, and c) interfere with social, academic, or occupational functioning or development.

History of ADHD

Concerns related to attentional deficits can be traced back to a German medical textbook written in 1775 by Melchior Adam Weikart in a chapter titled, "*Attentio Volubilis*," roughly translating to "lack of attention" (Barkley, 2022; Barkley & Peters, 2012). Two decades later in 1798, Alexander Crichton mentions a disorder resembling ADHD in a chapter describing attention problems in a medical textbook (Barkley & Peters, 2012). German physician Heinrich Hoffmann wrote poems about children he saw with attentional issues in his medical practice in

1865. Later, and perhaps the most well-known mention of children with serious sustained attention problems, occurred in a lecture series in 1902 by physician George Still; he attributed children's symptoms to "defective moral control", meaning they could not control or regulate their behaviors, despite having no impairment with intelligence or physical disease (Barkley & Peters, 2012). In 1918, after the Spanish Flu, many children who survived began developing symptoms that mirrored hyperactive and impulsive behavior, which was referred to as "post-encephalitic behavior disorder" (Lange et al., 2010; Ward, 2022).

In 1962, a disorder called hyperkinetic-impulse disorder was included in the second edition of the *Diagnostic and Statistical Manual of Mental Disorders* (DSM), which described motoric restlessness (Lange et al., 2010). The widely held belief at the time was that hyperactivity (as opposed to inattention) was the central cause for hyperkinesia, thus research on hyperactivity inundated the field (Lange et al., 2010). A decade later, Virginia Douglas' contributions to the literature outlined that sustained attention and impulse control were essential features of the disorder and likely better explained hyperkinetic behaviors compared to hyperactivity alone (Lange et al., 2010). As a result, the focus of hyperkinesis research shifted to attentional issues, and in the 1980's hyperkinetic-impulse disorder was re-conceptualized to attention deficit disorder (ADD) to capture symptoms of inattention and impulse control in the third edition of the DSM. In a revised version of the DSM-III in 1987, the name of the disorder was changed to attention-deficit/hyperactivity disorder (ADHD) to reflect symptoms of inattention, impulsivity, and hyperactivity (Lange et al., 2010). In the 1990's, with the new neuroimaging techniques guiding research on executive function and innovative studies on genetics, ADHD was no longer considered a disorder that occurred exclusively in childhood.

Rather, ADHD was now viewed as a chronic, neuropsychological disorder that persisted into adulthood (Lange et al., 2010).

Prevalence

The global community prevalence for children and adolescents diagnosed with ADHD averages around 5% (Sayal et al., 2018). Studies show that 5.7% to 77% of cases persist into adulthood; this large discrepancy is likely due to diagnostic or reporter inconsistencies (Agnew-Blais et al., 2016; Barbaresi et al., 2015; Caye et al., 2016; Cherkasova et al., 2022). Sex differences emerge in overall prevalence of diagnosis as well as symptom subtype. ADHD is more prevalent in boys than girls, with boys being diagnosed twice that of girls, possibly suggesting an under-recognition of ADHD in girls likely due to their expression of the disorder (APA, 2013; Sayal et al., 2018). For example, girls tend to have fewer hyperactive/impulsive symptoms and more inattentive symptoms; generally, girls' behavior is less disruptive than their male counterparts, which likely results in a referral bias (Skogli et al., 2013).

A decade ago in the United States, prevalence rates for having clinically significant ADHD symptomology among college students ranged from about 2 to 8% (DuPaul et al., 2009; Green & Rabiner, 2012). Comparatively, more recent global prevalence rates of ADHD symptoms in college students average 15.9% (Mak et al., 2022). Mak and colleagues explain the difference is due to the adoption of confidential web-based surveys that enable access to a subset of the population (e.g., those resistant to help-seeking and disclosing symptoms) who may have not been assessed in previous studies (2022). Interestingly, Mak and colleagues also found that gender differences tend to be minimal in college students (2022).

A decade ago, it was also thought that there were higher rates of ADHD among individuals in the United States with European ethnicity compared to other cultural groups

(APA, 2013). In fact, some argue that ADHD is a socially constructed 'American' disorder propagated by pharmaceutical companies; this rapid growth of child psychiatric diagnoses and pharmaceutical interventions is referred to as the 'McDonaldization' of children's mental health (Smith, 2017). However, recent global prevalence data collected in the past few years suggests otherwise. When broken down by region, ADHD prevalence in other countries is either equal or higher compared to the United States (Song et al., 2021). Usually, any differences in ADHD prevalence rates across regions can be attributed to differences in diagnostic practices and/or methodological differences in research (APA, 2013).

Progression of ADHD

ADHD's symptom trajectory typically presents as hyperactivity in the preschool age years, which can be difficult to differentiate between developmentally appropriate behavior. Upon school-age entry, inattentive symptoms tend to reveal themselves via lowered academic performance, and hyperactive/impulsive symptoms tend to be recognized as noncompliance to instructions (e.g., difficulty staying seated) and inability to inhibit impulses (e.g., blurting out answers, motoric movements). In adolescence, inattentive symptoms remain while hyperactivity becomes less common and instead is replaced by internal feelings of restlessness and impulsive behaviors (e.g., reckless driving). As individuals transition into adulthood, impairment associated with impulsivity may remain a concern but is associated with symptoms of inattention and restlessness most often (APA, 2013).

Factors like parenting can moderate the impact and progression of ADHD. For example, when children with ADHD symptoms are exposed to elevated levels of negative parenting (e.g., hostility, criticism, inconsistent discipline), they are more likely to experience increased social problems (Fenesy et al., 2019). Additionally, a negative or maladaptive family environment

moderates sluggish cognitive tempo (e.g., daydreaming, difficulty initiating and sustaining effort, lethargy) in people with ADHD (Fredrick et al., 2019). Alternatively, positive parenting and socialization practices (e.g., supporting youth autonomy) moderate the effect of ADHD symptoms on task perseverance, which in turn, influences academic achievement (Thomassin & Suveg, 2012).

It is not uncommon for children to present at a subclinical level or be "missed" by teachers or parents because they do not exhibit hyperactive or impulsive symptoms (Barkley, 2016; Moore et al., 2019). This leaves a subset of the population undiagnosed, usually until social or academic pressures heighten, and they are no longer able to function as well in academic, social, or occupational settings. This subset of the population likely missed the opportunity to receive early interventions and develop skills that others received who were identified earlier (Anastopoulos & King, 2015; Sacchetti & Lefler, 2017).

One major life event that can cause increased strain and social or academic pressure is the transition to college (Anastopoulos & King, 2015). The "perfect storm" is a model developed by Anastopoulos and King (2015) that describes the numerous challenges that students with ADHD symptoms face upon their transition to college, which ultimately limits their ability to thrive. For example, due to increased demands and challenges, students with subclinical levels of ADHD symptoms entering college may report increased impairment and require additional support to develop skills to be successful. Additionally, because ADHD is a persistent diagnosis and interventions in childhood do not "cure" the disorder, even students who carry a previous diagnosis of ADHD and who have received treatment may need additional support as they begin college (Kuriyan et al., 2013). Challenges faced by this population include, but are not limited to, having a reduced oversight of their academic activities, having greater autonomy to determine

how they spend their time as they no longer have a highly structured course schedule, managing a higher workload and more difficult assignments, and having to establish new social supports. For example, a child with ADHD might have a significant number of academic supports including an IEP or other school accommodations, access to medications and psychotherapy, and parental supervision in their schooling and daily life responsibilities. These supports provide greater external control of the environment, which functions to scaffold the child's self-regulation strategies. However, when they transition to college, they might naturally lose some of these supports and are unlikely to seek out new supports available on campus for reasons such as not understanding the impact of the disorder or not wanting to be perceived as "different" by their peers (Anastopoulos & King, 2015). Combined with inherent difficulties with self-regulation and added demands of college, these students become increasingly vulnerable to experiencing impairment in their academic, social, and occupational functioning.

Causes of ADHD

Research to-date has shown that there are many known genetic, environmental, and neurobiological risk factors that contribute to an ADHD diagnosis; these risks frequently interact and are comorbid with each other.

Genetic Risks

ADHD has a heritability rate of about 74% (Faraone & Larsson, 2019). No single gene causes ADHD: rather, ADHD is polygenic, meaning multiple gene variants or rare mutations are correlated with higher rates of ADHD (Thapar, 2018). Common inherited genes thought to be associated with ADHD include dopaminergic and serotonergic genes (Thapar et al., 2013). Copy number variants, which are chromosomal duplications and deletions, are also correlated with the onset of ADHD (Thapar et al., 2013).

Environmental Factors

Non-inherited environmental factors, such as neurological injury, often caused by teratogenic effects in pregnancy, have been found to mediate the onset of the disorder (Thapar et al., 2013). Pre-and perinatal factors such as maternal smoking and alcohol use, maternal stress, low birth weight and prematurity, and anti-depressant and acetaminophen use in pregnancy have been associated with the onset of the disorder (He et al., 2020; Sciberras, 2017; Thapar et al., 2013). Other environmental risks include exposure to pesticides and lead; dietary factors like nutritional deficiencies are also correlated with the development of ADHD (Thapar et al., 2013).

Neurobiological Factors

Barkley (1997) stated that the central deficiency in ADHD is poor behavioral inhibition that results from executive dysfunction. Executive functioning refers to self-directed actions that contribute to self-regulation, goal-directed behavior, and task persistence. According to Barkley's model, achieving complex, goal-directed behavior requires the interaction of four executive functions: non-verbal working memory, verbal working memory (internalization of speech), emotion regulation, and organization (reconstitution; 1997). More recently, Sonuga-Barke (2002) proposed a dual-pathway model, which suggests that ADHD is caused by dysfunction in the dopaminergic mesocortical and mesolimbic systems. The mesocortical and mesolimbic systems are responsible for motivation, emotions, and rewards (He & Antshel, 2017). This "double deficit" model explains deficits in both response inhibition (e.g., switching, inhibiting, and sustaining a response) and delay aversion motivation (e.g., delaying short term rewards in the pursuit of long-term goals) (Fleming & McMahon, 2012). In sum, individuals with ADHD tend to show difficulties with self-awareness, inhibition, nonverbal and verbal working memory, emotional self-regulation, self-motivation, and the planning/problem solving

areas of executive function (Barkley, 2022; Miyake et al., 2000). Essentially, those with executive function deficits have difficulties in areas that require self-directed action. Deficits in these areas might appear behaviorally as having difficulty sustaining attention, inhibiting responses, regulating emotions, organizing, planning, and multitasking. Furthermore, those with ADHD may have differing presentations of executive functioning deficits (e.g., poor inhibitory control vs. poor response speed; Roberts et al., 2017).

Co-occurring Difficulties

There are several co-occurring difficulties that individuals with ADHD commonly experience. These co-occurring difficulties include emotion dysregulation, functional impairments such as social, academic, and daily living problems, and comorbid psychological disorders. Although this study focuses on college students, much of the research on co-occurring difficulties has been studied in children and adolescents; therefore, this review will include literature from childhood to emerging adulthood.

Emotion Dysregulation

Emotion dysregulation, executive functioning deficits, and ADHD are interrelated (Steinberg & Drabick, 2015). Emotion regulation refers to an internal process of judging and evaluating emotionally relevant situations, leading to the manipulation of one's emotional state to promote responding that is in line with goal-directed behaviors (Shaw et al., 2014; Steinberg & Drabick, 2015). Thus, emotional dysregulation can be understood as difficulty understanding, identifying, or labeling emotions, over-relying on maladaptive strategies, or under/overregulating emotional experiences and expression. Emotion regulation deficits occur in up to 50% of youth with ADHD and up to 70% of adults with ADHD (Hirsch et al., 2019; Steinberg & Drabick, 2015). Emotion regulation deficits in ADHD can be traced to brain abnormalities in the

amygdala, ventral striatum, and orbitofrontal cortex; working memory deficits have a direct effect on poor emotion regulation (Groves et al., 2020; Shaw et al., 2014; Steinberg & Drabick, 2015). Additionally, increased severity of hyperactive/impulsive symptoms predict greater emotional dysregulation in those with ADHD (Groves et al., 2020).

Children with ADHD and co-occurring emotion dysregulation display high levels of reactivity (e.g., increased frustration, decreased time to anger, and high level of impatience) and both negative and positive emotionality (Barkley, 1997; Steinberg & Drabick, 2015). This results in a reduced ability to understand the effect of their emotions on others and increased reliance on external sources (e.g., rewards) for motivation. Emotion dysregulation is correlated with social impairment, peer victimization, engagement in risky behaviors, and the development of comorbid psychological disorders (Bunford et al., 2015; Fogleman et al., 2018; Steinberg & Drabick, 2015). College students with ADHD have increased psychological and emotional functioning deficits compared to those without ADHD; they report higher levels of flat and labile emotions (Green & Rabiner, 2012; Weyandt et al., 2013). In sum, emotional dysregulation is a co-occurring feature of ADHD due to executive functioning deficits and entails an increased risk of social and psychological consequences.

Social Impairment

Executive functioning deficits in individuals with ADHD may lead to social impairments and compromise friendships (Mackenzie, 2019). It is well established that children with ADHD have co-occurring social deficits, resulting in behaviors like interruption, argumentativeness, and noncompliance (Hoza, 2007; Tomb et al., 2011). They tend to struggle to interpret and appropriately respond to social cues as well as overestimate their own social competence. Due to low self-control and high levels of impulsivity, children with ADHD often have difficulties

making friends. These children quickly develop negative reputations that are extremely difficult to overcome, often leading to persistent peer rejection (Hoza, 2007). Once rejected, children with ADHD face a greater likelihood of peer victimization and psychological maladjustment (Bacchini et al., 2008; McQuade & Hoza, 2008; Mikami, 2010). Deficits in social functioning in childhood can have a significant impact on negative outcomes later in life, including a greater likelihood of substance use, psychopathology, and delinquency (Hoza, 2007; McQuade & Hoza, 2008; Mrug et al., 2012).

Social difficulties often continue into college years for students with ADHD. College students with higher levels of ADHD experience increased difficulties in social relationships like forming new relationships or engaging in risky sexual behavior (Blase et al., 2009; Sacchetti & Lefler, 2017). This can be particularly detrimental in a setting where forming friendships is integral to feeling connected and enhancing adjustment to college (Vasko et al., 2020). College students with ADHD report lower levels of social skills and self-esteem compared to their non-ADHD peers, and this effect is heightened for boys; self-esteem partially mediates the relationship between ADHD symptomology and adjustment to college (Shaw-Zirt et al., 2005; Weyandt et al., 2013). College students with ADHD also report a greater difficulty in providing emotional support to peers and managing interpersonal conflict (Khalis et al., 2018; McKee, 2017; Shaw-Zirt et al, 2005). Combined, this can also impact the quality of romantic relationships. Often, at the beginning of a romantic relationship people with ADHD can focus intensely on their partner, but as the relationship progresses, the partner with ADHD may lose focus on how much attention they pay to their significant other which often results in relationship dissatisfaction (Wymbs et al., 2021). Additionally, people with ADHD can have maladaptive conflict resolution styles due to the decreased ability to regulate emotions; for

women with ADHD, relationship conflict mediates the association between poor relationship quality and emotion regulation problems (Bruner et al., 2015; Wymbs et al., 2021). Furthermore, ADHD is a risk factor for dating violence as it is associated with both intimate partner violence perpetration and victimization (Wymbs et al., 2021). Lastly, another obstacle that college students must navigate is social stigma. Non-ADHD peers and even students with ADHD tend to hold more negative attitudes toward peers with ADHD, which can add to levels of maladjustment (Chew et al., 2009; McKee, 2017).

Academic Impairment

Individuals with ADHD face significant educational challenges. Children with ADHD are more likely to use special education services, get detention or be expelled, score lower on reading and mathematics tests, and have lower rates of high school graduation compared to non-ADHD peers (Loe & Feldman, 2007). The cost of supplementing education (e.g., special education, grade retention, disciplinary action) for children with ADHD is about $20.2 billion (Barkley, 2020a). Studies have revealed that children with ADHD are more likely to receive school services, have a formal education plan, and receive psychosocial treatments if they have a diagnosed developmental disorder (Zablotsky et al., 2018).

Students with ADHD symptoms who go on to college tend to adjust poorly and struggle academically (Khalis et al., 2018). This may be due to the structural differences between high school and college, such as the removal of supports, including a highly structured course schedule, informal classroom accommodations, parental supervision, and college courses placing a greater emphasis on independent learning (Canu et al., 2021; Pinho et al., 2019). It should be noted that students with ADHD who do attend college tend to have less ADHD related impairment compared to those with ADHD in the general population (Pinho et al., 2019).

