

Cognitive Based Interventions for Attention Deficit/Hyperactivity Disorder (ADHD) in College Students

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Abstract

ADHD was previously considered a disorder with onset in childhood and a declining trajectory in adolescence. However, recent research data show that in the majority of cases, the disorder persists into adulthood and is associated with a range of difficulties and significant psychosocial problems. The purpose of the present study was to examine intervention programs of CBT in students with ADHD, as well as to assess the effectiveness of the research on the specific symptoms they target each time. A search was conducted in the PubMed and Google Scholar databases, resulting in the inclusion of 13 studies. All cognitive-behavioral programs examined in the research had positive outcomes in addressing the core symptoms of ADHD. Additionally, they had a positive impact and significant improvement in levels of anxiety and depression, as well as in overall GPA and time management. The results suggest that although CBT interventions are effective for the student population with ADHD, more research is needed for greater reliability.

Keywords

Attention Deficit Hyperactivity Disorder (ADHD), Students, Psychotherapeutic Interventions, Cognitive Behavioral Therapy

1. Introduction

Attention Deficit/Hyperactivity Disorder (ADHD) is a neurodevelopmental disorder that onsets in childhood, typically between the ages of 7 and 12, characterized by difficulties with concentration, impulse control, and excessive activity (American Psychiatric Association, 2013). In adults, it affects approximately 2.5%

of the population (American Psychiatric Association, 2013). In contrast to the large body of research on how ADHD affects children and adults, there is less focus on the same issues in the transitional developmental stage of emerging adulthood, between the ages of 18 and 25 (Barkley et al., 2015; Arnett, 2007).

This research interest arises from the increasing number of students with ADHD attending university in the past decade (DuPaul et al., 2009). Improved understanding and management of ADHD in the student population have led the research community to implement interventions based on the Cognitive-Behavioral model. CBT is considered the treatment of choice for adults with ADHD, particularly in the student population, to address the core symptoms of the disorder as well as academic and psychosocial issues (DuPaul et al., 2009).

Until recently, ADHD was considered a disorder with onset and diminishing course during childhood and adolescence (Polanczyk et al., 2007). However, recent research data show that in the majority of cases, it persists into adulthood and is associated with a range of difficulties and significant psychosocial problems (Safren et al., 2005). Epidemiological data indicate that approximately 2% - 4% of the adult population exhibit a comprehensive view of the disorder, while around 30% - 50% of children with ADHD continue to exhibit symptoms into adulthood (Barkley et al., 2008; Biederman et al., 2010). Additionally, over 50% of adults with ADHD often co-occurs with other psychiatric disorders such as depression, anxiety, substance and alcohol abuse, eating disorders, or learning difficulties (Pehlivanidis, 2012). ADHD is also often associated with other psychiatric and neurodevelopmental disorders and a range of physical health conditions (Coghill et al., 2021).

ADHD results in significant burdens on an individual, family, and societal level and has a substantial impact on quality of life and daily functioning. Individuals diagnosed with ADHD are at increased risk for severe consequences, including poor educational outcomes, injuries and accidents, family conflicts, criminal behavior and incarceration.

1.1. Diagnostic Differences of ADHD in Childhood and Adulthood

The assessment of ADHD in children and adolescents includes history-taking and physical examination, reviewing information from home and community settings, according to the Diagnostic and Statistical Manual of Mental Disorders (DSM-5) (American Psychiatric Association, 2013; Coghill et al., 2021).

It is noteworthy that diagnosing ADHD in the adult population is a demanding and complex process (Prokopi & Pehlivanidis, 2017). Various psychometric tools are used to diagnose adults, primarily self-report scales (Pehlivanidis, 2012). Additionally, structured interviews, historical information, input from significant others in the adult's environment, and family psychiatric history are utilized. It is also important to investigate the onset of symptoms, their presence and consequences in functional areas, and comorbidity (Pehlivanidis, 2012).

Specifically, for a child to be diagnosed, symptoms must be present before the

age of 12, and symptoms of inattention and hyperactivity/impulsivity must appear in at least two settings. For adolescents and adults, aged 17 and above, at least five criteria (compared to six for children and adolescents) from either the inattention or hyperactivity/impulsivity categories, or both, are required (American Psychiatric Association, 2013). According to the DSM-5, the diagnostic criteria for the disorder in children and adolescents extend to adults, as the disorder does not diminish at a specific age. Attention Deficit/Hyperactivity Disorder (ADHD) is the most common behavioral disorder in childhood (Coghill et al., 2021). Prevalence has increased by approximately 3%, with the incidence rate ranging from 3–9% in school-aged children and 2.5% in adults (American Psychiatric Association, 2013). Furthermore, a systematic review from 2020 revealed that the global prevalence of ADHD in the adult population is around 6.76% (Song et al., 2021).

