Efficacy of Cognitive Behavioral Therapy in Managing Anxiety Disorders among Adolescents: An In-Depth Analysis of Individual, Group, and Digital Approaches

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Abstract. This research article delves into the efficacy of Cognitive Behavioral Therapy (CBT) in addressing adolescent anxiety disorders. It explores various facets of CBT, including its theoretical underpinnings and mechanisms of change, highlighting its role in altering dysfunctional beliefs and thought patterns that contribute to anxiety. The article underscores the advantages of CBT, such as its structured approach, cost-effectiveness, and the provision of practical coping skills, making it a preferred choice for dealing with adolescent anxiety. The study then investigates the efficacy of different CBT approaches, including individual, group, and computerized CBT (cCBT) in details, specifically in the context of the COVID-19. It encompasses a range of research, from meta-analyses to controlled trials, evaluating the impact of these treatments on anxiety symptoms and their long-term efficacy. Research demonstrates CBT's high efficacy in treating youth anxiety, offering sustained symptom reduction and complementing psychopharmacological treatments backed by extensive studies and neuroimaging advancements. Group CBT for adolescents shows effectiveness in anxiety treatment, offering peer support and shared experiences in a communal setting, enhancing coping strategies and social skill development. The findings indicate cCBT's effectiveness in providing accessible mental health support to adolescents, aligning well with their tech-savvy tendencies. In conclusion, this research underlines CBT's flexibility in addressing adolescent anxiety in both traditional and digital formats, with an emphasis on the promising potential of cCBT. It calls for future research to focus on standardizing CBT practices and validating the long-term effectiveness of cCBT.

Keywords: Anxiety; adolescence; cognitive behavioral therapy.

1. Introduction

Anxiety disorders consists of a category of mental health conditions defined by pronounced anxiety and fear. These conditions are marked by overwhelming amount of fear or anxiety that is challenging to manage and adversely affects everyday life activities [1]. They can be chronic and can significantly impair an individual's ability to function. Cognitive Behavioral Therapy (CBT) is a commonly used psychological treatment method that is based on the theory that people's feelings, thoughts, and behaviors are interlinked. Changing negative thought patterns can create active changes in feelings and behaviors. Within the framework of CBT, anxiety disorders are often understood as a result of dysfunctional beliefs and thought patterns that lead to excessive and irrational fear and worry. Individuals with anxiety disorders typically engage in cognitive distortions, such as catastrophizing, overgeneralizing, and other irrational thinking patterns that contribute to their heightened anxiety. They often have persistent negative thoughts about themselves, the world around them, and their future. These thoughts can be automatic, intrusive, and difficult to control. In response to these negative thoughts and the anxiety they generate, people often engage in avoidance behaviors or safety-seeking behaviors, which can temporarily reduce anxiety but reinforce fear and avoidance in the long term. The thoughts and behaviors associated with anxiety disorder can also create physical symptoms, such as increased heart rate, shaking, sweating, etc., which can even exacerbate anxious thoughts.

CBT aims to break this cycle by using various techniques to help individuals recognize and challenge their dysfunctional thoughts, gradually face and reduce avoidance of feared situations or objects and develop coping strategies to manage anxiety symptoms [2]. Common techniques used

include cognitive reframing, behavioral activation, exposure therapy, skill training, mindfulness, thought records, journaling, etc. Through this process, CBT helps individuals develop a more balanced and realistic way of thinking and living, which can reduce the symptoms of anxiety and improve overall functioning.

CBT method is considered one of the most efficient anxiety disorder treatments due to several factors. It is one of the most researched and clinically trialed forms of therapy, particularly for anxiety disorders [2]. CBT is typically a short-term treatment, making it a cost-effective option compared to other forms of therapy that may take way longer. It's focused on addressing specific, immediate, and realistic problems and teaching practical skills for dealing with them. CBT provides individuals with practical and effective coping skills and strategies that can be used to manage symptoms of anxiety so patients can learn to become their own therapists and take an active role in their recovery. This empowerment can lead to greater self-efficacy resilience and prevent further relapses. CBT is a structured form of therapy that involves clear goals and measurable outcomes, which can be particularly helpful for individuals with anxiety, providing them with a sense of predictability, motivation, and control. CBT could also be tailored to different individuals' needs and can be provided in various formats, including individual therapy, group therapy, books, online programs, etc. CBT not only addresses symptoms and relapses but also focuses on improving overall functioning and quality of life, which can positively impact relationships, work, and overall well-being.