Nonetheless, college students with ADHD take longer to complete assignments and tests due to re-reading material multiple times for comprehension, find it difficult to complete assignments on time, plan poorly for class assignment completion, have poorer organizational and time management skills, and become easily distracted (Vasko et al., 2020; Weyandt et al., 2013). College students with ADHD report being less confident in their ability to succeed and are less satisfied with their motivation and performance when they report difficulties with study and organizational skills (Green & Rabiner, 2012). College students with ADHD obtain lower GPAs—often a standard deviation lower than other students, use fewer study strategies, and complete fewer semesters of college compared to non-ADHD peers; this effect is magnified for those not using medication (DuPaul et al., 2021; Green & Rabiner, 2012). Additionally, students with ADHD are more likely to be placed on academic probation, take longer to graduate, and have higher dropout rates (Weyandt & DuPaul, 2006; Weyandt & DuPaul, 2013).

It is thought that the negative effects from the COVID-19 pandemic (e.g., struggles with remote learning, struggles with physical and mental health) have been magnified for those with ADHD and those with poorer emotional regulation abilities had an increase in ADHD symptomology during the pandemic (Breaux et al., 2021a; Breaux et al., 2021b). Furthermore, students with ADHD take fewer online courses due to difficulty with time management and concentration (Parker & Banerjee, 2007). At this point in time, it is uncertain how the rapid transition to online service delivery during COVID-19 affected the enrollment and educational success of students with ADHD at the collegiate level.

Problems in Daily Living Skills

Deficits in planning and organizational skills can lead to additional deficits in daily living skills. For example, students with ADHD struggle to plan for grocery shopping, cooking meals,

doing laundry, getting enough sleep, exercising, managing money, and taking medication; all of which affect independence and academic success (Canu et al., 2021). Other hurdles experienced by emerging adults with ADHD include problems maintaining employment, using drugs, and relying on others for financial support (Pollack et al., 2018; Vasko et al., 2020).

In addition, an ADHD diagnosis in childhood is correlated with an 8.4-year reduced life expectancy by young adulthood (Barkley, 2020b). This is due to multiple risk factors including accidental injuries like car accidents, involvement with hostility and aggression, and a variety of co-occurring medical conditions; those with ADHD are at greater risk for poor dental hygiene, poor nutrition, risky sexual behaviors, sleeping problems, chronic diseases, sedentary lifestyle, and Type II diabetes (Barkley, 2020b; Vasko et al., 2020).

Monetary Costs

The monetary costs associated with ADHD in the United States are estimated to be around $143 billion to $266 billion annually; most of these costs are related to healthcare, educational services for children, and loss of income for adults (Sayal et al., 2018). People with ADHD symptoms attain lower levels of employment and earn less than their peers of the same age, and this is worsened by a later date of diagnosis, highlighting the importance of early diagnosis and intervention (Sayal et al., 2018). A diagnosis of ADHD costs $41.5-50.2 billion extra in medical expenses alone for both children and adults in the US (Barkley, 2020a). There is also a family burden component of ADHD. Societal costs estimate that families can spend an excess of $19.4 billion among children ($6,799 per child) and $13.8 billion among adolescents with ADHD ($8,349 per adolescent); these include costs associated with accidents, legal issues, loss of parental income, and additional childcare expenses due to behavioral and educational problems (Barkley, 2020a; Schein et al., 2022; Usami, 2016).

Comorbid Psychological Disorders

The co-occurrence of internalizing and externalizing disorders with ADHD is common in both childhood and adulthood. People with combined-type ADHD and women tend to have higher comorbidity rates (Anastopoulos et al., 2018; Balazs & Kereszteny, 2017; Jacob et al., 2014). Regarding college students, almost 60% of college students with ADHD across the globe have comorbid psychological disorders (Mak et al., 2022). Among college students with ADHD, report of current ADHD symptoms and not an actual diagnosis of ADHD, is associated with more negative mental health outcomes; the most common comorbidities include depression, anxiety, bipolar, substance use disorders, and learning disorders (Anastopoulos et al., 2018; Mak et al., 2022; Weyandt et al., 2013; Wood et al., 2021). Up to 60% of college students with ADHD report a history of major depressive disorder compared to 12% of same age peers without ADHD; up to 40% of college students with ADHD endorse experiencing an anxiety disorder within their lifetime (Vasko et al., 2020). Additionally, students with ADHD report greater levels of alcohol, tobacco, and marijuana use, and are more likely to develop substance use problems and disorders (Vaskso et al., 2020). Negative reinforcement is thought to perpetuate substance abuse in students with ADHD, as they often use when they are in a negative mood state and/or for self-medication (Antshel et al., 2020).

Comorbid psychopathology has a serious impact on quality of life (QoL) for college students, and college students with ADHD report lower self-esteem and lower QoL (Goffer et al., 2019; Pinho et al., 2019; Vasko et al., 2020). Moreover, college students with ADHD also report flat affect, emotional lability, aggression, and greater overall psychological distress, likely due to difficulties in underlying emotion regulation (Green & Rabiner, 2012; O'Rourke et al., 2020; Weyandt & DuPaul, 2006; Weyandt et al., 2013).

Lastly, the presence of ADHD as a comorbid condition increases the risk of suicide for all ages in both girls and boys. For example, impulsivity is a risk factor for severe presentations of psychopathology, and suicide attempts are four times higher among first-year college students with ADHD compared to their non-ADHD peers (Eddy et al., 2020). Further, due to poor long-term planning behavior and deficits in emotion regulation, the absence of a suicide plan does not lower the risk for a suicide attempt in students with ADHD (Eddy et al., 2020).

Distinct Symptom Profiles among Individuals with ADHD. Assuming all people with ADHD have homogenous symptom profiles can lead to an incomplete understanding of symptoms and lack of efficacy in addressing symptoms. Studies examining ADHD symptom profiles have verified the three distinct subtypes of the disorder, which include the inattentive, hyperactive-impulsive, and combined symptom groups (Hudziak et al., 1998). However, most of the research examining symptom profiles has focused on comorbid diagnoses that commonly occur with the disorder.

In children with ADHD, symptom profiles are usually organized by a) low comorbidity, b) predominantly developmental disorders, c) predominantly internalizing disorders, and d) high comorbidity classes (Zablotsky et al., 2018). Children in high comorbidity classes have more severe hyperactive/impulsive symptoms and functional impairments in relationships and academics (Zablotsky et al., 2018).

In adults with ADHD, symptom profiles have been organized by endorsing a) few symptoms, b) mostly hyperactive-impulsive symptoms, c) inattentive symptoms, d) conduct problems, e) and conduct problems and combined symptoms (Ebejer et al., 2016). Our knowledge of potential profiles of ADHD among college students is limited. One reason for this may be due to the frequency of inaccurate diagnosis in the college population. A recent latent

class analysis on ADHD comorbidities among college students across nine countries revealed four symptom profiles: a) an ADHD + internalizing disorders class, b) an ADHD + bipolar comorbidities class, c) an ADHD + externalizing disorders class, and d) a pure ADHD disorder class (Mak et al., 2022). In summary, the structure of ADHD has been confirmed through symptom profiles that usually consist of few symptoms, mostly hyperactive-impulsive symptoms, and mostly inattentive symptoms. College students with ADHD symptoms, regardless of a diagnosis are experiencing impairment; a large portion of these students have comorbid disorders (Gray et al., 2016). ADHD is usually divided into low, high, or no (pure disorder) comorbidity classes; these usually consist of internalizing disorders, externalizing disorders, and bipolar disorders comorbidity classes.

Summary

In summary, co-occurring difficulties result in a myriad of costs. People with ADHD have deficits that lead to social impairments that continue into the college years (Sacchetti & Lefler, 2017). They also have academic problems (e.g., problems with organization and time management) that can lead to obtaining a lower GPA or dropping out of college (DuPaul et al., 2021). Additionally, people with ADHD often have co-occurring emotion dysregulation and daily living skill deficits. Sixty percent of college students with ADHD have a comorbid disorder, with the most common comorbid disorders being internalizing or externalizing in nature (Mak et al., 2022). Lastly, not only does the disorder result in high monetary costs to society, but it also results in a jarring cost to the individual, as an ADHD diagnosis is correlated with an 8.4-year reduced life expectancy (Barkley, 2020b).

Interventions for College Students with ADHD

There are three primary types of interventions that are available to college students with ADHD. These include medication management, non-pharmacological or behavioral interventions, and the combination of both.

Medication Management

Medication management has been found to be an efficacious treatment for individuals with ADHD. Common classes of medications used to treat ADHD are stimulants and non-stimulants. Stimulants include methylphenidate (e.g., Ritalin, Concerta, Quillivant) and amphetamine salts (e.g., Adderall and Vyvanse). Stimulants inhibit the reuptake of norepinephrine and dopamine; amphetamine salts also work on the presynaptic neuron to release additional norepinephrine and dopamine into the synaptic cleft. Typical side effects of stimulants include appetite suppression, insomnia, agitation, gastrointestinal distress, headaches, and elevated heart rate, and long-term exposure can result in reduced height and weight (Carucci et al., 2021). Non-stimulants include alpha-2 agonists like clonidine (Kapvay) and guanfacine (Tenex and Intuniv), and norepinephrine reuptake inhibitor atomoxetine (Strattera). Common side effects of alpha agonists and Strattera include GI distress, headaches, lowered heart rate, and sedation. Strattera also includes a “black box” warning, as it might raise the risk of suicidal ideation (Staufer & Greydanus, 2005).

Medication management of ADHD has been shown to improve structures in the brain (e.g., increase right anterior cingulate volume), increase brain activation, and improve functional connectivity (Shier et al., 2013) These changes are associated with improvements in executive functioning like working memory performance, academic performance, and overall quality of life in children and adolescents (Shier et al., 2013). For stimulants, there are a multitude of

studies that support its short- and long-term effectiveness in reducing ADHD symptoms and improving psychosocial and executive functioning outcomes (Shier, et al., 2013; Weyandt et al., 2014). Long-term effectiveness studies typically last longer than 24 weeks with intermittent titration periods depending on the randomized controlled trial (RCT; Fredriksen et al., 2013). It should be noted that long-term effectiveness studies are limited in quantity, and because there are high rates of non-adherence to ADHD medications, sometimes only half of the sample remains in treatment after two years (Fredriksen et al., 2013). In general, long-term effectiveness studies reveal statistically significant reductions in ADHD symptoms (e.g., attention, hyperactivity/impulsivity, emotion dysregulation) and improvements in psychosocial functioning with high levels of tolerability of the stimulants (Fredriksen et al., 2013). In some RCTs, symptom improvement is sustained for up to 24 months. When discontinuation of medication occurs, people report symptoms including increased fatigue, hunger, insomnia, headaches, and the return of ADHD symptoms (Fredriksen et al., 2013). A large systematic review and meta-analysis examining the effects of ADHD medication on functional outcomes revealed ADHD medications—mostly stimulants—reduce the risk of mood disorders, substance use outcomes, rates of criminal activity, suicidal attempts, traumatic brain injuries, motor vehicle crashes, emergency room visits, and improve test scores, GPA, and reading level for people across all age ranges with ADHD (Boland et al., 2020). Improvements in functional outcomes from stimulant medication use is likely a consequence of the reduction of ADHD symptoms. Although the efficacy of medication management is most often studied with child and adolescent populations, there is some evidence that stimulants reduce ADHD symptoms among college students (DuPaul et al., 2012; Vasko et al., 2020). Stimulant medication has been recognized as being safe for

adults with ADHD and recommended for the management of ADHD in college students (Adler et al., 2009; Staufer & Greydanus, 2005).

Non-pharmacological Interventions

Non-pharmacological interventions for ADHD are primarily behavioral in nature, and focus on modifying antecedents, behaviors, and/or consequences of events. A great deal of research has already reviewed available psychosocial treatments and behavioral parent training programs for children and adolescents, which are commonly implemented and well-established treatments (see Pelham & Fabiano, 2008; Evans et al., 2014). For those who are identified as having ADHD early in childhood, early interventions can be effective for improving outcomes and functioning in later life (Canu et al., 2021). However, many students may be "missed" or present at a subclinical level and subsequently not receive services until they reach college and face increased challenges (Barkely, 2016; Moore et al., 2019). Even students who receive services in childhood may require more focused support in college due to increased demands (Kuriyan et al., 2013). Non-pharmacological interventions for college students with ADHD include interventions that target ADHD symptoms and functional impairments; these are typically grounded in cognitive behavioral therapy (CBT), and often include disability services.

Cognitive behavioral therapy. CBT is a well-established treatment for college students that focuses on psychoeducation, self-care, time management, cognitive restructuring, and teaching academic skills (Barkley, 2018; Green & Rabiner, 2012; He & Antshel, 2017; Prevatt & Young, 2014; Solanto, 2011). CBT for ADHD in adults is effective in improving both primary outcome measures like inattention and hyperactivity/impulsivity symptoms and secondary outcome measures like psychosocial outcomes (Fullen et al., 2020). More specifically, individual, group, and combined formats are effective in increasing time management skills,

concentration, motivation, and anxiety management (Eddy et al., 2021; LaCount et al., 2015; Safren et al., 2005; Solanto et al., 2011). One example of this is the ACCESS program, which includes an 8-week active treatment, where students attend weekly 90-minute CBT group sessions and 30-minute individual sessions, followed by a maintenance phase the next semester where students attend two booster group sessions and five individual sessions (Anastopoulos & King, 2015). The program has produced a small effect on reducing total ADHD symptoms (d = .39) and a medium effect for reducing inattention symptoms (d = .50); additionally, the program resulted in higher usage rates of behavioral strategies (e.g., academic skill use, time management, use of study aids), improvements in executive functioning (e.g., behavioral regulation), and improvements in interpersonal relationships (Anastopoulos et al., 2021; Eddy et al., 2021). Though, the program did not significantly improve anxiety and depression, hyperactive-impulsive symptoms, GPA, or affect student's use of counseling services over time (Anastopoulos et al., 2021; Eddy et al., 2021).

Adaptations of CBT programs for college students have been developed to include a focus on common co-occurring difficulties, such as social impairments, substance use, and academic difficulties (Shaikh et al., 2017; Vasko et al., 2019). For example, some adapted programs have incorporated elements of interpersonal group therapy to target self-esteem and used motivational interviewing and behavioral activation to reduce substance use. Findings from these programs have shown improved outcomes in self-esteem, psychosocial competence, and emotional maturity (Shaikh et al., 2017).

In a review of the literature on ADHD for college students, He & Antshel (2017) explain that overall, CBT appears to have a moderate effect on improved quality of life and functional impairment, but often less of an effect on GPA, response inhibition, executive functioning, and

interpersonal functioning. Longitudinal studies examining treatment effects are limited. Once behavioral programs are removed, it is unclear how well students can generalize skills to new situations (He & Antshel, 2017). Generally, limitations in CBT intervention studies include failing to a) conduct research in the same setting it is implemented and reducing generalizability, and b) consider the feasibility of interventions (Anastopoulos et al., 2020; Eddy et al., 2021; Evans et al., 2014; Vasko et al., 2020). Other major limitations of intervention studies in college students are low completion rates of the intervention, limited utilization of skills between sessions, and having unrepresentative populations (Anastopoulos et al., 2021; Eddy et al., 2021; Shaikh, 2017).

Disability services. Disability services on college campuses are also available to support students with ADHD symptoms. To ensure college students are not discriminated against on account of a disability, they are protected by the Americans with Disabilities Act (ADA) and Section 504 (U.S., n.d.). Postsecondary institutions are responsible for providing necessary accommodations when a student discloses a disability; as such, reasonable accommodations reduce disability-related barriers so the student can complete course requirements (U.S., 2007). On-campus disability services function to provide students with a learning, mental, or physical disability an equal opportunity to attain academic success and protect against discrimination (U.S., 2007).

About 25% of students who receive disability services in college have an ADHD diagnosis (Weyandt & DuPaul, 2008). Common accommodations for ADHD include note taking, recording lectures, extending time on exams and assignments, providing alternative testing arrangements or locations, and providing instructions in multiple formats (Weyandt & DuPaul, 2008). To receive disability services, the student must initiate the accommodation

process with the disability office on campus. The student must also provide evidence of the disability, often requiring documentation that is less than three years old. After, the office determines if the student is eligible for services and coordinates appropriate accommodations based on the documentation. The student and the university must consent for parents to gain access to information about their child's disability services. Outcome data associated with the use of disability services is limited, though, some studies suggest that use is associated with a better understanding of the disorder, increased knowledge of services available, and improved self-advocacy skills (Wolf, 2006).