The diagnostic process is based on two lists consisting of 9 symptoms each, with one list referring to symptoms of inattention and the other referring to symptoms of hyperactivity/impulsivity (American Psychiatric Association, 2013). ADHD includes three subtypes: predominantly inattentive (e.g., distractibility, poor organization and follow-through), predominantly hyperactive-impulsive (e.g., restlessness, excessive activity, interrupting), and combined. A positive family history of ADHD supports the diagnosis of ADHD (American Psychiatric Association, 2013).

1.2. ADHD in Adulthood—Clinical Characteristics and Diagnosis

ADHD is a neurological disorder that persists throughout a person's life and continues to affect individuals in adulthood.

However, the manifestation of symptoms in adults differs from those seen in children. While children may run, climb constantly, or struggle to play quietly during their free time, adults often experience a sense of internal restlessness, struggling to find calm and limit excessive talking (Weibel et al., 2019). Inattention in adults, manifests as easily distracted attention, disorganization, tardiness with appointments, a need for change, frequent feelings of boredom, sensitivity to stress, an inability to see the big picture, and difficulty making decisions. Hyperactivity is expressed through restless movements and an inability to stay in one position for extended periods (Weibel et al., 2019). Impulsivity often results in impatience, acting without forethought, or emotionally driven behaviors such as impulsive spending. Additionally, adults with ADHD often face high rates of academic and occupational deficits, lower educational and socioeconomic levels, and frequently experience emotional fluctuations and outbursts of anger (Barkley et al., 2015).

Several psychological scales assess ADHD symptoms in the adult population. A widely used scale is the Conners Adult ADHD Rating Scale, which includes DSM-IV-TR criteria and features separate questionnaires for patients and significant others. Another scale is the Wender-Utah Rating Scale (WURS) (Song et al., 2021). The World Health Organization Adult ADHD Self-Report Scale (ASRS)

(Kessler et al., 2005) is also used to assess symptoms.

1.3. Etiopathogenesis and Comorbidity

Regarding the etiopathogenesis of ADHD, current research supports a multifactorial model emphasizing neurological and genetic factors (Faraone et al., 2000). Environmental factors, such as adverse social conditions, are also highlighted (Faraone et al., 2000).

Fleming et al. (2015) and Knouse & Fleming (2016) have investigated ADHD as a disorder of executive functions, describing it as a neurological process that continues to mature during emerging adulthood. Executive functions, including self-regulatory skills such as organization, planning, and behavioral inhibition, tend to improve and mature during early adulthood. However, in the adult population with ADHD, these functions seem to have a significant role in the expression of the disorder (LaCount et al., 2018). Special emphasis is given to executive functions such as organization, prioritization, and activation for task execution. Attention focus, maintenance, and shifting, as well as working memory, information recall, stress management, emotional control, and vigilance, and information processing speed are crucial areas (Brown, 2006). However, no neuropsychological theory currently explains the full range of symptoms and the etiopathogenesis of the disorder (Safren et al., 2005).

Furthermore, individuals with ADHD exhibit differences in brain systems, functions and structures. Dysfunctions are primarily associated with specific areas such as the prefrontal cortex, the basal ganglia, and the cerebellum. Dysfunctions have also been observed in brain structures that utilize dopamine and norepinephrine as neurotransmitters (Safren et al., 2005).

Adults with ADHD frequently exhibit comorbidity with other psychiatric disorders, such as mood disorders, substance use, anxiety disorders, and behavioral disorders (Song et al., 2021). The comorbidity rate is high, with reports indicating that up to 80% of adults with ADHD have at least one comorbid psychiatric disorder (Choi et al., 2022)

Symptoms attributed directly to adult ADHD are often mistakenly considered symptoms of these psychiatric disorders, complicating the diagnosis and treatment of ADHD (Song et al., 2021). Moreover, ADHD is diagnosed later in individuals with comorbid anxiety than in those without anxiety, possibly because the presence of anxiety may inhibit impulsivity (Katzman et al., 2017).