Adolescence is a developmental phase between childhood and adulthood, typically ranging from ages 10 to 19. It is a critical period marked by considerable psychological, physiological, and social changes. In this phase, people form their identities, gain independence, and navigate new social and academic challenges. Anxiety can interfere with these developmental processes, affecting academic performance, social interactions, and the formation of a healthy self-identity. Anxiety can impair concentration, memory, and the ability to learn, leading to difficulties in school and college, which is important for overall life development. Poor academic performance can have long-term consequences for educational and career opportunities. Adolescents with anxiety may withdraw from social interactions or avoid participating in activities. This can lead to social isolation, poor social skills, and missed opportunities for developing meaningful relationships.

Adolescence is also a crucial time for laying the foundations of good health, as behaviors and attitudes established in this period could create far-reaching effects on an individual's well-being. Many psychological illnesses' onsets start in the adolescent period. Untreated anxiety in adolescents can significantly raise the risk of emerging other mental health problems, such as substance use and depression, as individuals may turn to unhealthy coping mechanisms. Chronic anxiety can lead to various physical health problems too. Anxiety disorders that persist from adolescence into adulthood can become more difficult to treat and can negatively affect life choices, career paths, and personal relationships. Early intervention can prevent the development of more severe anxiety disorders and other related mental health issues. It can also equip adolescents with coping skills that will serve them throughout their lives.

Therefore, CBT intervention could be seriously considered to help adolescents develop practical skills to manage their anxiety. It is typically a cost-effective short-term treatment, which can be appealing to adolescents and their families. Parental involvement could also enhance the efficiency of CBT during this development stage. It focuses on specific goals and solving specific problems, making it easier for adolescents and their families to track their progress. CBT focuses primarily on current thoughts and behaviors, which are often more relevant to adolescents as they navigate their immediate challenges. It can be easily tailored to the unique needs and developmental level of each adolescent, making it a flexible tool for a variety of anxiety-related issues. It can be delivered individually, in groups, and even through digital platforms, making it accessible in various settings. CBT also encourages active participation from the adolescent. This involvement in their own treatment can be empowering and can lead to greater self-efficacy, leading to more fulfillment and achievement in their lives.

This research aims to investigate the overall efficacy of CBT for adolescents, the effectiveness of group CBT for adolescents, and the performance of computerized CBT for adolescents, especially in the COVID-19 Setting. CBT is a great solution to the problem, but access to professional therapy providers is limited globally. Group CBT and computerized CBT provides effective measures to scale the application of CBT worldwide and helps tons of adolescents overcome the challenge of anxiety. Research on this specific topic is limited, so this research aims to fill the gap and dig out insights from the newest research.

2. The Effectiveness of CBT and Clinical Applications in Adolescents

2.1. The Overall Effectiveness of CBT in Adolescents

The overall effectiveness of CBT programs sometimes remains doubtful among parents, but research shows that such worry is unnecessary. In a 2022 meta-analysis of 45 research papers on CBT for anxiety disorders in adolescent, it is suggested that CBT stands as a notably efficacious approach for managing anxiety disorders in adolescents, demonstrating the potential to reduce the recurrence of symptoms and even extending its reach to preschool-aged children through appropriate adaptations. It also proves to be a valuable adjunct to psychopharmacological treatments. Recent advancements in neuroimaging and psychophysiological measures, especially in relation to threat and motivational processing, offer promising insights into predicting symptom improvement with CBT [2]. The sheer volume of research papers (45 in total) included in the meta-analysis strengthens the argument that the method is not a niche treatment option but rather a well-established and extensively studied approach. The wide pool of data increases the reliability of the findings and supports the generalization of CBT's effectiveness in diverse settings and populations. The ability of CBT to reduce the recurrence of symptoms is particularly important. Chronic anxiety can significantly disrupt a young person's development, so a treatment that offers sustained benefits beyond the end of the therapy is highly valuable. The fact that CBT has been found to be a valuable adjunct to psychopharmacological treatments indicates that it can enhance the overall treatment strategy for anxiety disorders. The advancements in neuroimaging and psychophysiological measures underscore the potential for a more personalized approach to CBT as well. Clinicians could predict which children might respond best to CBT and tailor the therapy to individual needs.