Combined Treatment

Medication management in combination with psychosocial treatment has been shown to be more efficacious on improving ADHD symptoms compared to behavioral treatment alone for children and adolescents (Arnold et al., 2015; Shier et al., 2013). Medication and behavior therapy can produce similar effects on reducing the symptoms of ADHD in children and adolescents, but some studies point to behavior therapy being more effective for academic, social relations, and driving-related impairment; this has implications for practitioners going against the previously established norm of only recommending behavior therapy after medication (Sibley et al., 2014). Stimulants have a more pronounced short-term effect and long-term compliance can be poor, whereas behavioral therapies tend to have a longer-term effect especially on executive functioning and organizational skills (Rajeh et al., 2017). Lastly, medication management is usually not preferred by parents or effective enough to normalize social functioning in children (Pelham et al., 2018). In adulthood, findings on the effectiveness of combined treatments can be more complex (Caye et al., 2019). For example, some studies have found that CBT group interventions do not outperform medication management in improving ADHD *symptoms*, but

combination treatment does have better long-term *outcomes* compared to placebo (e.g., medication can quickly improve symptoms of inattention, whereas combination treatment adds skills that can be applied over the long term; Philipsen et al., 2010). Though, other studies have found that the use of CBT combined with medication management results in improved ADHD symptoms (Safren et al., 2010). In general, combined interventions are usually selected when the severity of symptoms is high (Caye et al., 2019).

Summary

In summary, interventions for college students with ADHD often include medication management, non-pharmacological interventions (e.g., CBT, the use of campus disability services), or combined treatments. The most effective treatments for college students with ADHD tend to be the use of stimulant medication, CBT, or the combination of both interventions, which is usually employed for high symptom severity (Barkley, 2018; Caye et al., 2018; DuPaul et al., 2012).

Service Utilization

As stated above, there are a multitude of treatments for ADHD and multifaceted treatments have been developed to address the unique needs of college students. Service utilization among students with ADHD can be broken down into different forms of utilization related to medication management, counseling services (e.g., cognitive behavioral therapy or other related treatments), and academic supports (e.g., office of disability services), which will be described next.

Medication Management

Data suggests that the prescription of pharmacotherapy for adolescents and adults with ADHD has increased over time (Sclar et al., 2012). In the United States, researchers found that

approximately 8.1% of college students were prescribed stimulant medication for ADHD in the past year, with Adderall and Ritalin being the most common (Garnier-Dykstra, 2012; Schulenberg et al., 2018). Students with ADHD are more likely to be taking an immediate release (82%) than an extended release (18%) stimulant (Froehlich et al., 2018; Green & Rabiner, 2012). Despite ADHD medications being commonly prescribed, adherence rates tend to be poor. On average, 53% of college students with ADHD do not adhere to medications due to forgetfulness and unwelcome side effects, such as a dry mouth and reduced appetite (Froehlich, 2018). Other reasons for non-adherence include wanting to deal with the problem on their own, not having enough time to seek services, financial barriers, stigma, and believing the problem will resolve itself (Eisenberg et al., 2011).

Interestingly, a large percentage of college students, including those with ADHD, report misuse or diversion of ADHD medications. Up to 62% of college students report a lifetime rate of diversion/non-prescription use, defined as giving prescription medications to those who are not prescribed; this can range from giving a friend a single pill to selling the medication (Froehlich, 2018). Among those who use non-prescription medication, academic reasons (e.g., to help with studying, improve concentration) are the most cited (Froehlich, 2018; Green & Rabiner, 2012). Thus, it is possible that those who use non-prescription medications to improve academic performance may do so to treat undiagnosed or subclinical ADHD (Sabbe et al., 2022). Notably, up to 25% of college students with ADHD in the United States also report medication misuse (e.g., taking higher doses than prescribed; Arria et al., 2008). In sum, although college students tend to have greater access to stimulants for ADHD, they also have a greater likelihood of non-adherence and misuse.

Counseling Services

Although limited, available data suggest a relatively small percentage of college students with ADHD seek counseling services to help with ADHD concerns. In a large, national sample of over 55,000 college students who sought counseling services in the 2020-2021 academic year, 1.8% identified attention/concentration difficulties as their primary concern for seeking treatment; 12.6% indicated it was a secondary concern (CCMH, 2022). Students with ADHD have reported a hesitation to seek therapy on campus due to services that lack specialized knowledge of how to treat ADHD in college students, stigma against the term "therapy", and the belief that treatment should not be generalized but instead be catered to be a unique experience based on the individual (Lefler et al., 2016). Although RCTs evaluating the individual and group programs among college students with ADHD had impressive participation rates, these programs used multiple steps to ensure participation, including text and email reminders, flexible re-scheduling of missed sessions, and high compensation, which is not generalizable to the typical college counseling center or disability services (Anastopoulos et al., 2021; Eddy et al., 2021).

Academic Supports

Studies report that about a fourth (20%-25%) of students receiving disability services on campus have ADHD (Anastopoulos & King, 2015; Chew et al., 2009; DuPaul et al., 2021; Gormley et al., 2019). Although academic support services are often available on college campuses, students with ADHD often do not believe they need additional help and do not seek support services in fear of being seen as "different", lack knowledge about what accommodations are available, and/or believe accommodations are too difficult to pursue (Chew et al., 2009; Green & Rabiner, 2012; Lefler et al., 2016; Meaux et al., 2009). Disability services typically require an official documentation of a diagnosis. This can be a barrier to receiving

support, due to the excessive monetary cost of obtaining a neuropsychological assessment and time commitment (Eddy et al., 2021).

Factors that Influence Service Utilization

Demographic differences. Although not specific to college students with ADHD, service utilization in the general college population varies greatly due to individual student characteristics (Auty et al., 2022; Eisenberg et al., 2011). Demographic differences also exist in utilization rates in the general population. Black undergraduate students are less likely to utilize university counseling services and disability services; Asian undergraduate students are less likely to utilize university-based counseling services and university health services (Bourdon et al., 2020). Women are much more likely than men to use psychiatric medication and therapy services (Bourdon et al., 2020; Eisenberg et al., 2011). College freshmen with ADHD on average have lower medication adherence rates than upperclassmen (Froehlich, 2018). Pre-college access to resources is likely to influence use once individuals transition to college; for example, students with ADHD who used pre-college academic services were more likely to use them at college (Gormley et al., 2019).

Stigma. People with ADHD experience multiple types of stigmas throughout their lives. Stigma is often grouped into three categories: public stigma, courtesy stigma, and self-stigma (Nguyen & Hinshaw, 2020). Public stigma occurs when members of the public (e.g., neighbors, teachers, peers) hold negative attitudes toward those with ADHD; an example of this may include teachers having low confidence in the academic abilities or competence of those with ADHD (Nguyen & Hinshaw, 2020). There are mixed results on the public's view of ADHD compared to other mental disorders. For example, studies among a general sample of adults have indicated that increased knowledge about mental illness resulted in viewing ADHD as "milder"

compared to other mental disorders (e.g., depression, bipolar disorder, schizophrenia; Pescosolido et al., 2019). Indeed, there is a growing movement to view individuals with ADHD as "neurodivergent" by recognizing strengths and intrinsic diversity in human brain function rather than pathologizing weaknesses (Doyle, 2020). However, general public attitudes about ADHD have remained the same; often those with ADHD receive disproportionate amounts of stigma compared to those with other mental disorders (Nguyen & Hinshaw, 2020). Courtesy stigma refers to "associated stigma", usually this occurs when society stigmatizes anyone associated with members of stigmatized groups (e.g., parents; Nguyen & Hinshaw, 2020). Mikami and colleagues found that after controlling for children's ADHD symptom severity, greater courtesy stigma in parents predicted more parental negativity; meaning, parent's perceived that others thought poorly of them because of their child's behavior, and this then negatively impacted the parent-child relationship (2015). Lastly, although a diagnosis can come as a relief to some, others experience self-stigma which refers to the shame, reduced self-esteem, and reduced self-confidence that an individual experiences related to their diagnosis; this can prevent treatment seeking behaviors (Nguyen & Hinshaw, 2020; Lefler et al., 2016).

Comorbid Psychological Disorders. The presence of internalizing symptoms (e.g., anxiety, depression, and stressful life events) predicts increased utilization of university counseling services (Bourdon et al., 2020). Internalizing symptoms, alcohol use, and antisocial symptoms predict the use of campus disability services (Bourdon et al., 2020). This relationship may be grasped by understanding the features of internalizing disorders. For example, based on the diagnostic criteria of anxiety disorders, we know that the common features of the disorder include fear with associated behavioral (e.g., muscle tension, impacted sleep) or cognitive disturbances (e.g., intrusive thoughts or ideation; APA, 2013). Thus, worries and physical

symptoms may lead students to seek counseling services. Likewise, we know that the features of depression include sad mood and loss of interest that causes distress in important areas of functioning (e.g., social, occupational; APA, 2013; Tse & Bond, 2004). Thus, impacted functioning and suicidal thoughts may lead students to seek services. When considering the role of alcohol use, impairments like impulse- or anger-related problems are correlated with negative consequences and may also lead students to seek counseling services (Kenney et al., 2018).

Co-Occurring Functional impairments. Functional impairments that may relate to a lack of service utilization should not be overlooked. We know that social skills allow us to connect with other people to have successful interactions, and trouble with these skills can cause social impairments and peer problems (Mikami et al., 2017). Thus, if a student is experiencing social problems, they might avoid disability and/or counseling services if they are required to navigate multiple social interactions. Also, we know that students with ADHD are more likely to be placed on academic probation; in one study, about 12% of students with ADHD were placed on academic probation compared to about 7% of those without ADHD (DuPaul et al., 2018; Weyandt & DuPaul, 2013). Thus, if placed on academic probation, students experiencing academic problems may be forced to seek additional services like disability accommodations. Likewise, a student may become ineligible for assistantships or federally funded financial aid if facing academic problems or probation, which in turn creates monetary problems and additional stress that may lead a client to seeking counseling services on campus (Altszuler et al., 2016; Bourdon et al., 2020). Lastly, as previously discussed, college students tend to struggle with non-adherence of stimulant medications for ADHD either due to deficits in daily living skills (i.e., forgetfulness to take medication) or misuse of stimulant medications (e.g., diversion or self-medicating by taking more medication than prescribed; Arria et al., 2008; Auty et al., 2022).

Meaning, there may be a subset of the population who are more likely to utilize medication management services to cope with academic problems.

Summary

The rate of mental health service utilization is steadily increasing, and as universities shift back to in-person operations post COVID-19, it is predicted that service utilization will steadily increase on college campuses (Gorman et al., 2021). However, students with ADHD are underutilizing support services on campus; only about a fourth of students receiving disability services on campus have ADHD and the number is even lower for students who utilize multiple (e.g., counseling and disability) services (CCMH, 2022; Chew et al., 2019; Gormley et al., 2019; Green & Rabiner, 2012; Lefler et al., 2016). College students with ADHD symptoms often have comorbid difficulties including functional impairments and comorbid mood disorders which can influence their likelihood to seek services (Gray et al., 2016). Evidence from available latent class analyses suggest that college students with ADHD symptoms are unlikely to have homogenous symptom profiles, but rather have complex profiles marked by unique combinations of comorbid presentations. These groups likely have different needs to adequately treat symptoms and functional impairment associated with ADHD symptoms. Further, these groups may derive different levels of benefit from available services. This approach counters a one-size fits all approach to the treatment available to students with ADHD symptoms, as this can lead to an incomplete understanding of symptoms and lack of efficacy in addressing problems.

The Current Study

The purpose of this study was to identify subgroups of college students with symptoms of ADHD and co-occurring difficulties using latent class analysis (LCA) and understand how service utilization behavior varied among these groups. LCA is an exploratory statistical

procedure that identifies subgroups within a population that share characteristics based on unobservable (latent) membership (Henry & Muthen, 2010; Naldi & Cazzaniga, 2020). These subgroups are often referred to as “classes”; the theoretical underpinning of LCA is that membership in latent classes can account for variations in scores, meaning scores on indicator variables are driven by subgroup membership (Naldi & Cazzaniga, 2020; Weller et al., 2020). LCA is person-centered in nature and has recently become a popular statistical technique applied to the social, behavioral, and health sciences (Lanza & Rhoades, 2013). LCA has been historically advantageous for determining subgroups of people that benefit from a common intervention based on their shared characteristics (Weller et al., 2020).

Subgroups characterized by multiple dimensions may differ in their treatment utilization, and identifying such subgroups is an important first step in enhancing treatment-related selection, implementation, and effectiveness. Currently, to this author's knowledge, no study has attempted to examine how service utilization varies among subgroups of college students with symptoms of ADHD and other co-occurring difficulties. The results of this study can be used to identify groups that might need more focused intervention and support early on, and groups that might need a multi-faceted approach to help reduce functional impairments. Additionally, results could allow universities to develop outreach services to specific subgroups of students with ADHD symptoms to increase treatment utilization and effectiveness (Lanza & Rhoades, 2013; Bourdon et al., 2020).

The following are the research questions and hypotheses for this dissertation:

1. What subgroups of college students with symptoms of ADHD and other co-occurring difficulties exist?

Although LCA is exploratory in nature, I used previous research to guide some hypotheses of what subgroups might emerge. Based on previous latent class analyses with college students, I expected to identify a group of students who reported pure ADHD symptoms, a group who reported ADHD and comorbid anxiety and depression, and a group who reported ADHD and comorbid problematic alcohol use (Mak et al., 2022). No hypotheses were made about how symptom presentation is differentially associated to the combinations in impairment in work, home, and social domains. Finally, I expected to identify a subclinical and/or limited impairment group (Ebejer et al., 2016; Hudziak et al., 1998; Mak et al., 2022).

2. Do demographic variables vary based on subgroup membership?

It is unclear whether demographic variables vary based on subgroup membership, but I reasoned that female gender might be more predictive of subgroups involving internalizing symptoms, whereas male gender might be more predictive of subgroups involving alcohol use disorder, given base rates for comorbid diagnoses (Dawson et al., 2010). Additionally, pre-college service use was used as a covariate as services used prior to college could affect current symptoms and thus subgroup membership. These hypotheses were tentative due to the exploratory nature of the analysis and its dependence on the subgroups identified in the first research question.

3. Do subgroups identified by the latent class analysis vary in their service utilization behavior during college?

Based on previous studies on medication management, counseling services, and academic support use in college, I expected that certain symptom presentations would be associated with different patterns of service utilization behavior, but these hypotheses were considered tentative due to their dependence on the subgroups identified in the first research question (CCMH, 2022; Garnier-Dykstra, 2012; Gormley et al., 2019). Specifically, I expected to find that the presence

of ADHD symptoms with comorbid internalizing symptoms would be associated with greater use of counseling service and disability service utilization and that the presence of functional impairment would be associated with greater use of medication management, counseling services, and disability services (Bourdon et al., 2020; Froehlich, 2019).

Table 1

Research question and analysis utilized

Research Question	Analysis Plan
1. What subgroups of college students with symptoms of ADHD and other co-occurring difficulties exist?	Unconditional Latent Class Analysis
2. Do demographic variables vary based on subgroup membership?	ML Three Step Approach; Pairwise Tests
3. Do subgroups identified by the latent class analysis vary in their service utilization behavior during college?	BCH Approach; chi-square analysis

Chapter III

METHODOLOGY

This chapter provides an overview of this dissertation's methodology, including key design features, study variables, and a description of the analytic methods. It should be noted, prior to any data collection and analysis, all study procedures were approved through Wichita State University's Institutional Review Board.

Participants

To be eligible to participate in this study, participants had to be a) currently enrolled in college as an undergraduate or graduate student, b) currently attending college in-person, c) fluent in English, d) currently living in the United States, e) between the age of 18-25, and f) have symptoms of inattention or hyperactivity/impulsivity as measured by the Adult ADHD Self-Report Screening Scale for DSM-5 (ASRS-5) ≥ 10. A total of 525 college students completed the screener in Spring 2023, but $n = 198$ did not meet study criteria. These participants were excluded, leaving a final sample of $N = 327$ participants, which is considered a sufficient sample size to estimate model parameters and reliably detect classes using latent class analysis (Weller et al., 2020).