ADHD has a high prevalence of comorbidity with bipolar disorder, with rates ranging from 5.1% to 47.1% (Choi et al., 2022). According to the literature, there is a significant comorbidity of ADHD with other disorders, particularly with substance use, including alcohol, nicotine, cannabis, and cocaine. Substance abuse or dependence is approximately twice as common in individuals with ADHD compared to the general population (Choi et al., 2022). A particularly strong association exists between ADHD and smoking, with these populations showing stronger physical dependence on nicotine compared to individuals without ADHD (Choi

et al., 2022). The burden of comorbid ADHD with substance use is significant. Studies have found that ADHD in individuals with substance use is related to earlier onset of substance use, increased likelihood of suicide attempts, more hospitalizations, higher rates of substance abuse, lower likelihood of achieving abstinence, and lower rates of treatment adherence. Overall, the co-occurrence of ADHD and substance use can lead to a more severe course of both substance use and psychiatric symptoms and outcomes (Katzman et al., 2017).

1.4. ADHD in the Student Population

A significant proportion of students entering higher education have already been diagnosed with ADHD, while a large number remain undiagnosed. Studies have estimated that among a sample of 326 undergraduate students enrolled in a four-year program, approximately 30% were diagnosed with ADHD (LaCount et al., 2018).

Despite the high prevalence of ADHD among students, there are no organized intervention models for this population, and few longitudinal studies have tracked adolescents with ADHD during their transition to university. This transition involves several challenges, as students move from a structured environment with an organized schedule to the less structured setting of university, where there are greater demands, increased independence, and different ways of managing daily life (LaCount et al., 2018).

1.5. Impacts of ADHD on Students

The student population with ADHD represents a specific group associated with the developmental milestones and challenges of a transitional developmental stage, namely emerging adulthood (Knouse & Fleming, 2016).

Emerging adulthood brings decisive changes in lifestyle, autonomy, and responsibility, including distancing from family guidance and increased independence in various areas of life (Arnett, 2007). These changes require corresponding cognitive, emotional self-control, and self-regulation skills—executive functions that are impaired in individuals with ADHD.

Cross-sectional and longitudinal studies have shown that students with ADHD report a lower quality of life compared to their peers without ADHD (DuPaul et al., 2018; Goffer et al., 2018). Areas affected include self-reported reduced productivity, worsened mental health, unstable interpersonal relationships, and difficulties in personal development (Vasko et al., 2020).

Specifically, students with ADHD face more problems in the academic domain, leading to lower average grades and less effective study strategies and methods. Research has also shown that they are more likely to withdraw from lectures, miss classes, and often fail to complete their studies (Vasko et al., 2020).

Additionally, there are impacts on the work environment, with a large percentage remaining unemployed during the period of emerging adulthood or being employed in lower socioeconomic level jobs and being more frequently dismissed

from jobs adulthood (Knouse & Fleming, 2016).

In terms of close interpersonal relationships, young students with ADHD experience greater difficulties in maintaining relationships. They are more likely to encounter financial difficulties and more prone to risky driving behaviors (Pinho et al., 2018).

A major feature of this developmental stage is that interpersonal relationships between individuals, peers, and parents change dynamics (Hartung et al., 2020). At the same time, young adults spend more time alone compared to other developmental periods (Arnett, 2007). This normal loss of the supportive environment may reduce the interpersonal engagement and support those young adults previously had. Consequently, this reduction in supportive frameworks during this developmental phase may lead individuals with ADHD to experience deficiencies in self-control and self-regulation (Knouse & Fleming, 2016).

Students with ADHD in the stage of emerging adulthood find it more challenging to adhere to treatment compared to adults in later developmental stages. Identity exploration is a major issue for individuals at this stage of emerging adulthood, and individuals with ADHD may experience ambivalence regarding their diagnosis and sense of self (LaCount et al., 2015a).

In early adulthood, individuals with ADHD may not have fully experienced the consequences of the disorder in their daily lives, which are characterized by a more demanding way of managing it (Hartung et al., 2020).

1.6. Cognitive-Behavioral Therapy for Students with ADHD

Current first line treatment for ADHD consists of the use of medication and CBT therapy, used separately or in combination (He & Antshel, 2017). Among other psychosocial therapeutic methods, such as mindfulness, psychoeducation, and coaching, CBT has been the most extensively evaluated for its effectiveness and is considered a treatment of choice for ADHD (Vasko et al., 2020). Various CBT manuals for adults have been adapted for the student population to address the unique challenges of this age group. Overall, these research findings are promising and suggest further studies in this specific population, but studies should follow the methodology of randomized controlled trials (LaCount et al., 2015b).

Inspired by the empirical work of Safren and Solanto (Safren et al., 2005; Solanto et al., 2011), Anastopoulos et al. (2021) developed a targeted intervention program exclusively for students with ADHD, called Accessing Campus Connections and Empowering Student Success (ACCESS). ACCESS is a comprehensive intervention program lasting one year, including 8 weeks of active therapy followed by a maintenance phase integrated into the students' academic schedule (Anastopoulos et al., 2020).