Besides, CBT could be highly effective across different formats and settings, providing a variety of treatment methods that cater to different family needs. A study in 2019 systematically reviewed and meta-analyzed the efficacy of various CBT approaches in addressing pediatric anxiety disorders. Including 81 randomized controlled trials with 3386 participants receiving CBT and 2527 controls, the study concluded that it is effective to use CBT for childhood anxiety disorders. The findings indicated that when compared to wait-list and attention control conditions, individual-based CBT was more effective. In contrast, group-based CBT showed greater efficacy than both wait-list control and standard methods. Additionally, remote CBT outperformed both attention control and wait-list control. Family-based CBT also proved to be more efficacious than standard treatment, wait-list control, and attention control. Importantly, the efficacy of Selective Serotonin Reuptake Inhibitors (SSRIs) was found to be on par with individual-based CBT, but the combination of these treatments was more beneficial than CBT alone [3]. The effectiveness of remote-based CBT compared to wait-list control and attention control is particularly relevant in the context of increasing telehealth services. This suggests that CBT can be delivered effectively through remote means, which is crucial for accessibility and may help address barriers to treatment like geographic location and mobility. Family-based CBT's superiority over wait-list control, treatment as usual, and attention control underscores the importance of involving the family in treatment, which could support the idea that anxiety in children is often intertwined with family dynamics, and addressing these as part of treatment can lead to better outcomes. The fact that SSRIs, which are most commonly prescribed to treat anxiety, were found to be no more effective than individual-based CBT highlights CBT as a viable first-line treatment, which is significant given the preference for non-pharmacological

interventions in pediatric populations due to concerns about side effects and long-term impacts of medication.

Youth are a group who are susceptible to stress and anxiety from academic requirements or peer pressure. To benefit more youth and control the problems at the beginning, a short-term solution applied in a school setting could be an ideal way to make a difference in students' lives. A study designed to assess the potency of targeted school-based CBT for adolescents aged 12 to 16 with anxiety disorder and determine whether a shorter, brief CBT program was as effective as the standard duration CBT. A total of 313 adolescents, primarily girls, were randomly assigned to either a 10-week standard CBT program, a 5-session brief CBT program, or a 10-week waitlist group. Self-reported and parent-reported anxiety symptoms, clinical severity, depressive symptoms and impairment from anxiety were measured before and after the interventions and at a 1-year follow-up. The outcome showed both standard and brief CBT substantially decreased the anxiety symptoms in adolescents, with small to moderate effect sizes compared to the waitlist group. Anxiety induced impairment reported by parents also decreased significantly. These positive results were persistent at the follow-up after one year [4]. The fact that both the standard and brief CBT programs led to a substantial reduction in anxiety symptoms suggests that school-based CBT can be an effective context for delivering mental health interventions to adolescents. This suggests that a shorter CBT intervention could also be a feasible option for reducing anxiety symptoms in adolescents. This is particularly important for environments where there are time or resource constraints. Both self-reported and parent-reported measures showed significant improvement, indicating a consensus between adolescents and their parents regarding the changes in the adolescents' anxiety levels. This alignment is significant because it strengthens the reliability of the reported outcomes.