Demographic data is reported in Table 2. The median age of the sample collected on Midwest college campuses was 20 years old (SD =1.89), and ages ranged from 18 to 25 years. Nearly all the participants (99.1%) consisted of students from Wichita State University. Over half of the sample identified as female (64.5%), while 22.6% identified as male, and 5.5% identified as non-binary. Over half of the sample identified as heterosexual (57.8%), while 18.7% identified as bisexual, and 7% identified as asexual. Most of the sample identified as White (86.2%), while 10.7% identified as Mexican or Mexican American, and 5.2% identified as African American. A majority of the sample were undergraduates in college (85.7%), with the

median being a junior in college. Most of the students were enrolled full-time (90.2%) while 9.2% were enrolled part-time. The mean grade point average (GPA) of the sample was 3.2. Most of the sample's parents had obtained a college degree or higher (63.6%); the median annual income for parents was $75,000-$100,000. A significant portion of the sample had health insurance (93.9%). Lastly, 92.4% of the sample lived in Kansas.

Table 2

Demographic characteristics

Variable	*N* / mean	% (Std. Dev.)
Age	3.60 (20.6 years)	(1.89)
Gender identity		
Woman or female	211	64.5%
Man or male	74	22.6%
Other	24	7.3%
Non-binary	18	5.5%
Sexual orientation		
Straight/Heterosexual	189	57.8%
Bisexual	61	18.7%
Lesbian or Gay	21	6.4%
Asexual	23	7.0%
Pansexual	19	5.8%
Self-identify	12	3.7%
Race		
White	282	86.2%
Hispanic	43	13.1%
Other[a]	53	16%
Black/African American	17	5.2%
Year in college		
1st year undergraduate	81	24.8%
2nd year undergraduate	74	22.6%
3rd year undergraduate	64	19.6%
4th year undergraduate	61	18.7%
Graduate student	31	9.5%
5th year beyond	16	4.9%
Parent combined annual income (above and below 75k)		
$75,000 or more	172	52.6%
Below $75,000	155	47.4%

Health insurance coverage		
Yes	307	93.9%
No	20	6.1%

Note. [a] American Indian or Alaska Native, Chinese, Filipino, Asian Indian, Vietnamese, Korean, Japanese, Hawaiian, Other Asian (e.g., Pakistani, Cambodian, Hmong, etc.), Some other race.

Measures

ADHD Screener

The presence of ADHD symptoms was assessed with the Adult ADHD Self-Report Screening Scale for DSM-5 (ASRS-5; Ustun et al., 2017). This six-item measure was chosen for its validity and widespread use in ADHD research (Ustun et al., 2017). A sample item from this measure includes asking, "How often do you put things off until the last minute"; the full measure can be found in Appendix A. Items are scored 0-4 and result in a summary score of 0-24. A score of 14 or higher is suggestive of ADHD (91.4% sensitivity, 96.0% specificity, 11.2% prevalence; Ustun et al., 2017). In the previous DSM-IV version, if at least four of the six the items are rated as being present to a clinical degree (defined as either "sometimes" or "often" depending on the question) the screen would be considered positive (Kessler et al., 2005; Lovett et al., 2021; Ustun et al., 2017). As this is an exploratory study, we reasoned that a cutoff score of 14 may be too high and subsequently screen out participants with subclinical levels of ADHD symptoms and reduce the overall sample size available to complete the study. As previous research suggests, among college students with ADHD, report of current ADHD symptoms and not an actual diagnosis of ADHD, is associated with more negative mental health outcomes (Anastopoulos et al., 2018; Mak et al., 2022; Weyandt et al., 2013; Wood et al., 2021). Thus, to retain participants and include a more representative sample of students with ADHD symptoms, the decision was made to shift the cutoff score to 10, as research indicates this score typically indicates ADHD symptoms, even in low-severity groups (Baggio et al., 2021; Genç et al., 2021).

Demographic Questionnaire

Participants completed a brief demographic questionnaire (Appendix B), which included questions about age, gender identity, sexual orientation, race, ethnicity, socioeconomic status, year in school, parent education level, enrollment status, grade point average (GPA), and state of residence.

ADHD Symptoms

ADHD symptoms were measured with the 18-item Adult ADHD Self-Report Scale (ASRS-v1.1; Kessler et al., 2005). The ASRS-v1.1 has three factors inattention, hyperactivity/impulsivity motor, and hyperactivity/impulsivity verbal; items were scored 0-4 and resulted in summed scores for the three subscales (Stanton et al., 2018). A sample item from this measure includes “How often are you distracted by noise or visibility around you”; the full scale can be found in Appendix C. The scale has substantial concurrent validity and adequate test-retest reliability in a college sample (Lovett et al., 2021). Results from previous research suggest that the 18-item ASRS scale is useful to improve classification among people who are positive on the 6-item ASRS screener (Kessler et al., 2005). No total score or cutoff for diagnostic likelihood was used, rather, summing unweighted dichotomous responses across all 18 questions produced optimal scoring to predict clinical syndrome classification (Kessler er al., 2005). Data was coded using a median split (i.e., M = 51 for the full measure, M = 27 for the inattention factor, M = 15 for the hyperactivity/impulsivity motor factor, and M = 10 for the hyperactivity/impulsivity verbal factor) to separate the groups on high (1) or low (0) symptomology for each of the three subscales and the total scale.

Functional Impairment

Functional impairment was measured with the Sheehan Disability Scale (SDS; Appendix D). The SDS is a brief, self-report, three-item measure of functional impairment across work/school, social, and family life domains (Leon et al., 1997). The SDS has high internal reliability with coefficient alpha of 0.89 and strong construct validity in an ADHD population (Coles et al., 2014; Leon et al., 1997). The participants rated the extent to which work/school, social life, and home life or family responsibilities were impaired by their symptoms on a 10-point scale. The three items were summed to a single dimensional measure of global functioning that ranged from 0 (unimpaired) to 30 (highly impaired; Leon et al., 1997). Scores of 5 or more on any of the three scales signified significant functional impairment. Scores 5 and above on each scale were recoded to (1) Yes impairment; and scores 4 or below were recoded to (0) No impairment (Leon et al., 1997).

Internalizing Symptoms

The Depression, Anxiety and Stress Scale-21 Items (DASS-21) is the short-form, 21-item scale designed to measure the subscales of depression, anxiety, and stress (Henry & Crawford, 2005; Appendix E). There are seven items on each of these three subscales and the responses are provided using a 4-point scale ranging from “did not apply to me at all” (0) to “applied to me very much or most of the time” (3). Scores for depression, anxiety, and stress were calculated by summing the scores relevant to items and multiplying them by two; cut-off scores were provided for severity labels (normal, mild, moderate, severe, extremely severe). Example items include “I find it hard to wind down” and “I find it difficult to relax.” The scale has good to excellent internal consistency across the three subscales in a general adult population (α = .86-.92) and adequate construct validity and reliability (Henry & Crawford, 2005). For each category, scores

that fell in the normal or mild cutoff range were recoded to (0) Within Normal Limits; scores that fell in the moderate, severe, or extremely severe range were recoded to (1) and indicated the presence of depression, anxiety, and stress. Specifically, scores that were 14 and above in the depression scale, 10 and above in the anxiety scale, and 19 and above in the stress scale were recoded to (1).

Alcohol Use

The Alcohol Use Disorders Identification Test (AUDIT) is a 10-item survey designed to assess problematic drinking behavior (Saunders et al., 1993; Appendix F). This measure was scored on a 5-point scale (0 = Never to 4 =Daily or Almost Daily) and included items on the amount and frequency of drinking, alcohol dependence symptoms, and problems resulting from alcohol use (Saunders et al., 1993). Scores were summed and could range from 0 to 40. On the basis of established scoring criteria, a score of 7 or below indicates low-risk consumption, a score of 8-14 indicates hazardous or harmful consumption, and a score of 15 or more indicates alcohol dependence (Saunders et al., 1993). For the purposes of this study, scores ≤7 were recoded to (0) low risk and >7 were coded (1) high risk. The AUDIT is validated in college students and is a recommended screening tool for use with adolescent and young adult populations (Saunders et al., 1993).

Service Utilization

Questions regarding service utilization were adapted from the American College Health Association National College Health Assessment and can be found in Appendix G (ACHA-NCHA; American, 2011). The questions were about medication management, individual psychological, group treatment, and disability services received prior to and during college. Each question asked what presenting concern the services were received for, the provider, number of

services accessed (0 to 10+), and satisfaction level (0 to 10). Additionally, a question was added about the informal supports received for their mental health in the past 12 months. In previous studies, reliability analyses demonstrated moderate to strong results in the evaluation of grouped or scaled items, and construct validity analyses demonstrated adequate consistency over different survey periods and populations (American, 2011). Service utilization was coded 0 = No use or 1 = Past Use for each of the four forms of services. Additionally, a total score ranging from 0 to 4 was summed for pre-college service utilization and a total score from 0 to 4 was summed for current college service utilization. The overall frequency of access was represented by the average of all items assessing how many times the participant accessed each service. Overall satisfaction with services was averaged, and a total score was used.

Procedures

Participants were recruited from universities across the United States using a multipronged approach. Data collection occurred between January 18th and February 16th, 2023; the study was also posted on a) the SONA system, a platform designed to oversee student participation in departmental research, b) flyers around campuses, and c) announcements (e.g., emails from offices of disability services and emails from the campus research analyst that manages Qualtrics accounts).

The Institutional Review Board approved all study procedures and materials. All procedures were completed online at one time point. Participants were first presented with informed consent, followed by a short series of screener questions to determine eligibility for the study. Ineligible participants were redirected to the end of the study. Eligible participants then completed the demographic questionnaire, ASRS v1.1, SDS, DASS-21, AUDIT, and questions about service utilization that were adapted from the American College Health Association

National College Health Assessment. Skip logic was used in the service utilization questionnaire if the participant indicated they never received services to reduce administration time. Students at Wichita State University that completed the study through the SONA system were incentivized with the receipt of 1 research credit upon survey completion. At the end of the survey, participants were provided resources on ADHD and well as mental health resources in case they felt distressed during survey completion. Additionally, at the end of the survey all participants who met study criteria were provided the opportunity to enter a raffle to win an Amazon Fire Tablet which retails for about $60; three winners were chosen using a random number generator.

Data Analysis Plan

Initial data preparation and cleaning involved eliminating all participants with a significant amount of missing data and those who did not pass all four validity check questions. 400 people started the survey; 71 people did not pass validity check questions and 2 had a significant amount of missing data and were excluded from further analyses. This left a sample size (N = 327) for the analysis of the research questions.

Descriptive statistics and data cleaning procedures were conducted to explore for missing data, potential outliers, as well as to ensure that the data meet the assumptions (e.g., local independence) required by the chosen statistical analyses. Frequency and patterns of missing data were explored. Missing data was explored to determine the appropriate response (e.g., Missing Completely at Random (MCAR) data is treated differently than if a pattern can be determined). The data was missing completely at random (MCAR; p = .936) and the highest amount of missing data on a measure was 1.7%; typically, if the proportion of missing data is below 5% case analysis may be used as the primary analysis (Jakobsen et al., 2017). Once the

sequence of missing data was identified, counter measures were taken. The series mean was imputed in place of missing values in the data set (Kang, 2013).

For research question one, an unconditional Latent Class Analysis (LCA) was used to identify what subgroups of college students with symptoms of ADHD exist. LCA assumes that a categorical latent factor gives rise to manifest indicators of a specific pattern of responses. The technique models heterogeneity in the data and groups participants together who share a common pattern of responses into "classes." The following eleven categorical indicator variables were used to inform latent class membership: work/school impairment, social impairment, family/home impairment, anxiety, depression, stress, alcohol consumption, total ADHD score, ADHD inattentive subscale, ADHD motor hyperactive/impulsive subscale, and ADHD verbal hyperactive/impulsive subscale. For the following subscales, data was coded using median split: total ADHD score, ADHD inattentive subscale, ADHD motor hyperactive/impulsive subscale, and ADHD verbal hyperactive/impulsive subscale.

After initial data cleaning, preparation, and basic descriptive analysis in SPSS, data was exported into a .dat notepad. The .dat data file was then utilized with Mplus 8 software for analysis. To identify the appropriate number of classes, a one-class model was fit first, followed by successive models with increasing numbers of classes until the addition of new classes no longer improved model fit. To determine the best fitting model, multiple indices and theory were used. Goodness of fit measures including the sample-size adjusted Bayesian information criterion (BIC) and the Akaike Information Criterion (AIC) were examined, with lower values indicating better fit (Nylund et al., 2007; Weller et al., 2020). Plots of these indices were also used to identify a leveling off, similar to a scree plot. The Lo-Mendell-Rubin (LMR) adjusted likelihood ratio test was used to compare the estimated model with a model with one less class.

A lack of significance indicates the additional class does not significantly improve model fit. Entropy scores were used to identify the percentage of individuals correctly classified; current literature states there is no agreed upon cutoff, but a value above .80 is acceptable (Weller et al., 2020). Average posterior probability values greater than .80 are desirable and indicate separate and distinct classes. Finally, the size of each class was considered. Classes that include less than 5% of the respondents are generally considered too small to be meaningful (Nylund-Gibson & Choi, 2018). The most parsimonious model that has both statistical and theoretical support was retained.

For research question two, the ML three-step approach (Nylund-Gibson et al., 2019) was used to evaluate how demographic and pre-college service utilization covariates (scored dichotomously) varied based on subgroup membership identified by the latent classes found in research question 1. In the first step, the posterior probabilities and modal class assignment from the unconditional model were saved. In the second step, individual cases were assigned to latent classes and the estimated conditional error probabilities for modal class assignment were computed. In the third step, the classification scores were related to demographic variables using logistic regressions.

For research question three, the BCH approach (Asparouhov & Muthén, 2021) was used to evaluate how service utilization behaviors vary across each class. The BCH method uses a weighted multiple group analysis, where the groups correspond to the latent classes to avoid shifts in class. The BCH method evaluates the means across classes for outcome variables and is the preferred method for continuous & binary auxiliary variables, even when there are substantial differences in the variance of the variables across classes (Asparouhov & Muthén, 2021).

Chapter IV

RESULTS

This chapter presents results from this study's statistical analysis. Results are organized by each of the three primary research questions.

Research Question 1: What subgroups of college students with symptoms of ADHD and other co-occurring difficulties exist?

The study's first research question was addressed by conducting a latent class analysis. Results from the class enumeration process, in which potential latent class solutions were generated, the best fitting model was identified, and the final solution was interpreted, are presented below. Latent class enumeration gives preferences to the model that adequately captures that data with the fewest number of classes (Nylund et al., 2007; Weller et al., 2020).

The LCA analysis was conducted in MPlus8.0 (Muthén & Muthén, 2017). Latent class models were generated ranging from a 1-class to a 6-class solution and goodness of fit statistics were compared (see Table 3). It is common that there are conflicting model indicators (Nylund-Gibson & Choi, 2018). Model fit was based on our theoretical understanding of symptom criteria and impairment along with the goodness of fit statistics listed in Table 3. The Log-Likelihood and AIC decreased with each successive model, but the Lo-Mendell Rubin adjusted likelihood ratio test indicated that adding classes past the four-class model did not significantly improve model fit; the 5 and 6 class models were deemed to be too minor to justify the loss of parsimony associated with them and were therefore rejected. The BIC, which is considered the most robust indicator of model fit when comparing latent class models, continued improving through the three-class model (Nylund et al., 2007). All entropy values were above .8 and thus determined to be acceptable (Weller, 2020). Information criteria were plotted with the goal of identifying a point of diminishing returns (see Figure 1; Nylund-Gibson & Choi, 2018). Based on the

goodness of fit indicators, the three and four class models were selected as candidate models for substantive interpretation.