In addition to the traditional CBT model, there are third-wave CBT studies focusing on ADHD in the student population. Mindfulness-Based Interventions (MBIs) are a new psychological approach with philosophical roots, and clinical studies have shown their application in various psychiatric and physical disorders

(Pheh et al., 2021). For college students with ADHD, mindfulness-based trials have shown promising results in reducing attention deficits, improving metacognitive processes, and self-regulation (Aadil et al., 2017).

Furthermore, Dialectical Behavior Therapy (DBT) by Linehan (Linehan, 1993) has been combined with traditional CBT techniques in a group program for students with ADHD (Fleming et al., 2014). The program consisted of 8 weekly sessions focusing on social support and healthy lifestyle.

The volume of literature on students with Attention Deficit/Hyperactivity Disorder highlights that this clinical group faces more academic failure, greater psychological and emotional difficulties, as well as issues with substance and alcohol use (Green & Rabiner, 2012).

Many students with ADHD, despite facing all these multiple challenges in academic life, interpersonal relationships and emotional regulation, they manage to succeed in entrance exams for higher education, overcome adversities, and maintain a good quality of life (He & Antshel, 2017).

Students with ADHD represent a population requiring specialized therapeutic interventions during the transitional stage of higher education. However, research, interventions, and randomized clinical trials in this population remain scarce with numerous methodological issues. There is thus an increased need for the development and evaluation of effective and useful therapeutic interventions focusing on students with ADHD in the new and less structured academic environment, which demands more functional independence (He & Antshel, 2017).

Most therapeutic interventions for students with ADHD focus on the academic domain, symptom improvement, daily schedule organization, and also address comorbid conditions such as depression and substance use (Vasko et al., 2020).

Nevertheless, research on intervention programs for students with ADHD, both in Greece and internationally, is in its early stages. Although notable efforts are being made, there is still considerable research to be conducted.

The aim of this paper is to study intervention programs based on CBT for students with ADHD, and to evaluate the effectiveness of research on the specific symptoms they target. Additionally, this text addresses ADHD in the student population, as well as CBT model interventions, and evaluates the effectiveness of programs in this specific population.

2. Method

This study gathers psychosocial interventions within cognitive-behavioral programs for addressing ADHD in the student population in the period from 2015 up to 2024.

To identify existing research on psychosocial interventions of cognitive-behavioral approach for ADHD in college students, the process involved searching electronic databases. Specifically, searches were conducted in PubMed and Google Scholar using the following keywords: attention deficit hyperactivity disorder

(ADHD), adults, college students, university students, psychotherapeutic interventions [OR] cognitive behavioral therapy [AND] [OR] psychosocial interventions.

The studies were evaluated based on the intervention design (randomized controlled trial, case studies, open-label studies), intervention level (individual, group), and type of intervention (CBT, dialectical behavior therapy, psychoeducation). Additionally, the effectiveness of each intervention was assessed in terms of reductions in various areas targeted by the intervention (reduction in anxiety and depressive symptoms, reduction in attention deficits, hyperactivity/impulsivity).

Inclusion Criteria

The articles included in the study had to meet the following criteria:

- Published in a peer-reviewed journal with a blind review system, anytime from 2015 to 2024.
- Written in Greek or English.
- All participants in the studies must have been diagnosed with ADHD.
- All participants in the sample must be enrolled in higher education.
- The type of interventions must fall under the broader category of cognitive-behavioral therapies (CBT, psychoeducation, mindfulness-based cognitive therapy, dialectical behavior therapy).
- The therapy could be either individual or group-based and conducted either in-person or in a hybrid format.

From the studies retrieved in the search, 45 studies were evaluated against the inclusion criteria. Of these, 17 studies did not meet the inclusion criteria, 15 studies were non-intervention programs, and 13 were included in the review.

3. Results

The literature review yielded thirteen studies with measurable outcomes. Most interventions were of the cognitive-behavioral type, but there were also studies from the third wave that utilized mindfulness and psychoeducational programs. Several studies employed the ACCESS program by [Anastopoulos & King \(2015\)](#). Additionally, some research applied the intervention protocol by [Safren et al. \(2005\)](#) with certain modifications ([Safren et al., 2005](#)). Detailed characteristics of each study are presented in [Table 1](#).

Table 1. Cognitive-Behavioral programs for a student population.