2.2. Group CBT evaluation

Due to the verified effectiveness and popularity of the CBT program, group CBT (GCBT) has recently also become one of the favorable choices for therapists and patients due to its various advantages, especially for treating anxiety disorders. The shared experience in the group setting could potentially lessen the feelings of isolation and provide a sense of validation and understanding that is often lacking in individual therapy. Participants can be motivated by each other and could potentially learn from each other's experiences and coping strategies. GCBT offers a safe and structured space to develop social competence. The best thing about group CBT is that it is often more economical than individual therapy because the therapist's time is shared among several people, making it a more accessible option for many. Therefore, its application value is also worthy of careful investigation. A study conducted a randomized controlled trial to examine the efficacy of CBT for anxiety disorders in children and adolescents. It also compared ICBT and GCBT approaches. The study included 182 referred participants aged 8 to 15 years with generalized anxiety disorder, social phobia, and separation anxiety. They were assigned randomly to a standard 10-week 60-minute ICBT, 90-minute GCBT, and a waitlist group in the local community health center. Pre-assessment, post-assessment, and one-year follow-up assessments were conducted by parents and youth, including diagnostic interviews and symptomatic measurements. The result shows that significantly more youth became free from all anxiety disorders after receiving CBT compared to those in the waitlist group. The diagnostic recovery rates for GCBT (20.5%) and ICBT (25.3%) were notably not distinct. The child's reported anxiety symptoms after treatment and the clinical severity rating of the primary anxiety disorder were the areas in which GCBT and ICBT were shown to be equivalent after one year [5]. The results confirm the validity of CBT compared to the non-treatment group for youth. The follow-up after one year indicates similarity in recovery rates in the long term and also suggests that group therapy could be a more cost-effective option without significantly compromising the outcome, which is an important consideration for community clinics with limited resources.

Another research investigated the enduring effects of both GCBT and ICBT for youth with anxiety disorders receiving treatment in local health centers. The study involved 139 participants, ranging from 11 to 21 years, averaging 15.5 years at the time of assessment. These individuals had been

diagnosed with generalized anxiety disorder (GAD), social anxiety disorder (SOP), and/or separation anxiety disorder (SAD). On average, the assessment was conducted approximately 3.9 years after treatment, spanning from 2.2 to 5.9 years. The outcomes were assessed regarding the condition of all initially diagnosed anxiety disorders, the absence of the primary anxiety diagnosis, and changes in anxiety symptoms reported by both the young individuals and their parents. The results from the long-term follow-up revealed that 53% of participants no longer exhibited any of the anxiety diagnoses included, and 63% no longer had their primary anxiety diagnosis, accompanied by substantial decrease in all anxiety symptoms. Notably, no statistically notable differences in outcomes were observed between ICBT and GCBT [6]. The fact that assessments were conducted on average 3.9 years post-treatment and indicated that more than half of the subjects no longer met the diagnostic criteria for any anxiety disorders indicates that GCBT has enduring effects on the youth. The fact that both the young individuals and their parents reported significant reductions in all anxiety symptoms further reinforces the long-term efficacy of GCBT. Besides, even though the study did not find a difference, it does not account for individual preferences and the potential social benefits that group therapy can offer, such as peer support and decreased stigma. This could be an area for further research.

Nowadays, it's easier than ever to find a qualified CBT therapist online, but the quality of therapists is uneven and hard to distinguish. It's also easy to not fully commit to prescribed sessions when things get busy these days. All these conditions could lead to unsuccessful treatment or significantly reduce the effects of the treatment. A study examined the role of therapist adherence, therapist competence, individual versus group setting, and the patient-therapist alliance as factors influencing the sustaining effects of CBT for anxiety disorders in adolescents. Researchers analyzed videotapes of 181 therapy sessions from a randomized controlled trial involving 170 young participants with an average age of 11.6 years with anxiety disorders. Researchers assessed the adherence and competence of therapists while alliance ratings were provided by both therapists and young individuals. The subjects underwent diagnostic interviews and anxiety symptom assessments before the treatment, after the treatment, at follow-up after a year, and long-term follow-up (average 3.9 years post-treatment). The results indicate when therapist adherence was high, the competence of therapists predicted better outcomes, especially when CBT was conducted individually. Alliance rated by therapist played a role in the disappearance of the primary diagnosis and all diagnoses, particularly at group CBT settings. The interactions indicated that therapists who exhibited both high adherence and competence achieved more favorable outcomes over an extended period. Furthermore, the alliance seemed to be especially crucial for group CBT outcomes, while adherence is seemingly indispensable for individual CBT outcomes [7]. From the results, it can be concluded that it would be most effective to have high adherence, high therapist competence, and individual therapy to reach a better outcome. However, when having a high alliance with group CBT therapists with high competence, youth could also benefit from the therapy as well. Therefore, when assigning therapists to individual or group CBT, it might be beneficial to consider their strengths in adherence and competence, as well as their ability to form a strong alliance with the patients.