Table 3

Goodness of fit indicators for latent class models

	# FP	LL	AIC	BIC	aBIC	LMR p-value	BLRT p-value	Entropy
1 Class	11	-2049.4	4120.7	4162.4	4127.5	--	---	---
2 Class	23	-1814.8	3675.7	3762.9	3689.9	462.4 p < .00	Values = -2049.4 p < .00	**.96**
3 Class	35	-1764.5	3599.0	**3731.7**	3620.7	V = 99.2 p < .00	V = -1814.8 p<.00	.92
4 Class	47	-1740.8	3575.5	3753.6	**3604.6**	**V= 46.9 P <.00**	**V=-1764.5 p<.00**	.84
5 Class	59	-1727.1	3572.1	3795.7	3608.6	V=23.0 p = .48	V= -1740.8 p = .10	.85
6 Class	71	**-1714.6**	**3571.1**	3840.2	3615.0	V=24.6 P =.08	V=-1727.1 p=.67	.86

**Note*. #FP = Free Parameters, LL = Log-Likelihood, AIC = Akaike Information Criterion, BIC = Bayesian Information Criterion, aBIC = Sample-Size Adjusted Information Criterion, LMR = Lo-Mendell Rubin Adjusted Likelihood Ratio Test, BLRT = Bootstrapped Likelihood Ratio Test

Figure 1

Information criteria for unconditional latent class models

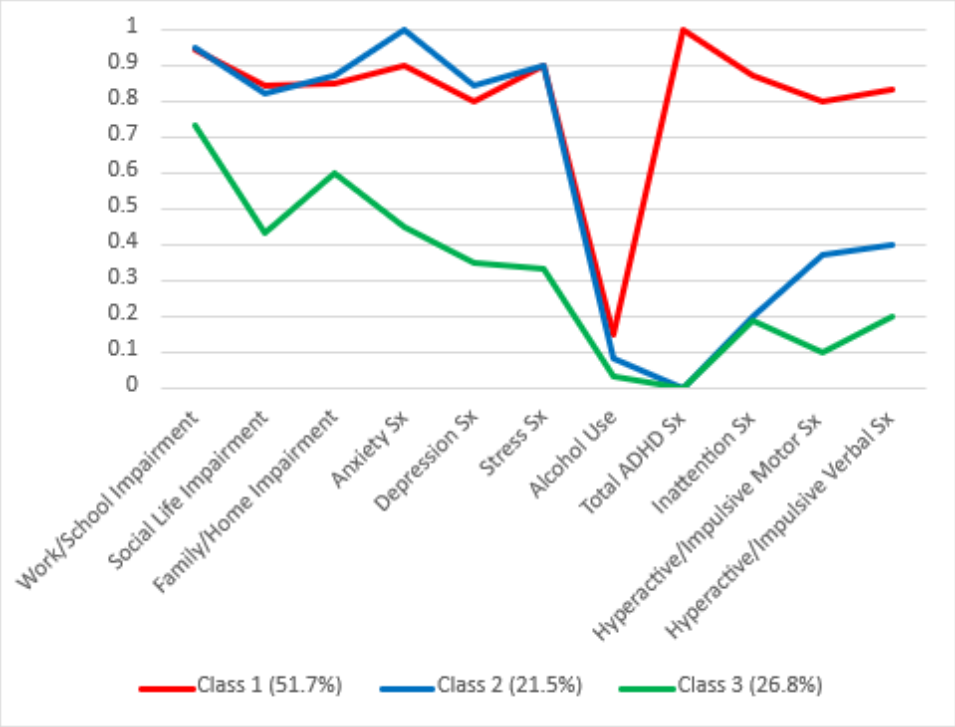
The 3-class model identified classes that differed primarily based on impairment level and ADHD symptoms (Figure 2—panel a). The three classes can be understood as follows: Class

1 = High impairment with high level of ADHD symptoms; Class 2 = High impairment with moderate hyperactivity/impulsivity symptoms; and Class 3 = Moderate impairment with mild ADHD symptoms. There was substantial improvement in information criteria model fit indicators between the 2- and 3-class models, and the BIC continued to improve through the third class, indicating that the 3-class model fit the data significantly better than the 2-class model.

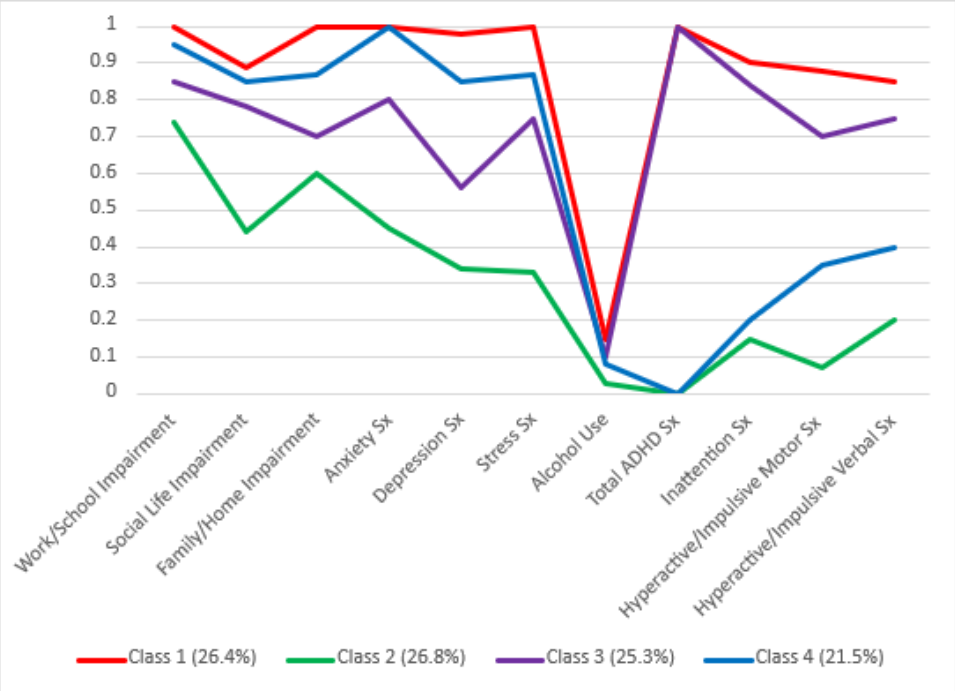
The 4-class model identified classes that differed primarily on severity of impairment and ADHD symptoms (Figure 2—panel b). The four classes can be understood as follows: Class 1 = High impairment and high ADHD symptomology overall; Class 2 = Moderate impairment and mild ADHD symptoms; Class 3 = Moderate impairment and high ADHD symptoms; and Class 4 = High impairment but moderate ADHD hyperactivity/impulsivity symptoms. The Lo-Mendell Rubin Adjusted Likelihood Ratio Test and the Bootstrapped Likelihood Ratio Tests continued improving through the 4-class model.

Figure 2
Item probability plots of latent class candidate models

a) 3-Class Model



b) 4-Class Model



Importantly, the 4-class model split Class 1 from the 3-class model into two separate classes, Class 1 and Class 3. Specifically, the 4-class model offered an additional class (Class 3) that reflected moderate levels of impairment and high ADHD symptoms. However, despite being labeled as "moderate", scores for the moderate anxiety class were still on the upper end of the spectrum and were not deemed to be substantially different from the high impairment with high ADHD symptoms class (Class 1). Thus, the contributions of the 4-class model were also deemed to be too minor to justify the loss of parsimony associated with them and the model was therefore rejected. The 3-class model, in contrast, was determined to offer unique and substantively meaningful classes. The classes are unique in that there is a class with high impairment across internalizing and functional impairment domains with high ADHD symptoms (Severe with ADHD), a class with high impairment across internalizing and functional impairment domains with moderate ADHD hyperactivity/impulsivity symptoms (Severe with Moderate ADHD), and a class with moderate impairment across internalizing and functional impairment domains with mild ADHD symptoms (Moderate with Mild ADHD). Based on this contribution, as well as the reduction in the BIC when compared to the 2- and 4-class model, the 3-class model was selected as the final solution.

Research Question 2: Do demographic variables vary based on subgroup membership?

Research question 2 is focused on understanding the relationship between demographic variables and the latent classes representing current symptoms and impairment. Answering the question involved adding covariates to the unconditional LCA estimated in the first research question to understand the effect of covariates on the probability of belonging to a certain latent class. The probability of class membership is related to the values of the covariates through multinomial logistic regression. Specifically, the latent variables were regressed onto measures

of demographics and pre-college service utilization. The latent classes were held fixed while accounting for classification error; the auxiliary variables (i.e., covariates) were included and their relationship to the latent class variable was estimated (Nylund-Gibson & Choi, 2018). Adding the covariates to the model after the LCA ensures latent classes do not reflect combined indicator variables and demographics. Covariates were first checked to meet the assumptions of logistic regressions (i.e., linearity, lack of outliers); the demographic variables selected for inclusion also showed sufficient variability across the sample. Age and total pre-college service use were treated as ordinal variables, whereas gender, sexual orientation, race, and parent income variables were dichotomized.

Table 4 contains the logistic regression odds ratios that were used to compare covariates across classes. Significant differences were found between the Severe with ADHD and the Moderate with Mild ADHD classes (p = .01) and the Severe with Moderate ADHD and the Moderate with Mild ADHD classes (p = .02) on parent income level, such that the likelihood of belonging to the Severe with ADHD or Severe with Moderate ADHD classes decreased as parent income increased whereas the likelihood of belonging in Moderate with Mild ADHD class increased as parent income increased. A probabilities plot was generated to explore the likelihood of belonging in a specific latent class as a function of the covariate parent income. As shown in Figure 3, participants' parents had a decreasing likelihood of making more than $75,000 in the Severe with ADHD class (57.7 to 48%) and the Severe with Moderate ADHD class (24.3 to 17.7%), whereas in the Moderate with Mild ADHD class, participants' parents had an increasing likelihood of making more than $75,000 (17.9% to 34.3%).

Additionally, sexual orientation was trending towards significance (p = .08) between the Severe with Moderate ADHD and Moderate with Mild ADHD classes. Specifically, results

indicated individuals in the Severe with Moderate ADHD class were less likely to identify as heterosexual compared to individuals in the Moderate with Mild ADHD class. All other covariates were not significant, including in comparisons using the Severe with ADHD class as the reference class compared to the Severe with Moderate ADHD class.

Table 4

Logistic regression odds ratio results for the 3-class LCA with covariates and the moderate impairment with mild ADHD symptoms (Moderate with Mild ADHD/class 3) as the reference group

Latent Class Covariate	Odds Ratio	S.E.	95% C.I.	P-value
High impairment with high ADHD symptoms (Severe with ADHD/class 1)				
Total Pre-Service Use	1.19	0.19	0.87, 1.64	0.28
Age	0.98	0.08	0.83, 1.16	0.83
Gender	0.81	0.25	0.45, 1.47	0.48
Sexual Orientation	0.72	0.22	0.39, 1.33	0.29
Race	1.58	0.56	0.79, 3.15	0.19
Parent Income	0.44	0.14	**0.23, 0.81**	**0.01**
High impairment with moderate hyperactivity symptoms (Severe with Moderate ADHD/class 2)				
Total Pre-Service Use	1.35	0.30	0.88, 2.07	0.18
Age	1.01	0.12	0.80, 1.27	0.95
Gender	1.51	0.68	0.62, 3.67	0.36
Sexual Orientation	0.48	0.20	0.21, 1.08	0.08
Race	1.47	0.71	0.57, 3.76	0.43
Parent Income	0.38	0.16	**0.16, 0.88**	**0.02**

Note. Age was coded (1 = 18, 2 = 19, 3 = 20, 4 = 21, 5 = 22, 6 = 23, 7 = 24, 8 = 25); gender (0 = non-women, 1 = women); sexual orientation (0 = other, 1 = heterosexual); race (0 = other, 1 = white), parent income (0 = below $75k, 1 = above $75k), and total pre-college service use (0 = none, 1 = 1 service used, 2= 2 services use, 3 =3 services use, 4 = 4 services used).

Figure 3

Probability plot for parent income covariate

Research Question 3: Do subgroups identified by the latent class analysis vary in their service utilization behavior during college?

Research question 3 focused on understanding the relationship between the latent classes and students' current service utilization behavior. The BCH approach was utilized to avoid shifts in classes and to compare means across the classes (Muthén & Muthén, 2017). For this research question, current medication use, current individual therapy use, current group therapy use, current disability service use, total services used in college, overall frequency of use, and overall satisfaction of use were used as the auxiliary variables; their descriptive statistics (M, SD, percent) are included in Table 5.

Table 5

Descriptives of service utilization variables

	Mean (Std. Dev.)	Frequency (N)	Percent
Medication Use	0.43 (0.50)		
No use		186	56.9%
Use		141	43.1%
Individual Therapy Use	0.47 (0.50)		
No use		173	52.9%
Use		154	47.1%
Group Therapy Use	0.06 (0.23)		
No use		309	94.5%
Use		18	5.5%
Disability Services Use	0.15 (0.35)		
No use		279	85.3%
Use		48	14.7%
Total # Services Used in College	1.10 (1.05)		
None		123	37.6%
1 service used		85	26.0%
2 services used		85	26.0%
3 services used		30	9.2%
4 services used		4	1.2%
Total College Use (Di)*	0.62 (0.46)		
Use		204	62.4%

No use		123	37.6%
Frequency of Accessing Each Service (0-5)	3.75 (0.87)		
Medication	4.56 (0.94)	135	41.3%
Individual Therapy	3.13 (0.75)	150	45.9%
Disability Service	3.27 (0.96)	46	14.1%
Group Therapy	3.35 (1.10)	15	4.6%
Total Satisfaction of Use (0-10)	7.09 (2.15)		
Medication	7.17 (2.06)	139	42.5%
Individual Therapy	7.13 (2.63)	150	45.9%
Disability Services	8.10 (1.75)	48	14.7%
Group Therapy	5.40 (2.44)	15	4.6%

Note. *Di = dichotomous

When comparing service utilization behavior across classes, significant differences were found across every variable with the exception of current group therapy use, which few individuals endorsed (n = 18). Table 6 contains the chi-square and p-values that were used to compare service utilization across classes. Significant differences were found between the Severe with ADHD and Moderate with Mild ADHD classes on current medication use (p =.01), current individual therapy use (p =.00), current disability services use (p =.01), total services used in college (p =.00), overall frequency of use (p =.00), and overall satisfaction of use (p =.01). Additionally, significant differences were found between Severe with Moderate ADHD and Moderate with Mild ADHD classes on current individual therapy use (p =.03), and overall frequency of use (p =.04).

Specifically, those in the Severe with ADHD class were significantly more likely to use medications (M = .50, SE = .04) compared to those in the Moderate with Mild ADHD class (M = .32, SE = .05). About a third (30.95%) of participants who reported utilizing medication services reported doing so for ADHD, followed by anxiety (30.16%) and depression (28.97%). Those in the Severe with ADHD class (M = .53, SE = .04) and Severe with Moderate ADHD class (M = .52 =, SE = .07) were significantly more likely to utilize individual therapy services compared to

those in the Moderate with Mild ADHD class (*M* = .32, *SE* = .06). Of the participants who reported utilizing individual therapy services, 29.89% reported doing so for anxiety, followed by depression (29.33%) and ADHD (16.76%). Participants in the Severe with ADHD class (*M* = .20, *SE* = .03) were also significantly more likely to use disability services compared to the Moderate with Mild ADHD class (*M* = .08, *SE* = .03). Of the participants who reported utilizing disability services, 39.51% reported doing so for ADHD, followed by anxiety (22.22%) and depression (16.05%). Further, those in the Severe with ADHD class were more likely (*M* = 1.30, *SE* = .09) to use more total services in college compared to those in Moderate with Mild ADHD class (*M* = .76, *SE* = .11). Participants in the Severe with ADHD (*M* = 2.54, *SE* = .15) and Severe with Moderate ADHD (*M* = 2.45, *SE* = .25) classes used services significantly more frequently compared to those in the Moderate with Mild ADHD class (*M* = 1.69, *SE* = .23). Lastly, participants in the Severe with ADHD (*M* = 4.73, *SE* = .29) class were significantly more satisfied with services compared to those in the Moderate with Mild ADHD class (*M* = 3.35, *SE* = .46).