Researchers	CBT Programms	Program content	Control group	Number of session	Type of research	Results
LaCount et al., 2018	Adaptation of the therapeutic protocol by Solanto, Marks, Mitchell, & Wasserstein (2011) for learning organizational and planning skills (OTMP intervention)	Psychoeducation, organizational and planning skills, time management, task completion.	15 undergraduate students with ADHD who did not receive treatment	3 weeks	Non-randomized clinical study	The participants in the intervention group showed improvement in attention deficit, hyperactivity/impulsivity, and organizational skills compared to the initial measurements.

Continued

Eddy et al., 2015	Adaptation program of the GAD protocol by (Safren et al., 2005)	Psychoeducation, organization and planning of activities. Reduction of distraction, cognitive restructuring. Training in other skills	There was no control group	8 weeks	4 Case studies	The results suggest that this specific short-term protocol is a useful therapeutic tool for students with ADHD, but further research in clinical studies is needed
Van der Oord et al., 2018	Adaptation of the GAD program for organization and planning by (Boyer, Van Dyck, Kuin, & Van der Oord, 2012) for a student population.	Psychoeducation in ADHD, study organization strategies, goal setting, time management, assessment of knowledge regarding goals, and restructuring.	Waiting list	6 weeks	Randomized clinical trial	The study showed controversial findings. There was improvement in the intervention group on the attention scale. There was no statistical difference between the two groups in study skills. The results for distraction were satisfactory, showing improvement.
Solanto & Scheres, 2020	CBT intervention adapted for a student population, with an emphasis on improving executive functions in students with ADHD.	Psychoeducation in ADHD, addressing the specifics of academic studies. Time management, procrastination, self-care for mind and body, healthy sleep, exercise. Recognition and challenging of automatic negative thoughts. Practice in mindful breathing	20 undergraduate psychology students from the university	12 weekly sessions	Open-label study	The effectiveness of the CBT intervention was evident in students with ADHD. Symptoms of inattention improved. There was significant improvement in executive functions as well. At the end of the intervention, 7 out of 18 students no longer met the DSM-5 criteria for ADHD diagnosis
Gu, Xu, & Zhu, 2018	Mindfulness-based Cognitive Therapy (MBCT) program, adapted protocol for depressive disorders (Segal, Teasdale, Williams, & Gemar, 2002).	Explanation of the therapeutic model. Practice of seated meditation, focusing on mindful breathing. Mindful observation of bodily sensations, thoughts, and emotions. Mindfulness practice	Waiting list, 26 participants	6 weeks	Randomized clinical trial.	Participants who received MBCT reported higher levels of mindfulness and reduced anxiety and depressive symptoms. There was significant improvement in inattention and hyperactivity/impulsivity.
Fleming et al., 2015	Group skills program of Dialectical Behavior Therapy (Linehan) adapted for a student population (Fleming & McMahon, 2012)	Team introduction, goal setting, mindfulness, daily activity planning. Sleep, nutrition, and exercise management. Emotion regulation, problem-solving skills.	Participants in the control group who received a self-help manual for skill development in adults with ADHD (Tuckman, 2007).	8 weeks	Pilot randomized clinical trial	Participants showed improvement in executive functions and quality of life. There was an improvement in attention and hyperactivity even in follow-up measurements 3 months later. However, there was no significant improvement in anxiety and depression levels, nor in the overall GPA.
Anastopoulos et al., 2021	ACCESS program (Anastopoulos & King, 2015) for students with ADHD, adapted from existing CBT programs for adults.	Psychoeducation in ADHD, guidance on campus functioning. Time management, organization, behavioral skills for executive functions, cognitive restructuring (individual sessions). In group sessions, practice of skills on a daily basis	There was no control group.	10 weeks	Open-label study (within a cohort study framework)	Immediately after the intervention, there was a reduction in ADHD symptoms, improvement in executive functions, and a decrease in anxiety and depression. Improvements in symptom severity were also observed 5 to 7 months after the intervention