3. Investigation of Computerized CBT (cCBT)

Due to the limited access to mental health resources during COVID-19, many patients have started to trial computerized CBT to maintain their mental health, which is usually practiced on a mobile phone or web pages through a preprogrammed interface. Adolescents nowadays are usually tech-savvy and more likely to seek help from online solutions. However, the effectiveness always remains questionable due to the reduced individualized therapist interaction, reduced engagement and adherence to the session, ineffective self-reporting diagnosis, and automated treatment plan. Thus, research in this area is urgently needed to examine its true efficacy and potentially prevent unforeseeable hazards. A systematic review assessed cCBT's effectiveness for treating anxiety and depression of adolescents and young adults against passive and active controls, focusing on post-

treatment and follow-up effects. Comprehensive searches across six authoritative databases, including PubMed, EMBASE, and PsycINFO, yielded 7670 papers, with 24 meeting the criteria for inclusion. The Cochrane risk-of-bias tool and the GRADE approach were used to evaluate the study quality. The results indicate that cCBT had a small to medium positive effect on anxiety symptoms (g=0.44) compared with passive controls. It also indicated that cCBT was efficacious in diminishing post-treatment anxiety symptoms when comparing passive controls. When compared to active treatment controls, cCBT was as useful in diminishing anxiety symptoms [8]. This research indicates promising results of large-scale propagation of the CBT session. The data suggests that cCBT has a notable positive effect on reducing anxiety symptoms. Showing a small to medium effect size (g=0.44) indicates that cCBT is better than doing nothing (passive control), which supports the utility of cCBT as a viable treatment option. cCBT's similar effectiveness in comparison to active treatment controls indicates that cCBT can be a feasible alternative to traditional therapy methods, especially when considering barriers such as cost, accessibility, or stigma that may be associated with traditional therapy.

When pandemics hit the world hard, people worldwide start to quarantine at home for long months. Lots of people find it hard to remain mentally healthy staying at home due to irregular living and working schedules and unhealthy style of living. Many people, especially high school or college students who take online courses, start to realize the importance of self-care and start to seek therapeutic methods to improve their lives. When face-to-face interaction is prohibited, the application of cCBT can help optimize healthcare resources by providing an accessible treatment option that can be scaled up to serve a large number of patients simultaneously. However, its effectiveness has been rarely investigated. In a recent study, scientists in China conducted research comparing the use of cCBT during pandemics in 1st six months of 2020 and during the same period in 2019. With the system provided for free during the pandemic, the study aimed to compare user engagement and the impact on anxiety and depression. Subjects were grouped into either anxiety or depression groups based on self-report and completed empirically valiid scale before every cCBT session, which consisted of 5 or 6 training modules for approximately once every five days. The formation of the training remained unchanged between 2019 and 2020. The study found significant demographic differences between the two periods, with a notable increase in cCBT use during the lockdown associated with the number of COVID-19 cases in each province. Besides, cCBT showed a significant positive effect on reducing anxiety and depression conditions among its users during the epidemic. It also indicated that women, students, and those severely impacted by the pandemic were more inclined to utilize cCBT training [9]. From the study, it shows that cCBT is a viable option for mitigating anxiety and depression, particularly when traditional face-to-face therapy is inaccessible. People generally acknowledge its effects and are more willing to use it when they are in difficult situations. However, the self-selected report could lead to great bias, and without a control group (e.g., individuals not using cCBT or using different interventions), it is difficult to ascertain whether the observed improvements were due to cCBT or other factors such as natural recovery or other concurrent interventions. The study also does not specify if the severity of symptoms was evenly distributed or if cCBT is equally effective for all levels of symptom severity. It also does not mention follow-up assessments for longer period of time during covid, so it is unknown whether the benefits of cCBT could be sustained, considering that pandemics lasted for about two years.