Table 6

Comparisons of service utilization behavior across classes

	Chi-square	P-Value
Medication use		
Severe with ADHD vs. Severe with Moderate ADHD	1.86	0.17
Severe with ADHD vs. Moderate with Mild ADHD	7.84	**0.01**
Severe with Moderate ADHD vs. Moderate with Mild ADHD	0.85	0.36
Individual therapy use		
Severe with ADHD vs. Severe with Moderate ADHD	0.01	0.94
Severe with ADHD vs. Moderate with Mild ADHD	9.26	**0.00**
Severe with Moderate ADHD vs. Moderate with Mild ADHD	4.61	**0.03**
Group therapy use		
Severe with ADHD vs. Severe with Moderate ADHD	2.96	0.09
Severe with ADHD vs. Moderate with Mild ADHD	1.88	0.17
Severe with Moderate ADHD vs. Moderate with Mild ADHD	0.10	0.75
Disability use		
Severe with ADHD vs. Severe with Moderate ADHD	2.72	0.09

Severe with ADHD vs. Moderate with Mild ADHD	6.59	**0.01**
Severe with Moderate ADHD vs. Moderate with Mild ADHD	0.28	0.60
Total service use in college		
Severe with ADHD vs. Severe with Moderate ADHD	2.69	0.10
Severe with ADHD vs. Moderate with Mild ADHD	15.78	**0.00**
Severe with Moderate ADHD vs. Moderate with Mild ADHD	3.01	0.08
Overall Frequency of Use		
Severe with ADHD vs. Severe with Moderate ADHD	0.10	0.75
Severe with ADHD vs. Moderate with Mild ADHD	9.94	**0.00**
Severe with Moderate ADHD vs. Moderate with Mild ADHD	4.43	**0.04**
Overall Satisfaction of Use		
Severe with ADHD vs. Severe with Moderate ADHD	0.05	0.83
Severe with ADHD vs. Moderate with Mild ADHD	6.54	**0.01**
Severe with Moderate ADHD vs. Moderate with Mild ADHD	3.00	0.08

Summary of Results

In summary, the goal of research question 1 was to identify what subgroups of college students with symptoms of ADHD and other co-occurring difficulties exist; this was addressed by conducting a latent class analysis. A three-class model was selected as the final solution and best fitting model based on theoretical understanding of symptom criteria and impairment along with the goodness of fit statistics. Class 1 consisted of students with high impairment across internalizing and functional impairment domains with high ADHD symptoms (Severe with ADHD; 51.7%); Class 2 consisted of students with high impairment across internalizing and functional impairment domains with moderate hyperactivity/impulsivity ADHD symptoms (Severe with Moderate ADHD; 21.5%); and Class 3 consisted of students with moderate impairment across internalizing and functional impairment domains with mild ADHD symptoms (Moderate with Mild ADHD; 26.8%).

The goal of research question 2 was to understand the relationship between demographic variables and the latent classes representing current symptoms and impairment. Answering this question involved understanding the effects of covariates on the probability of belonging to a

certain latent class using the ML three-step approach. The only significant variable found was parent income level between the Severe with ADHD and Moderate with Mild ADHD classes (p = .01) and Severe with Moderate ADHD and Moderate with Mild ADHD classes (p = .02), such that parents in the Severe with ADHD and Severe with Moderate ADHD classes had a higher probability of making less than $75,000 compared to parents in the Moderate with Mild ADHD class.

Lastly, the goal of research question 3 was to understand if the latent classes varied in their service utilization behavior during college; this was addressed by using the BCH approach. Participants in Class 1 (Severe with ADHD) used significantly more total services, and were significantly more likely to utilize medication, individual therapy, disability services compared to Class 3 (Moderate with Mild ADHD). Additionally, participants in Class 2 (Severe with Moderate ADHD) were more likely to utilize individual therapy compared to Class 3 (Moderate with Mild ADHD). Lastly, participants in the Severe with ADHD and Severe with Moderate ADHD classes used services more frequently than those in the Moderate with Mild ADHD class and those in the Severe with ADHD class were more satisfied with services compared to those in the Moderate with Mild ADHD class.

Chapter V

DISCUSSION

The overarching goal of this study was to identify subgroups of college students with symptoms of ADHD and co-occurring difficulties using latent class analysis (LCA) and understand how service utilization behavior varies among these groups. Utilizing data that was collected from a sample of adult college students from Wichita State University, latent class analysis (LCA) was used to identify meaningful classes of college students with symptoms of ADHD and other co-occurring difficulties. I then explored whether the latent classes that emerged varied significantly by demographic variables. Finally, I explored whether service utilization among college students varied by latent class membership.

The section will begin with a discussion of key findings and how those findings relate to existing research. It should be noted that latent class analyses are rare in studies of ADHD specific to service utilization behavior. Thus, there may be few direct parallels to which the study's findings can be compared. After discussion of key findings, implications for research and practice will be discussed, then the study's limitations will be outlined.

Key Findings

Latent Classes

A three-class model was identified as the final solution and best fitting model based on theoretical understanding of symptom criteria and impairment along with the goodness-of-fit statistics. Class 1 consisted of students with high scores across internalizing and functional impairment domains with high ADHD symptoms (Severe with ADHD; 51.7%), Class 2 consisted of students with high scores across internalizing and functional impairment domains with moderate hyperactivity/impulsivity ADHD symptoms (Severe with Moderate ADHD; 21.5%), and Class 3 consisted of students with moderate scores across internalizing and

functional impairment domains with mild ADHD symptoms (Moderate with Mild ADHD; 26.8%).

These findings are consistent with previous research on symptom profiles of adults with ADHD, which typically find classes consisting of a) few symptoms, b) mostly hyperactive-impulsive symptoms, and c) inattentive symptoms (Ebejer et al., 2016). Additionally, specific to college students with ADHD and comorbidities, previous research has suggested symptom profiles of a) an ADHD + internalizing disorders class, b) an ADHD + bipolar comorbidities class, c) an ADHD + externalizing disorders class, and d) a pure ADHD disorder class (Mak et al., 2022).

Surprisingly, our sample did not have an inattentive symptom only group. This may be because our sample consisted of young adult college aged students and most of them were women (64.5%). Previous LCAs indicate women within the inattentive classes typically report more symptoms and reduced emotional health; additionally younger adults typically report more symptoms compared to older adults (Ebejer et al., 2016). Thus, similar to LCAs with younger college students, our results reflected classes that consisted of ADHD-combined and comorbid disorders compared to an inattention only class (Mak et al., 2022).

Additionally, it appears that our sample did not have a "pure" ADHD disorder class. Rather, the Severe with ADHD and Severe with Moderate ADHD classes both endorsed high impairment across measures of internalizing domains. Conceptually, this aligns with ADHD + internalizing disorders symptom profile found in Mak et al., (2022). Specific to research on adult ADHD and the ASRS-v1.1, the inattentiveness factor is associated with internalizing disorders, the verbal hyperactivity/impulsivity factor is negatively related to major depressive disorder (e.g., those with depressed mood and withdrawn will not be overly talkative and noisy), and the

motor hyperactivity/impulsivity factor is positively related to generalized anxiety disorder and panic disorder (Stanton et al., 2018). Thus, this may help explain why both the Severe with ADHD class with high symptoms of inattention and motor and verbal hyperactivity/impulsivity and the Severe with Moderate ADHD class with moderate symptoms of motor and verbal hyperactivity/impulsivity showed more impairment regarding internalizing symptoms.

Interestingly, the final classes did not represent a class of high ADHD and problematic alcohol use as expected from previous research on finding a class of ADHD + externalizing disorders (Mak et al., 2022). This may be explained by the mean age of the sample was 20.6 years old, under the legal age limit to purchase and consume alcohol. Also, perhaps additional measures of externalizing behaviors and more comprehensive measures of internalizing disorders compared to screeners would have been useful for this sample, which will be discussed further in the limitations section.

Further, the Moderate with Mild ADHD class symptom profile suggests one class of students is experiencing less impairment overall and is consistent with previous findings of having a class consisting of few symptoms (Ebejer et al., 2016). Notably, this class may also be a reflection of the decision to include a subclinical sample; students may not be meeting the threshold for a diagnosis of ADHD but clearly report impairment, which will be further discussed in the implications section. However, it should be noted that in order to participate in the study, participants needed to endorse a threshold of symptoms consistent with ADHD and associated problems during the screening process; the study design did not allow for a sample without ADHD symptoms.

The pattern of impairments endorsed by students in the sample aligns with the research on co-occurring difficulties that college students with ADHD experience. For example, students

with ADHD report notable academic impairments; they often struggle academically, are more likely to be placed on academic probation, and have higher dropout rates (Khalis et al., 2018, Weyandt & DuPaul, 2006; Weyandt & DuPaul, 2013). This was a clear and consistent pattern across all participants in the sample and might reflect a self-selection bias into the study. Additionally, it is not surprising to see the two classes with greater internalizing symptoms also report higher levels of impairments in social life and family/home responsibilities. High levels of depression and anxiety can cause lower quality of life, significant problems in relationships, and reduce productivity and achievement (APA, 2013; Li et al., 2022). College students with ADHD often report lower levels of social skills and managing interpersonal conflicts as well as deficits in daily living skills, which can also impact home responsibilities (Canu et al., 2021; Shaw-Zirt et al, 2005).

Demographic Variables

The goal of research question 2 was to understand the relationship between demographic variables and the latent classes representing current symptoms and impairment. The tentative hypotheses that gender and pre-college service use may be more predictive of subgroup membership were made. However, the only significant variable found was parent income level between the Severe with ADHD and Moderate with Mild ADHD classes (p = .01) and Severe with Moderate ADHD and Moderate with Mild ADHD classes (p = .02). Parents in the Severe with ADHD and Severe with Moderate ADHD classes had a higher probability of making less than $75,000 compared to parents in the Moderate with Mild ADHD class. Meaning, parents of students in the Moderate with Mild ADHD class had a higher probability of making more income, greater than $75,000.

I reasoned that female gender might be more predictive of subgroups involving internalizing symptoms, whereas male gender might be more predictive of subgroups involving alcohol use disorder, given base rates for comorbid diagnoses (Dawson et al., 2010). However, we did not see any separation of internalizing vs externalizing disorders in our LCA as much of the sample reported high internalizing symptoms and few reported alcohol use. Additionally, I reasoned that pre-college service use could affect current symptoms and thus affect subgroup membership. However, pre-college use was not found to be a significant covariate. One reason for this may be because for some pre-college use might have helped reduce impairment (like in the Moderate with Mild ADHD class), but for others, pre-college use could have been a signal of more impairment overall (like in the Severe with ADHD and Severe with Moderate ADHD classes); this relationship should be examined in future studies.

Nevertheless, the significant results found are consistent with the current literature. A meta-analysis of socioeconomic status and child psychopathology of children in the United States revealed that children raised in families with low socioeconomic status (SES) are more likely to display symptoms of psychopathology (Peverill et al., 2021). Previous data suggests ADHD is more prevalent among children with families with lower household incomes and lower parental education (Rowland et al., 2017). Specific to college students, many studies suggest SES is associated with anxiety and depression; college students with lower SES are more likely to suffer from anxiety and depressive disorders compared to those with higher SES (Eisenburg et al., 2013; Simić-Vukomanović et al., 2016). There are limited studies specifically focused on SES for college students with ADHD, though a systematic review of socioeconomic disadvantage and ADHD in children and teens across five continents found significant associations between low SES and increased prevalence of ADHD (Russell et al., 2016). It

should be noted that each study tends to use different scales for ranking parent income as high or low. In the current study, income was coded based on a median split, which was $75,000. However, this median split may not generalize to other areas of the United States, which will be discussed further in the limitation section. Additionally, another important consideration is the sample population; generally, even though a majority of the sample's parent's annual income was over $75,000, Wichita State University generally serves a first-generation population of students. Therefore, it is unknown whether the same findings would emerge at other institutions across the United States where parents may have greater income and potentially greater educational attainment.

Service Utilization Behavior

Lastly, the goal of research question 3 was to understand if subgroups identified by the LCA varied in their service utilization behavior during college. The tentative hypothesis that certain symptom presentations (e.g., co-morbid ADHD and internalizing symptoms, high levels of impairment) would be associated with different patterns of service utilization behavior was found to be true in this study. Participants in Class 1 (Severe with ADHD) used significantly more total services, and were significantly more likely to utilize medication, individual therapy, disability services compared to Class 3 (Moderate with Mild ADHD). Additionally, participants in Class 2 (Severe with Moderate ADHD) were more likely to utilize individual therapy compared to Class 3 (Moderate with Mild ADHD). Lastly, participants in the Severe with ADHD and Severe with Moderate ADHD classes used services more frequently than those in the Moderate with Mild ADHD class and those in the Severe with ADHD class were more satisfied with services compared to those in the Moderate with Mild ADHD class. The most common reason for seeking medication services was for ADHD, closely followed by anxiety and

depression; for individual therapy the most common reason was closely split between anxiety and depression, and lastly ADHD was reported as the most common reason for seeking disability services. Thus, among the students who reported using services on campus, those with higher levels of impairment were more likely to utilize services. Meaning, those with higher levels of impairments and symptoms are either being identified and encouraged by colleges and universities to seek support, or the students are seeking out the support services themselves and the support services offered appropriately match their needs. However, it appears that this may be less true for those with moderate impairments and mild symptoms. This may be because this group is unaware of the level of their impairments, or the university does not have support services appropriate for them; this group likely needs more focused support on college campuses.

Conceptually, this aligns with previous findings that those with higher levels of impairment are higher utilizers of available services (Bourdon et al., 2020). Although it is still concerning that the Moderate with Mild ADHD class was the least likely to receive services as they still reported moderate impairment and ADHD symptoms, their class reported less symptoms of anxiety and depression in comparison to the other two classes; thus, perhaps the presence of comorbid conditions is what drives students to seek services rather than simply ADHD alone. Bourdon and colleagues noted endorsement of each additional mental health condition is associated with increases in service utilization, meaning, the higher level of impairment, comorbidity, and distress results in higher utilizers of services (2020). Alternatively, those in the Moderate with Mild ADHD class may not have a diagnosis of ADHD, potentially as they are at a subclinical level, and find it less acceptable to seek treatment or are ineligible for some services compared to those with a diagnosis. Though, the literature on this is mixed as attitudes toward mental health treatment vary significantly and can be impacted by multiple

factors like race; recent studies show the most important factor in service use is increased perceived accessibility (Bourdon et al., 2020, Alvarez-Hernandez et al., 2022).

Most notably, over half of the study's sample are not receiving medication services (56.9%), individual therapy services (52.9%), group therapy services (94.5%), and disability services (85.3%) that are available to them. This is consistent with prior research outlining that college students with ADHD have poor adherence rates to medications and have low rates of seeking counseling and disability services (Froehlich, 2018; Lefler et al., 2016; Anastopoulos & King, 2015). For example, specific to disability service utilization, a recent study revealed only about 25% of college student participants use disability accommodations in a single semester (Blasey et al., 2022). Specific to internalizing problems among college students, depression, but not anxiety, is a significant predictor of utilizing counseling services (Bourdon et al., 2020). Some have sought to understand the reasoning for low service utilization; reasons range from personal stigmas held about seeking services to beliefs that help is not needed, but future research is needed to understand this relationship (Lefler et al., 2016). However, due to the sample primarily representing one university, this could be an issue specific to Wichita State University or the greater Wichita community.

Implications

This study's findings suggest multiple avenues for future research and practice implications. First and foremost, future research across a more diverse national or international sample on service utilization behavior of college students with ADHD and comorbid symptoms and impairments is warranted. For example, results from this study indicate participant's parents had a reduced likelihood of making more than $75,000 if their child was experiencing higher impairment; but over half the sample (52.6%) indicated their parents combined annual income

was above $75,000. Thus, there may be a segment of students who are low income who may be displaying higher impairment and future research is needed for this population.

Moreover, future research across a more diverse sample may yield different service utilization behavior as other universities may offer a boarder variety of services for students. The current study's sample and their service utilization could be highly reflective of services offered at Wichita State University. For example, low utilization rates of group therapy may be explained by a lack of group therapy services offered at Wichita State University to students with concerns related to ADHD. There may be higher group therapy utilization rates on campuses that offer programs like the ACCESS program, a cognitive-behavioral therapeutic intervention specifically aimed at undergraduates with ADHD (Anastopoulos & King, 2015).

Additionally, results from this study revealed students with symptoms of ADHD are underutilizing services. As previously mentioned, over half of the sample is not receiving medication services, individual therapy services, group therapy services, and disability services that are available to them. Almost 40% of students who endorsed symptoms of ADHD are not receiving any services at all; this aligns with data suggesting there is a clear gap between symptomatic students and those who are receiving services (Blasey et al., 2022). Future research should focus on understanding the characteristics of why some students receive services and why some do not. For example, perhaps the students who receive services (e.g., disability services) are only doing so because they have been identified by the university as "at risk" due to their grades. Alternatively, perhaps those receiving services had stronger support (e.g., parents, advisors) or understood how to navigate the system to apply for accommodations due to experience with IEPs or 504 plans prior to college. Further, students may not utilize certain services as they do not find them "helpful". For example, Mamboleo and colleagues explained

that using accommodations from disability services is often related to the level of understanding and caring that individual instructors show toward their students (2020). Thus, the burden of ensuring students access services may be falling on individual interactions with professors compared to an office like disability services or counseling and prevention services. Understanding the subtleties as to why some students receive accommodations and some do not can help color a picture of how to accommodate the students who are experiencing symptoms but are slipping through the cracks not receiving services.