Continued

Pheh et al., 2021	Online Mindfulness Program (iMBI) for ADHD and executive functions, tailored to the needs of students with ADHD (Crane et al., 2017)	Introduction and psychoeducation on ADHD and mindfulness. Body and sensation observation. Mindfulness practice, time organization, program review.	Control group that would receive the clinically indicated treatment for adults with ADHD in Malaysia, along with psychoeducation about the disorder.	8 weeks	Blind randomized clinical trial.	The present study yielded positive results and highlighted the effectiveness of the online program for students with ADHD in Malaysia
Hartung et al., 2020	Organization, time management, and study skills program (OTMP skills). Adapted from the program for adults with ADHD (Solanto et al., 2011)	Psychoeducation in ADHD, organization and time management, goal setting. Academic skills and cognitive restructuring	There was no control group.	6 weeks	Open-label study	The results indicated that this program is a promising tool for ADHD. Improvements were observed in attention span and short-term memory
Anastopoulos et al., 2021	ACCESS GAD program for students with ADHD (Anastopoulos & King, 2015)	Psychoeducation on ADHD, guidance on campus functioning. Time management, organization, behavioral skills for executive functions, cognitive restructuring (individual sessions). In group sessions, practice of skills on a daily basis.		8 weeks	Large, multi-level, randomized clinical trial	The findings from this large, multi-level study showed statistically significant improvement across all ADHD symptoms immediately after the completion of the program. There was also improvement in inattention symptoms as measured by self-report questionnaires, as well as in executive functions
Eddy et al., 2021	ACCESS program (Anastopoulos & King, 2015) for students with ADHD, adapted from existing CBT programs for adults (Safren et al., 2005; Solanto et al., 2011)	Group program consisting of 8 weekly meetings of 90 minutes each, along with individual sessions of 30 minutes. Time management, organization, behavioral skills for executive functions, cognitive restructuring. There was no.		Two consecutive semesters.	Randomized clinical trial.	The results show that ACCESS highlights improvements in academic skills and daily functioning. Students reported an increase in their motivation to study, time management, and daily functionality

Programs' Content and Results

Group Cognitive-Behavioral Programs Designed for Students (ACCESS)

The ACCESS program, specifically designed for students with ADHD, was noted in only one study out of the thirteen reviewed. Four of these studies implemented the specialized group intervention program for students with ADHD, the ACCESS program by Anastopoulos & King (2015). Furthermore, six of the thirteen studies focused on adapted CBT programs for students based on existing protocols designed for adults with ADHD.

The Accessing Campus Connections and Empowering Student Success (ACCESS) program is a comprehensive intervention lasting one year, with 8 weeks of active therapy. It includes psychoeducation on ADHD, campus navigation instructions, time management, study organization, and behavioral skills for executive functions, as well as cognitive restructuring (individual sessions). The group sessions apply skills on a daily basis, following 8 weekly 90-minute meetings and

individual 30-minute sessions (Anastopoulos et al., 2021). The adaptation of the therapeutic process involves 12 group sessions covering psychoeducation on the disorder, self-care, time management, recognition and alteration of automatic negative thoughts, learning academic skills, and motivation for using university services (Anastopoulos & King, 2015).

Students who completed the program reported significant improvements in functionality at university and work. Specifically, there were statistically significant differences in reading and the time students spent on it ($F(2) = 0.91$, $p = 0.41$). Additionally, there was a reduction in anxiety and depressive symptoms (-0.35 , $p < 0.001$). In executive functioning, there were statistically significant improvements in behavior regulation and metacognitive thinking (Standardized mean difference -0.64 , -0.66 , $p < 0.001$). However, statistical data for attention deficits showed large differences (-0.83 , $*p < 0.001$), while for impulsivity, the differences were small to medium (-0.43 , $p < 0.001$).

LaCount et al. (2015a) adapted an intervention protocol from Safren et al. (2005). This program combines individual and group CBT interventions for adults with ADHD. The study involved 19 undergraduate students focusing on psychoeducation about ADHD, study schedule organization, functional thinking development, procrastination, and relapse prevention. Students who completed the program reported significant improvements in university functionality ($p = 0.047$; $d = 0.51$) and work ($p = 0.033$; $d = 0.63$). There were statistically significant improvements in attention deficits ($p = 0.045$; $d = 0.94$) and for hyperactivity/impulsivity ($p = 0.139$; $d = 0.78$).

Additionally, the other five studies included adapted group CBT programs. Hartung et al. (2020) implemented an adult ADHD program by Solanto et al. (2011), focusing on organization, time management, and study skills (OTMP skills). The results showed that this program is a promising tool for ADHD. Improvements were observed in attention deficits and short-term memory, as well as time and activity planning skills ($t = -2.45$, $p = 0.011$, $d = 0.57$). Statistically significant small to medium differences were noted for attention deficits ($t = 2.71$, $p = 0.006$, $d = 0.44$).

Solanto & Scheres (2020) implemented a CBT intervention adapted for students with ADHD, emphasizing improvements in executive functions. The intervention included psychoeducation on ADHD, focusing on study peculiarities, time management, procrastination, self-care, sleep hygiene, exercise, and recognition and challenging of automatic negative thoughts. It also involved mindful breathing practice. The study, involving 20 undergraduate psychology students, showed effectiveness in improving ADHD symptoms ($F = 31.01$, $p = 0.001$, $ES = 0.646$) and executive functions ($96.67 - 87.22$, $F = 18.7$; $p = 0.000$, $ES = 0.524$).