Another research conducted in the same year also investigated such issues but under a more controlled environment, which aims to examine the efficacy of a computerized cognitive behavioral therapy (cCBT) program for alleviating symptoms of anxiety, depression, and insomnia among COVID-19 patients. The study involved 252 COVID-19 patients with anxiety and depression diagnosis in China in five different clinical location. They were randomized into two groups. One group receives cCBT and treatment as usual (TAU) and the other receives only TAU. The study randomized 252 COVID-19 patients across five sites into two groups: one receiving cCBT+TAU and the other receiving only TAU. The cCBT program was designed for a one-week session aiming to shift patients' cognition and emotion and includes gaming and testing modules. Efficacy was

measured using various empirically effective testing scales before and after the intervention, with an follow-up assessment at one center one month later. Results showed that compared to TAU alone, the cCBT participants had significantly improved scores in all measures after the intervention. It also showed notable improvement in symptoms of depression, anxiety, and insomnia in follow-up and after-intervention phases in the TAU+cCBT group [10]. This research adds more convincing arguments that cCBT could be a great weapon for clinical intervention in such a particular environment and could show sustained effects after the intervention. The intervention period for cCBT was relatively short (1 week), yet it produced significant improvements in psychological symptoms, indicating that cCBT can have a quick therapeutic effect. While the study's results are promising, it also highlights the need for continued investigation into the long-term impacts of cCBT. And to establish whether these findings can be generalized across different populations and settings. Though the demographics are not targeted specifically to the adolescent population, it can be inferred that they are highly likely to receive benefits from such treatment. The cCBT program included gaming and testing modules, which could be particularly engaging for adolescents who are generally more receptive to digital and interactive formats. The intervention period of one week was relatively short, yet it produced significant improvements. This could be appealing to adolescents, who might prefer shorter-term interventions due to their dynamic and often busy lifestyles.

4. Conclusion

This research elucidates the effectiveness of CBT in treating adolescent anxiety disorders, spanning individualized sessions, group settings, and computerized formats. The findings consistently indicate that CBT drastically reduces anxiety symptoms and improves overall functioning in adolescents, which is a crucial developmental stage marked by unique psychological challenges. Individual CBT shows strength in its tailored approach, directly addressing the specific concerns of each adolescent. Group CBT leverages the power of shared experiences and peer support, reducing feelings of isolation and enhancing social skill development. The cCBT stands out for its adaptability and accessibility, aligning with the digital inclinations of today's youth and proving especially valuable during times like the COVID-19 pandemic.

However, the variability in CBT implementation across different research contexts may influence outcome consistency. The primary reliance on self-reported measures introduces potential subjective biases. Moreover, the influence of therapists' varying techniques and skill levels, which is an aspect not thoroughly explored in this study, could significantly impact CBT's effectiveness. Looking ahead, future research should aim for compare the effectiveness of CBT across different settings and populations to increase the external validity. Incorporating a mix of objective assessments, such as physiological indicators of anxiety or clinician-administered assessment, and subjective measures would offer a more comprehensive view of CBT's impact. Furthermore, investigating the role of therapist competence and style in treatment efficacy is crucial. Such exploration could lead to improved therapist training and selection, optimizing CBT delivery. While the research affirms the positive effect of CBT in various formats for adolescent anxiety, addressing these research gaps can deepen understanding and effectiveness of these therapeutic interventions. Advancing in these areas will ensure that CBT remains a dynamic and relevant tool for supporting adolescent mental health in diverse and changing environments.

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