However, the implications of the Moderate with Mild ADHD class cannot be overlooked. The current study included participants with subclinical levels of ADHD given data suggesting symptomology rather than diagnosis is associated with more negative mental health outcomes (Weyandt et al., 2013). Thus, the Moderate with Mild ADHD class may represent a group of students who are experiencing subclinical levels of symptoms. Meaning, some services (e.g., medication) may not be offered or appropriate if they are not eligible for a diagnosis. Lefler and colleagues argued that the current DSM-5 symptom criteria may not be the best fit for diagnosing college students who are "late-identified", or had symptoms as a child but do not receive a diagnosis until an adult, as some of the current criteria (e.g., often climbs) are more appropriate for elementary aged children; additionally, the current criteria do not specify how many symptoms needed to be present in before the age of 12 when making an ADHD diagnosis in adulthood (2021). These issues may be contributing to the problem of subgroups of students, like the Moderate with Mild ADHD class, who experience symptoms but do not receive services as they are not meeting the criteria for a diagnosis that would make them appropriate and eligible for services. Symptom cutoffs that indicate impairment in adults, as well as alternative symptoms

that are more appropriate for adults should be further researched and incorporated into future additions of the DSM (Lefler et al., 2021).

Further, future qualitative research (e.g., focus groups) for college students with ADHD symptoms and co-occurring difficulties may be beneficial to understand the barriers and facilitators to service utilization. Specifically, a focus group with students who fall in the Moderate with Mild ADHD class may be particularly useful to understand their needs and details like if they have a diagnosis, how they understand their own symptoms, barriers (if any) to receiving a diagnosis, and support that would be the most helpful to them. For example, implementing a structured study group or monthly information sessions on finding a healthy study environment or time management skills may be helpful for this group of students to reduce school impairment.

The current findings can inform practitioners and stakeholders who provide counseling or support services to students with ADHD and comorbid symptoms. Results indicate students who experienced the most impairment (Severe with ADHD) were more likely to receive services. It should be emphasized that the Moderate with Mild ADHD class reported impairment and ADHD symptoms, yet they were significantly less likely to receive services, meaning, a group of students with impairment and symptoms are going untreated without support on campus. There may be a need to adjust the assessment of ADHD to capture these unique classes of students. First, it may be possible that some students are not aware they meet criteria for ADHD, or they may be unable to obtain an official diagnosis to receive services (e.g., cannot pay for psychological evaluation). Colleges and universities should be screening and assessing all incoming students for ADHD and comorbid disorders; or providing affordable options for students to receive a diagnosis. Additionally, coordinated or integrated care settings on campus

may increase identification of these students and increase appropriate referrals for evaluation. Second, when assessing for ADHD in college, assessments should take into consideration the unique symptom profiles students may present with. As this study uncovered, there may be students who experience moderate to high levels of impairments but show differing levels and symptom presentations of ADHD; for example, those with high levels of ADHD compared to those with milder symptoms. Third, the effect of comorbid conditions cannot be overlooked and should be regularly assessed. In this sample, there was no "pure" ADHD class, each class endorsed symptoms of anxiety and depression. These comorbidities speak to the transdiagnostic and individualized treatment needs of these individuals (Mak et al., 2022).

To support the students on campus with subclinical levels of ADHD that experience impairment, colleges and universities need to have a systematic way of identifying these individuals. Ideally, as a part of a campus wide screening effort, these students would be identified and provided resources appropriate for their needs. For example, despite these individuals presenting at subclinical levels of ADHD, they may have other concerns (e.g., internalizing disorders, impairments in other areas of life) that warrant services. Alternatively, they could be provided non-clinical resources appropriate to their situation; this may include colleges and universities holding outreach workshops or seminars (e.g., stress and time management, communication skills, etc.) or simply better advertising these workshops that likely already exist to this population of students. In practice, this may look like academic advisors or instructors attending training to increase awareness of and identify students with impairment and have a simple way to opt the students into receiving notifications about these outreach events.

Limitations

This study's findings should be understood in the context of its limitations. First, there are generalizability issues as it pertains to the sample; participants in the current study were part of convenience sample of students who volunteered for the study. Although attempts were made to recruit from the larger local community (e.g., community colleges and universities across multiple states), most of the sample (99.1%) consisted of students recruited from Wichita State University through various means like brochures, emails, and SONA. The factors that led this group of students to take the study may differentiate them from students who saw study advertisements and chose not to volunteer, and findings should be considered with this in mind. Likewise, the sample generally lacked diversity; for example, over half of the sample were women (64.5%) and the large majority were white (86.2%) and had health insurance coverage (93.9%). As the sample determines the latent classes, a larger and more diverse sample from different regions may yield alternative classes that consist of different characteristics and service utilization behaviors. This may limit the generalizability of the conclusions drawn.

Second, the decision to use subscale scores rather than multiple items within each scale as indicator variables is also another limitation to the study. However, this decision was made to limit the number of indicator variables. There is no agreement on the recommended number of indicator variables to include in a model, but it is simpler to interpret classes when indicator variables have fewer levels (Weller et al., 2020). I cannot rule out the possibility that other distinct classes might have emerged if individual items, rather than subscale scores were used.

Third, a latent class analysis (LCA) requires the use of categorial (often binary) variables, whereas a latent profile analysis (LPA) utilizes continuous indicator variables (Nylund-Gibson & Choi, 2018). Dichotomizing variables into categorical and binary variables is consistent with best

practice guidelines for conducting a LCA (Nylund-Gibson & Choi, 2018). However, when dichotomizing variables, participants are separated based on a median split where all values on one side of the median are considered equivalent and any further variation in participant's scores are ignored. Also, two values on either side of the median are characterized as different whereas they may be similar. Thus, this process of placing participants into two groups can result in a loss of detailed information within the data. The decision to run an LCA was made as it is the recommended analysis to use with covariates (Asparouhov & Muthén, 2021). However, the implications of running an LCA and not LPA could have resulted in a more truncated analysis of the sample, so results should be interpreted with this in mind.

Fourth, the use of self-report data is an additional limitation to this study. Specifically, lack of parental corroboration in developmental history may specifically produce bias in ADHD prevalence estimate. Additionally, as the ASRS screener does not specify age of onset, it could potentially produce a positive ADHD screen that makes it difficult to differentiate from other mental disorders that have similar clinical features (Mak et al., 2022). Additionally, while the use of screening measures was necessary to reduce the burden on participants, they are inherently limiting in the information that can be assessed. Likewise, our screener eliminated individuals who did not meet a minimum threshold of reporting symptoms of ADHD; as such, we did not have the opportunity to explore latent classes for a subgroup without any ADHD symptoms unlike previous studies (e.g., Ebejer et al., 2016).

Finally, as with any latent class analysis, a number of additional comorbid conditions and impairments could have been included as indicator variables of our classes. We intentionally restricted the number of indicators and assessment of co-occurring conditions due to our sample size and survey length limitations given our target sample. However, future studies with larger

samples could potentially include other indicator variables (e.g., screeners for conduct disorders, bipolar disorders) that are associated with ADHD. Future longitudinal research should examine the stability of these classes over time.

Conclusions

The current study identified subgroups of college students with symptoms of ADHD and co-occurring difficulties using latent class analysis (LCA) to understand how service utilization behavior varied among these groups. To this author's knowledge, this is the first study to report on symptom profiles of college students with ADHD and comorbid difficulties and their service utilization behavior. The three latent classes that were identified varied both by impairment levels and ADHD symptoms. The results are important in the following ways: ADHD was frequently comorbid with other internalizing disorders; college students reported moderate to high levels of functional impairment particularly in regard to work/school functioning; and students with differing levels of impairment and ADHD symptoms utilized services differently—often those with higher levels of impairment were more likely to utilize services. There is a need for increased screening of ADHD and comorbid difficulties on campuses. Colleges and universities need to adjust their approaches in how they identify students in need of services, market available services, and incorporate adjustments (e.g., treating comorbid ADHD and internalizing disorders) to treatment protocols. Future studies should aim to include larger, more nationally representative samples of participants to generalize findings to the broader community.

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APPENDICES

APPENDIX A

SCREENER

Please answer the following questions.

1. Are you currently enrolled as an undergraduate or graduate college student?

- Yes
- No

2. Are you currently attending at least one college course in-person?

- Yes
- No

3. Are you fluent in English?

- Yes
- No

4. Do you currently live in the United States?

- Yes
- No

5. What is your age: _____ *[dropdown list to select]*

6. Adult ADHD Self-Report Screening Scale for DSM-5 (ASRS-5)

This Adult ADHD Self-Report Screening Scale for DSM-5 (ASRS-5) is intended for people aged 18 years or older. Check the box that best describes how you have felt over the past 6 months.

	Never	**Rarely**	**Some-times**	**Often**	**Very Often**
1.How often do you have difficulty concentrating on what people are saying to you even when they are speaking to you directly?	0	1	2	3	4
2.How often do you leave your seat in meetings or other situations in which you are expected to remain seated?	0	1	2	3	4
3.How often do you have difficulty unwinding and relaxing when you have time to yourself?	0	1	2	3	4
4.When you're in a conversation, how often do you find yourself finishing the sentences of the people you are talking to before they can finish themselves?	0	1	2	3	4
5.How often do you put things off until the last minute?	0	1	2	3	4
6. How often do you depend on others to keep your life in order and attend to details?	0	1	2	3	4

Participants will be exited from the study if they indicate they are a) not enrolled as a college student, b) are not attending college in-person, c) are not fluent in English, d) do not currently live in the United States, e) or are under 18 years of age or over the age of 25, and f) do not have symptoms of either inattention, hyperactivity or impulsivity.

APPENDIX B

DEMOGRAPHICS QUESTIONNAIRE

1. Which term do you use to describe your gender identity:

- Woman or female
- Man or male
- Transgender woman
- Transgender man
- Genderqueer/Gender non-conforming
- Non-binary
- Self-identify: [Text]

2. Please select your sexual orientation:

- Straight/Heterosexual
- Bisexual
- Lesbian or Gay
- Asexual
- Pansexual
- Self-identify: [Text]

3. Are you of Hispanic, Latino, or Spanish origin?

- No, not of Hispanic, Latino, or Spanish origin
- Yes, Mexican, Mexican Am., Chicano
- Yes, Puerto Rican
- Yes, Cuban
- Yes, another Hispanic, Latino, or Spanish origin: [Text]

4. Please select your race and/or ethnicity: [Select all that apply]

- White (e.g., German, Irish, English, Italian, Lebanese, Egyptian, etc.)
- Black or African Am. (E.g., African American, Jamaican, Haitian, Nigerian, Ethiopian, Somali, etc.)
- American Indian or Alaska Native (e.g., Navajo Nation, Blackfeet Tribe, Mayan, Aztec, Nome Eskimo Community, etc.)
- Chinese
- Filipino
- Asian Indian
- Vietnamese
- Korean
- Japanese
- Native Hawaiian
- Samoan

- Chamorro
- Other Pacific Islander (e.g., Tongan, Fijian, etc.)
- Other Asian (e.g., Pakistani, Cambodian, Hmong, etc.)
- Some other race: [Text]

5. What year are you in college?

- 1st year undergraduate
- 2nd year undergraduate
- 3rd year undergraduate
- 4th year undergraduate
- 5th year beyond
- Graduate student
- N/A

6. What is your enrollment status

- Full-time
- Part-time
- Other (please specify)

7. Please type your approximate numerical cumulative grade point average (e.g., 3.0) in the box below: _____ *[Write in]*

8. What is the highest degree one of your parents has obtained?

- Secondary school (high school) or less
- Some postsecondary (college) education
- College graduate (e.g., BA, BS)
- Master's degree or equivalent (e.g., MA, MS)
- Doctoral degree or equivalent (e.g., PhD, MD)
- N/A

9. What is your parent(s) estimated combined annual income?

- $250,00 or more
- $100,000 - $250,000
- $75,000 - $100,000
- $50,000 - $75,000
- $25,000 - $50,000
- Less than $25,000
- N/A

10. If you are financially independent, what is your estimated annual income?

- $100,000 or more
- $75,000 - $100,000

- $50,000 - $75,000
- $25,000 - $50,000
- $10,000 - $25,000
- Less than $10,000
- N/A

11. Do you have health insurance (through your parents plan or individually)?

- Yes
- No
- N/A

12. What State do you live in?

- _____ *[drop down list to select]*

APPENDIX C

ADULT ADHD SELF-REPORT SCALE (ASRS-v1.1)

Please answer the questions below, rating yourself on each of the criteria shown using the scale on the right side of the page. As you answer each question, select the box that best describes how you have felt and conduced yourself over the past 6 months.

	Never	**Rarely**	**Some-times**	**Often**	**Very Often**
1.How often do you have trouble wrapping up the final details of a project, once the challenging parts have been done?	0	1	2	3	4
2.How often do you have difficulty getting things in order when you have to do a task that requires organization?	0	1	2	3	4
3.How often do you have problems remembering appointments or obligations?	0	1	2	3	4
4.When you have a task that requires a lot of thought, how often do you avoid or delay getting started?	0	1	2	3	4
5.How often do you fidget or squirm with your hands or feet when you have to sit down for a long time?	0	1	2	3	4
6.How often do you feel overly active and compelled to do things, like you were driven by a motor?	0	1	2	3	4
7.How often do you make careless mistakes when you have to work on a boring or difficult project?	0	1	2	3	4
8.How often do you have difficulty keeping your attention when you are doing boring or repetitive work?	0	1	2	3	4
9.How often do you have difficulty concentrating on what people say to you, even when they are speaking to you directly?	0	1	2	3	4
10.How often do you misplace or have difficulty finding things at home or work?	0	1	2	3	4
11.How often are you distracted by activity or noise around you?	0	1	2	3	4
12. How often do you leave your seat in meetings or other situations in which you are expected to remain seated?	0	1	2	3	4
13.How often do you feel restless or fidgety?	0	1	2	3	4
14. How often do you have difficulty unwinding and relaxing when you have time to yourself?	0	1	2	3	4

15. How often do you find yourself talking too much in social situations?	0	1	2	3	4
16. When you're in a conversation, how often do you find yourself finishing the sentences of the people you are talking to, before they can finish themselves?	0	1	2	3	4
17. How often do you have difficulty waiting your turn in situations when turn taking is required?	0	1	2	3	4
18. How often do you interrupt others when they are busy?	0	1	2	3	4

**Clinically significant symptom levels for seven questions were defined as responses of sometimes, often, and very often. For the remaining 11 questions, often and very often were the clinically significant symptom levels.*

APPENDIX D

SHEEHAN DISABILITY SCALE

Please mark ONE response for each Scale

WORK*/SCHOOL

The symptoms have disrupted your work / schoolwork:

Not at all	**Mildly**			**Moderately**			**Markedly**			**Extremely**
0	1	2	3	4	5	6	7	8	9	10

□ N/A I have not worked/studied at all during the past week for reasons unrelated to the disorder. Work includes paid, unpaid volunteer work or training.