Van der Oord et al. (2018) adapted the CBT program for organization and planning by Boyer, Van Dyck, Kuin, & Van der Oord (2012) for a student population. The intervention included psychoeducation on ADHD, study organization strategies, goal setting, and cognitive restructuring. The study showed mixed results.

There was an improvement in attention scores in the intervention group, but no statistical difference in study skills between groups. Results were satisfactory for attention deficits, showing statistically significant improvements ($-0.78, p = 0.44$).

The study by Eddy et al. (2015) discusses the adaptation of the CBT protocol by Safren et al. (2005). It presents 8 different case studies of students participating in psychoeducation, organization, and activity planning. The results suggest that this short-duration protocol is a useful therapeutic tool for students with ADHD but more clinical studies are needed (t score reduction of 8.25). Participants found the treatment valuable, improving their ability to manage distress, with cognitive techniques noted as particularly effective in reducing anxiety related to dysfunctional ADHD schemas.

Another study by Eddy et al. (2021) examined the ACCESS program (Anastopoulos et al., 2021), which includes a group program of 8 weekly 90-minute meetings and parallel 30-minute individual sessions. It also covered time management, organization, behavioral skills for executive functions, and cognitive restructuring. Results indicate that ACCESS highlights improvements in academic skills and daily functionality, with students reporting enhanced motivation to study, better time management, and improved daily functionality ($b = 1.78, SE = 0.54, p = 0.001$).

Finally, LaCount et al. (2018) adapted the therapeutic protocol by Solanto, Marks, Mitchell, & Wasserstein (2011) for learning organization and planning skills (OTMP intervention). The intervention focused on psychoeducation, organization and planning skills, time management, and task completion. Participants showed improvement in attention deficits and hyperactivity/impulsivity ($\Delta = -4.32, SE\Delta = 0.70, p = 0.003, d = 0.74$) and organizational skills ($\Delta = 12.00, SE\Delta = 4.97, p = 0.03, d = 0.68$) compared to initial measurements.

Group Mindfulness-Based Cognitive Therapy (MBCT) and Mindfulness-Based Stress Reduction (MBSR)

Mindfulness involves awareness of the mind and body in the present moment by observing sensations, thoughts, and feelings non-judgmentally. It is part of the third wave of CBT interventions.

Gu, Xu, Zhu (2018) implemented a mindfulness-based cognitive therapy program for a student population with ADHD. Their findings showed a reduction in attention deficits ($F(2, 52) = 9.380, p = 0.003$) and anxiety ($F(2, 52) = 5.890, p = 0.019$) compared to the control group. Additionally, students were able to continue practicing mindfulness after the program, which helped in reducing attention deficits and mind wandering.

Pheh et al. (2021) designed an 8-week online mindfulness-based intervention for students with ADHD in Malaysia. The program included psychoeducation on ADHD symptoms, mindfulness practice, and emotional regulation. Results highlighted the program's contribution in the improvement of the executive functioning skills that are impaired in ADHD. However, further studies are needed to enhance the generalizability and validity of the results.

In another study with a student population with ADHD, [Lester & Murrell \(2018\)](#) compared two mindfulness programs. One group received a mindfulness program based on [Kabat-Zinn \(1982\)](#)'s protocol, while the other received Vipassana meditation from the yoga tradition. Both interventions showed reductions in ADHD symptoms, anxiety levels, and increases in mindfulness.

Dialectical Behavior Therapy

Dialectical behavior therapy (DBT) is a form of cognitive-behavioral therapy originally designed for patients with borderline personality disorder. Its adaptation for ADHD targets impulsivity, emotional regulation, low self-esteem, and interpersonal relationships.

[Fleming et al. \(2014\)](#) developed a group DBT program adapted for students based on Linehan's protocol ([Linehan, 1993](#)). The program lasted 8 weeks, and participants showed improvements in executive functions and quality of life. There was an improvement in attention and hyperactivity ($F(2, 62) = 3.13, p = 0.056$), even in follow-up measurements 3 months later. However, there was no significant improvement in anxiety and depression levels or overall GPA. Symptoms were assessed before and after the intervention, as well as three months later.

4. Discussion

Therapeutic interventions for adults with ADHD should be multi-level and target all aspects and areas of functionality of the individual ([Song et al., 2021](#)). A comprehensive approach may include medication, psychoeducation, and specially designed psychotherapeutic interventions ([Song et al., 2021](#)).

In addition to medication, there has been growing research interest in psychosocial interventions in recent years. A variety of psychosocial interventions for adults with ADHD have emerged, with increasing research evidence over the last decade. These interventions include cognitive-behavioral therapy (CBT), mindfulness, psychoeducation, and coaching ([He & Antshel, 2017](#)). Among these therapeutic methods, CBT has been the most extensively evaluated for its effectiveness and is considered a treatment of choice for ADHD ([Vasko et al., 2020](#)).

The standard treatment protocol for cognitive-behavioral therapy in adults with ADHD is based on the manual by [Safren et al. \(2005\)](#). The program is divided into four modules: Module A: Psychoeducation, Organization, and Planning of Activities and Tasks; Module B: Reducing Distraction; Module C: Cognitive Restructuring (Functional Thinking); and Module D: Training in Other Skills ([Safren et al., 2005](#)).

Given the fact that ADHD can impair the patient's general function and quality of life, different or supplementary to CBT therapeutic approaches have been applied aiming at reducing the disorder's symptoms. Scientific interest has been recently drawn to the effect of interventions based on cognitive techniques on ADHD symptom severity in the student population ([Fleming et al., 2014](#); [Knouse & Fleming, 2016](#); [Vasko, et al., 2020](#)). Accordingly, the current literature review attempted to evaluate the existing data from randomized and no randomized

control trials concerning cognitive based interventions on ADHD.

From this literature review, it is evident that the majority of the studies investigated have measurable outcomes for the student population with ADHD. Most of the interventions were group-based, with the exception of one study involving case studies of students. These interventions had a specific number of sessions, a defined structure, and were primarily based on cognitive-behavioral models. Specifically, the core structure of these intervention programs included psychoeducation on ADHD, organization and planning of daily schedules, management of distractibility and procrastination, anxiety management, and study skills. Additionally, depending on the intervention model, there was training in cognitive restructuring or specific skills such as mindfulness.

The cognitive-behavioral programs reviewed in the research showed positive results in addressing the core symptoms of ADHD. They also had a positive impact and significant improvement in anxiety and depression levels, as well as in GPA and time management. Promising psychosocial interventions have been developed and vary widely in therapeutic approaches, ranging from organizational skills to mindfulness and cognitive-behavioral therapy (Fleming et al., 2014; Eddy et al., 2021).

The results of the studies highlighted the need for further group interventions with larger samples to generalize and statistically validate the findings. Additionally, the development and implementation of further cognitive-behavioral interventions for the student population with ADHD would provide better and more tailored models that combine skills for the challenges of the academic context and also their individual emotional challenges and comorbid conditions. Directions for future research that include longitudinal studies examining the long-term impact of interventions post-college to enhance the applicability of the findings. The increased academic expectations and demands for behavioral self-regulation, coupled with reduced structure and oversight, make the college environment challenging for emerging adults with ADHD.

Furthermore, the conduct of combined programs to address comorbid disorders and difficulties that may exacerbate ADHD symptoms is also recommended. Overall, this study supports the usefulness of conducting further randomized controlled studies to test the effectiveness of those cognitive based studies for this challenging neurodevelopmental disorder. It is suggested to conduct further research in other languages, along with longer time frames.

Limitations

This literature review bears certain limitations. Firstly, an apparent lack of studies evaluating the effects of Cognitive-based interventions on ADHD symptom severity, and a lack of rigorous conducted RCTs exists. In addition, the majority of the studies included small sample sizes, among the studies, the different recruited control groups, and the observed high risk of overall bias constitute important limitations of this review. Moreover, the outcome measures in those studies were

derived from self-reports.

Therefore, these restrictive factors make the analysis of the results at a quantitative level not achievable. Also, the specific study examined studies published in English and Greek. This limitation may have excluded other studies in other languages and other cultures. Lastly, in the present review, another limitation was the small sample that was studied. Implementing group CBT programs for students with ADHD at the university level can face several challenges in real-world settings.

Many students with ADHD may hesitate to participate in such programs due to fear of being stigmatized or judged. Also, there are time and schedule conflicts. Many students with ADHD often have busy and fluctuating schedules. The demands of coursework, part-time jobs and other responsibilities can make it difficult to commit to regular CBT sessions, especially if these require specific times and durations.

Moreover, students with ADHD often have diverse needs and challenges. Difficulties with attention, hyperactivity and emotional regulation can vary greatly from person to person, making it hard to design a one-size-fits-all program. Successful implementation of such programs requires careful planning, specialized resources and a strong understanding of the specific needs of students with ADHD.

Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

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