SOCIAL LIFE

The symptoms have disrupted your social life / leisure activities:

Not at all	**Mildly**			**Moderately**			**Markedly**			**Extremely**
0	1	2	3	4	5	6	7	8	9	10

FAMILY LIFE / HOME RESPONSIBILITIES

The symptoms have disrupted your family life / home responsibilities:

Not at all	**Mildly**			**Moderately**			**Markedly**			**Extremely**
0	1	2	3	4	5	6	7	8	9	10

Days Lost

On how many days in the last week did your symptoms cause you to miss school or work or leave you unable to carry out your normal daily responsibilities? (Enter a number 0-7): _____

Days Unproductive

On how many days in the last week did you feel so impaired by your symptoms, that even though you went to school or work, your productivity was reduced? (Enter a number 0-7): _____

APPENDIX E

DASS-21

Instructions: Please read each statement and select a number 0, 1, 2, or 3 which indicated how much the statement applied to you **over the past week**. There are no right or wrong answers. Do not spend too much time on any statement:

The rating scale is as follows:

0-Did not apply to me at all
1-Applied to me to some degree, or some of the time
2-Applied to me a considerable degree or good part of time
3-applied to me very much or most of the time

1(s)	I found it hard to wind down	0	1	2	3
2(a)	I was aware of dryness of my mouth	0	1	2	3
3(d)	I couldn't seem to experience any positive feeling at all	0	1	2	3
4(a)	I experienced breathing difficulty (e.g., excessively rapid breathing, breathlessness in the absences of physical exertion)	0	1	2	3
5(d)	I found it difficult to work up the initiative to do things	0	1	2	3
6(s)	I tended to over-react to situations	0	1	2	3
7(a)	I experienced trembling (e.g., in the hands)	0	1	2	3
8(s)	I felt that I was using a lot of nervous energy	0	1	2	3
9(a)	I was worried about situations in which I might panic and make a fool of myself	0	1	2	3
10(d)	I felt that I had nothing to look forward to	0	1	2	3
11(s)	I found myself getting agitated	0	1	2	3
12(s)	I found it difficult to relax	0	1	2	3
13(d)	I felt down-hearted and blue	0	1	2	3
14(s)	I was intolerant of anything that kept me from getting on with what I was doing	0	1	2	3
15(a)	I felt I was close to panic	0	1	2	3
16(d)	I was unable to become enthusiastic about anything	0	1	2	3
17(d)	I felt I wasn't worth much as a person	0	1	2	3
18(s)	I felt that I was rather touchy	0	1	2	3
19(a)	I was aware of the action of my heart in the absence of physical exertion (e.g., sense of heart rate increase, heart missing a beat)	0	1	2	3
20(a)	I felt scared without any good reason	0	1	2	3
21(d)	I felt that life was meaningless	0	1	2	3

APPENDIX F

AUDIT

	0 points	1 points	2 points	3 points	4 points
1. How often do you have a drink containing alcohol?	Never	Monthly or less	2-4 times a month	2-3 times a week	4 or more times a week
2. How many standard drinks containing alcohol do you have on a typical day wen drinking?	1 or 2	3 or 4	5 or 6	7 to 9	10 or more
3. How often do you have six or more drinks on one occasion?	Never	Less than monthly	Monthly	Weekly	Daily or almost daily
4. During the past year, how often have you found that you were not able to stop drinking once you had started?	Never	Less than monthly	Monthly	Weekly	Daily or almost daily
5. During the past year, how often have you failed to do what was normally expected of you because of drinking?	Never	Less than monthly	Monthly	Weekly	Daily or almost daily
6. During the past year, how often have you needed a drink in the morning to get yourself going after a heaving drinking session?	Never	Less than monthly	Monthly	Weekly	Daily or almost daily
7. During the past year, how often have you had a feeling of guilt or remorse after drinking?	Never	Less than monthly	Monthly	Weekly	Daily or almost daily
8. During the past year, how often have you been unable to remember what happened the night before because you had been drinking?	Never	Less than monthly	Monthly	Weekly	Daily or almost daily
9. Have you are someone else been injured as a result of your drinking?	No		Yes, but not in the past year		Yes, during the past year
10. Has a relative or friend, doctor or other health worker been concerns about your drinking or suggested you cut down?	No		Yes, but not in the past year		Yes, during the past year

APPENDIX G

SERVICE UTILIZATION

Adapted from the American College Health Association National College Health Assessment

The following section asks about whether or not you have received services from different types of healthcare or mental health professionals both prior to and in college.

1. Have you received medication management for a psychological disorder or concern *prior to college*?

□ No
□ Yes

1.2 What presenting concern did you receive the medication management for (e.g., ADHD, depression, anxiety, relationship concerns)? _____ [write in]

1.3 Who provided the medication management?

	Yes	No
Pediatrician	1	2
Family physician	1	2
Nurse Practitioner	1	2
Psychiatrist	1	2
Neurologist	1	2
A provider not described above (please specify)	1	2

1.4 How often did you use medication management (e.g., how often do you take medications)?

- Almost never (less than once per month)
- Rarely (e.g., 1-2 times per month)
- Sometimes (e.g., 1-2 times per week)
- Often (e.g., 3-5 times per week)
- Always (e.g., 6-7 times per week or daily)
- N/A
- Other [please specify]

1.5 How satisfied were you with the medication services?

Not at all	Mildly			Moderately			Markedly			Extremely	N/A
0	1	2	3	4	5	6	7	8	9	10	

2. Have you received individual psychological or mental health services (e.g., individual therapy) *prior to college*?

□ No
□ Yes

2.2 What presenting concern did you receive the mental health services for (e.g., ADHD, depression, anxiety, relationship concerns)? _____

2.3 Who provided the mental health services?

	Yes	No
A counselor (e.g., social worker, family therapist, psychologist, licensed professional counselor)	1	2
Psychiatrist (MD or DO)	1	2
A provider not described above (please specify)	1	2

2.4 How often did you access individual therapy services (e.g., frequency of attending sessions)?

- Almost never (less than once every 3 months)
- Rarely (e.g., less than once per month)
- Sometimes (e.g., 1-2 times per month)
- Often (e.g., 1 time per week)
- Always (e.g., more than 2 times per week)
- N/A
- Other [please specify]

2.5 How satisfied were you with the individual therapy services?

Not at all	Mildly			Moderately			Markedly			Extremely	N/A
0	1	2	3	4	5	6	7	8	9	10	

3. Have you received group treatment (e.g., skills group) *prior to college*?

□ No
□ Yes

3.2 What presenting concern did you receive the group treatment for (e.g., ADHD, depression, anxiety, relationship concerns)? _____

3.3 Who provided the group treatment?

	Yes	No
A counselor (e.g., social worker, family therapist, psychologist, licensed professional counselor)	1	2

A provider not described above (please specify)	1	2

3.4 How often did you access the group treatment (e.g., frequency of attending group sessions)?

- Almost never (less than once every 3 months)
- Rarely (e.g., less than once per month)
- Sometimes (e.g., 1-2 times per month)
- Often (e.g., 1 time per week)
- Always (e.g., more than 2 times per week)
- N/A
- Other [please specify]

3.5 How satisfied were you with group treatment?

Not at all	Mildly			Moderately			Markedly			Extremely	N/A
0	1	2	3	4	5	6	7	8	9	10	

4. Have you received school academic / disability services (e.g., IEP/504 plan) *prior to college*?

□ No
□ Yes

4.2 What presenting concern did you receive the school academic/disability services for (e.g., ADHD, depression, anxiety, relationship concerns)? _____

4.3 Who provided the school academic/disability services?

	Yes	No
A teacher (e.g., extended times on assignments/exams, testing in a different room)	1	2
A school counselor (e.g., short visits with counselor during school day to help with emotion regulation)	1	2
A provider not described above (e.g., a Speech-Language Pathologist) [please specify]	1	2

4.4 How often did you use academic/disability services for school?

- Almost never (less than once every 3 months)
- Rarely (e.g., less than once per month)
- Sometimes (e.g., 1-2 times per month)
- Often (e.g., 1 time per week)
- Always (e.g., more than 2 times per week)
- N/A
- Other [please specify]

4.5 How satisfied were you with the academic/disability accommodations?

Not at all	Mildly			Moderately			Markedly			Extremely	N/A
0	1	2	3	4	5	6	7	8	9	10	

5. Have you received medication management for a psychological disorder *during college*?

□ No
□ Yes

5.2 What presenting concern did you receive the medication management for (e.g., ADHD, depression, anxiety, relationship concerns)? _____

5.3 Who provided the medication management?

	Yes	No
My current campus health center	1	2
A provider in the local community near my campus (e.g., primary care physician)	1	2
A provider in my hometown (e.g., family doctor)	1	2
A provider not described above (please specify)	1	2

5.4 How often did you use medication management (e.g., how often do you take medications)?

- Almost never (less than once per month)
- Rarely (e.g., 1-2 times per month)
- Sometimes (e.g., 1-2 times per week)
- Often (e.g., 3-5 times per week)
- Always (e.g., 6-7 times per week or daily)
- N/A
- Other [please specify]

5.5 How satisfied were you with the medication services?

Not at all	Mildly			Moderately			Markedly			Extremely	N/A
0	1	2	3	4	5	6	7	8	9	10	

6. Have you received individual psychological or mental health services (e.g., individual therapy) *during college*?

□ No

□ Yes

6.2 What presenting concern did you receive the mental health services for (e.g., ADHD, depression, anxiety, relationship concerns)? _____

6.3 Who provided the mental health services?

	Yes	No
My current campus health and/or counseling center	1	2
A mental health provider in the local community near my campus (e.g., social worker, psychologist)	1	2
A mental health provider in my hometown (e.g., social worker, psychologist)	1	2
A provider not described above (please specify)	1	2

6.4 How often did you access individual therapy services (e.g., frequency of attending sessions)?

- Almost never (less than once every 3 months)
- Rarely (e.g., less than once per month)
- Sometimes (e.g., 1-2 times per month)
- Often (e.g., 1 time per week)
- Always (e.g., more than 2 times per week)
- N/A
- Other [please specify]

6.5 How satisfied were you with individual therapy services?

Not at all	Mildly			Moderately			Markedly			Extremely	N/A
0	1	2	3	4	5	6	7	8	9	10	

7. Have you received group treatment (e.g., skills group) *during college*?

□ No
□ Yes

7.2 What presenting concern did you receive the group treatment for (e.g., ADHD, depression, anxiety, relationship concerns)? _____

7.3 Who provided the group treatment?

	Yes	No
My current campus health and/or counseling center	1	2
A mental health provider in the local community near my campus	1	2

A mental health provider in my hometown	1	2
A provider not described above (please specify)	1	2

7.4 How often did you access the group treatment (e.g., frequency of attending group sessions)?

- Almost never (less than once every 3 months)
- Rarely (e.g., less than once per month)
- Sometimes (e.g., 1-2 times per month)
- Often (e.g., 1 time per week)
- Always (e.g., more than 2 times per week)
- N/A
- Other [please specify]

7.5 How satisfied were you with group treatment?

Not at all	Mildly			Moderately			Markedly			Extremely	N/A
0	1	2	3	4	5	6	7	8	9	10	

8. Have you received academic or disbility services for school (e.g., IEP/504 plan) *during college*?

□ No
□ Yes

8.2 What presenting concern did you receive academic or disability services for school (e.g., ADHD, depression, anxiety, relationship concerns)? _____

8.3 Who provided the academic/disability services?

	Yes	No
Office of Disability (e.g., testing in a different setting than my classroom, homework assistance)	1	2
A teacher or professor (e.g., extended times on assignments/exams, note taker)	1	2
A provider not described above (e.g., a Speech-Language Pathologist) [please specify]	1	2

8.4 How often did you use academic/disability services for school?

- Almost never (less than once every 3 months)
- Rarely (e.g., less than once per month)
- Sometimes (e.g., 1-2 times per month)

- Often (e.g., 1 time per week)
- Always (e.g., more than 2 times per week)
- N/A
- Other [please specify]

8.5 How satisfied were you with the academic/disability services?

Not at all	Mildly			Moderately			Markedly			Extremely	N/A
0	1	2	3	4	5	6	7	8	9	10	

9. In the past 12 months, have you received counseling or support for any mental or emotional health problem from any of the following sources? (Check all that apply)

	No	Yes
Roommate	1	2
Friend (not roommate)	1	2
Significant other	1	2
Family Member	1	2
Religious counselor or other religious contact	1	2
Support group (e.g., in-person or online like a Facebook group, TikTok comments, or reddit forum)	1	2
If none of the above apply to you, select "Yes"	1	2
Other (please specify)	1	2

APPENDIX H

CONSENT FORM

Thank you for your interest in our research study. Please read the following page carefully.

Purpose: We are investigators at the Wichita State University Psychology Department. We are recruiting college students with symptoms of Attention-Deficit/Hyperactivity Disorder (ADHD) to understand the degree to which their mental health symptoms are related to their use of services like therapy and medication.

Eligibility Criteria: Eligible participants must currently be a) enrolled as a college student, b) attending at least one class in-person, c) fluent in English, d) living in the United States, e) between the ages of 18-25, and f) endorsing at least subclinical levels of ADHD symptoms on our brief screening questionnaire.

Procedures: If you decide to participate, you will be asked to complete a brief screening questionnaire to verify your eligibility for the study. Eligible participants will then be directed to the primary survey that will take about 10-15 minutes to complete. The survey will ask questions about mental health symptoms and service utilization. In addition, we will request information about your age, gender, educational status (e.g., enrollment status, attending college in person, year, GPA), sexual orientation, race/ethnicity, parental annual income, individual income, and health insurance coverage.

Benefits: There are no personal benefits to participating in this study, but your responses will help add to literature on how symptoms of ADHD and co-occurring difficulties are associated with use of mental health resources. Students participating through Wichita State University SONA systems will earn 1 SONA credit. After completion of the study, all participants will have the option to enter a raffle to win an Amazon Fire Tablet. Three winners will be chosen. Note: If you withdraw before the end of the study, you will not have the option to enter the raffle. Additionally, this study contains several validation checks to make sure that you are following instructions and not responding randomly. As long as you read the instructions, answer these questions as instructed, and enter the raffle after completion of the study, you will be eligible to win the raffle. If you fail these validation checks, do not follow the instructions, or you do not enter the raffle, you will not be eligible to win the raffle. Lastly, students who fail the validation checks and do not follow the instructions will not be awarded SONA credit.

Study gifts are considered taxable income. You will be asked to complete a W9 form which requires your name, address, and social security number in order for you to receive study payments. A Form 1099 will be sent to you and to the Internal Revenue Service if your payments are $600 or more in a calendar year.

Discomfort/Risks: It is possible you might feel uncomfortable when answering questions about your mental health symptoms. You can skip any questions that make you feel uncomfortable, or you can take a break from answering those questions.

Refusal/Withdrawal: Participation in this study is entirely voluntary. If you agree to participate, you are free to withdraw from the study at any time.

Confidentiality: We will store your data in a password protected file on a password protected university server. Student IDs will only be collected for the purposes of the raffle and will not be associated with survey responses. Only the research team will have access to any survey data, and we will not save your student ID number with your survey answers. Also, because we are using the Internet, there is a chance that someone could access your online responses without permission. In some cases, this information could be used to identify you without our knowledge. No identifying information will be used in analysis and write-up.

Raffle Terms and Conditions: After completion of the study, participants will have the option to enter a raffle to win an Amazon Fire Tablet. Three winners will be chosen, and each winner will receive a tablet. A random number generator will be used to select winners. To enter the raffle, participants must 1) meet study eligibility criteria, 2) complete the survey according to its instructions, 3) pass all validity check questions, 4) enter a matching student ID on both the survey and raffle entry page, and 5) enter a valid email address on the raffle entry page to be contacted if chosen as a winner. Wichita State University has some discretion in handing out prizes. For example, winners will have one week to respond to the co-investigator to claim their prize; if this does not occur, a new winner will be chosen.

Contact: If you have any questions, please contact the Principal Investigator, Samantha Slade at Samantha.slade@wichita.edu or the Co-Investigator, Sarah McGill at skmcgill@shockers.wichita.edu. For questions about the rights of research participants, you may contact the Office of Research at Wichita State University, 1845 Fairmount Street, Wichita, KS 67260-0007, and telephone (316) 978-3285.

You are under no obligation to participate in this study. By selecting "Yes" below, you are indicating that:

- You have read (or someone has read to you) the information provided above,
- You are aware that this is a research study,
- You have voluntarily decided to participate
- You are aware that you must pass a screener that confirms your eligibility to complete the study and to be eligible for the raffle.

I have read the above and agree to participate in this survey. Yes No

APPENDIX I

DEBRIEFING STATEMENT

We thank you for your time spent taking this survey. Your response has been recorded.

The purpose of this study is to identify subgroups of college students with ADHD symptoms and co-occurring difficulties and understand how these symptoms are related to the use of services like therapy and medication. Identifying these subgroups is an important first step to ensure students are being served with treatments that best match their needs. If you have questions about ADHD or would like resources about the disorder, please visit the Children and Adults with Attention-Deficit/Hyperactivity Disorder (CHADD) website: https://chadd.org/

Additionally, if you feel distressed, please call or text the 988 Suicide & Crisis Lifeline by dialing 988. When people call, text, or chat 988, they will be connected to trained counselors that are part of the existing Lifeline network. These trained counselors will listen, understand how their problems are affecting them, provide support, and connect them to resources if necessary. Please visit this website for more information or to chat with a counselor: https://988lifeline.org/current-events/the-lifeline-and-988/

If you have any questions or are interested in the results of the study, please contact the Principal Investigator, Samantha Slade at Samantha.slade@wichita.edu. For questions about the rights of research participants, you may contact the Office of Research at Wichita State University, 1845 Fairmount Street, Wichita, KS 67260-0007, and telephone (316) 978-3285.