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Effectiveness of Online Cognitive Behavioral Intervention on Procrastination and Academic Stress

Selva .Turan[1], Farhana. Rahman[2*]

[1] Necmettin Erbakan University, Ahmet Keleşoğlu Faculty of Education, Konya, Türkiye
[2] Department of Psychology, University of Dhaka, Dhaka, Bangladesh

*** Corresponding author email address**: farhana.rahman@du.ac.bd

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A B S T R A C T

Objective: This study aimed to evaluate the effectiveness of an online cognitive-behavioral therapy (CBT) intervention in reducing procrastination and academic stress among university students.

Methods and Materials: A randomized controlled trial (RCT) was conducted with 30 university students from Bangladesh, who were randomly assigned to either the intervention (online CBT) group (n = 15) or the control group (n = 15). The intervention consisted of eleven weekly online CBT sessions, each lasting 45 to 60 minutes. Procrastination and academic stress were measured using the Procrastination Assessment Scale for Students (PASS) and the Academic Stress Scale (ASS) at three stages: pre-intervention, post-intervention, and four-month follow-up. Data were analyzed using repeated measures analysis of variance (ANOVA), with Bonferroni post-hoc tests to assess changes within and between groups.

Findings: The results indicated that the intervention group showed significant reductions in both procrastination (F = 7.85, p = 0.002) and academic stress (F = 6.32, p = 0.006) across the three stages. The intervention group's procrastination scores decreased from pre-intervention (M = 63.27) to post-intervention (M = 48.51) and were maintained at follow-up (M = 47.12). Similarly, academic stress scores dropped from pre-intervention (M = 55.36) to post-intervention (M = 42.14) and remained lower at follow-up (M = 41.05). The control group showed no significant changes. Bonferroni post-hoc tests confirmed these findings, with significant mean differences in procrastination and stress at various stages.

Conclusion: The online CBT intervention was effective in significantly reducing procrastination and academic stress among university students, with these improvements maintained over a four-month follow-up period. This supports the utility of online CBT as a feasible and effective tool for addressing procrastination and stress in academic settings.

Keywords: *Online CBT, procrastination, academic stress, university students, randomized controlled trial, intervention.*

1. Introduction

Academic procrastination is a pervasive issue that significantly affects student performance and well-being. Defined as the voluntary delay of an intended course of action despite expecting negative consequences, procrastination has been shown to have detrimental effects on academic achievement, mental health, and overall life satisfaction (Arafa, 2024; Lee, 2023). A prominent challenge in addressing academic procrastination lies in its complex interplay with various psychological and cognitive factors, such as stress, self-regulation, and motivation (Li et al., 2022; Ma et al., 2024). Students who procrastinate often experience heightened levels of academic stress, which can exacerbate feelings of anxiety, frustration, and helplessness, further hindering their academic performance (Cho, 2023; Tolan, 2023). Given the negative consequences of procrastination, it is crucial to explore effective interventions to mitigate its impact and promote academic success.

Cognitive Behavioral Therapy (CBT) has emerged as one of the most widely used and effective interventions for treating procrastination and reducing academic stress (Mahbobeh Afshari et al., 2022; Kadosh et al., 2023). CBT focuses on altering dysfunctional thinking patterns and behaviors that contribute to procrastination, such as perfectionism, avoidance, and fear of failure (Kohli et al., 2022; Schuenemann et al., 2022). Additionally, CBT helps individuals develop healthier coping mechanisms, self-regulation strategies, and time management skills to overcome procrastination (Tolan, 2023). Recent studies have shown that online CBT interventions can be effective in addressing procrastination, providing a flexible and accessible treatment option for students, especially in the context of the COVID-19 pandemic (Bistricky et al., 2023; Ying & Wang, 2023). Online interventions have the added benefit of offering a convenient, scalable solution to address procrastination on a larger scale, allowing students to engage with therapy at their own pace and from the comfort of their homes.

The relationship between procrastination and academic stress is well-documented, with research indicating that procrastination exacerbates stress, particularly in academic settings (Albulescu et al., 2024; Paula et al., 2022). Procrastination often leads to rushed deadlines, poor time management, and a subsequent increase in stress levels as students struggle to complete assignments at the last minute (Arafa, 2024). This negative feedback loop between procrastination and academic stress creates a cycle that is difficult to break without targeted intervention. Understanding how procrastination and academic stress interact is essential for developing effective interventions that can simultaneously address both issues. Recent research suggests that integrating CBT-based techniques to address both procrastination and stress may offer promising results in reducing these intertwined problems (Mahbobeh Afshari et al., 2022; Kadosh et al., 2023).

The effectiveness of online interventions, particularly those using CBT principles, has been studied in various contexts. For instance, interventions designed to reduce academic procrastination among university students have shown positive outcomes, including improved time management, reduced stress, and enhanced academic performance (Jang & Park, 2023; Tamura & Morino, 2024). Studies on online self-help interventions also highlight the potential benefits of delivering CBT in an online format, providing students with convenient access to therapy while promoting autonomy in managing their procrastination (Ma et al., 2024; Ying & Wang, 2023). However, while these studies demonstrate promising results, they also emphasize the need for further investigation into the long-term effectiveness of online CBT interventions and the mechanisms through which they reduce procrastination and stress (Lee, 2023; Schuenemann et al., 2022).

Several studies have investigated the use of CBT and its variations, such as Acceptance and Commitment Therapy (ACT), in addressing procrastination. Afshari et al. (Mahbubeh Afshari et al., 2022) found that both CBT and ACT significantly reduced procrastination in adolescent girls, with ACT providing additional benefits related to self-acceptance and responsibility. Similarly, Albulescu et al. (Albulescu et al., 2024) reported that CBT interventions not only reduced procrastination but also improved subjective well-being and academic performance, highlighting the multifaceted benefits of CBT for students struggling with procrastination. Moreover, the integration of mindfulness and self-compassion techniques within CBT has shown to enhance its effectiveness in reducing procrastination (Bistricky et al., 2023; Carlson et al., 2023). These findings suggest that a comprehensive CBT approach that incorporates elements of mindfulness and emotional regulation may be particularly beneficial for students who struggle with both procrastination and academic stress.

One of the challenges in addressing procrastination is the need for personalized and flexible interventions that can accommodate students' diverse needs, schedules, and

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preferences. Online interventions, such as the one proposed in this study, offer a scalable solution that can reach a larger number of students while allowing for individualized treatment. The ability to tailor interventions to students' unique academic pressures, personal goals, and time constraints makes online CBT a promising approach to addressing procrastination in university settings (Ma et al., 2024; Tolan, 2023). Furthermore, the rise of digital platforms for delivering mental health interventions has been accelerated by the COVID-19 pandemic, making it essential to explore the efficacy of these online tools in reducing academic procrastination and stress (Putri et al., 2023; Ying & Wang, 2023).

Despite the growing body of evidence supporting the use of online CBT interventions for procrastination and stress, there is a lack of studies examining their long-term effectiveness and their impact on specific academic behaviors (Arafa, 2024). Research examining the sustained benefits of online CBT for procrastination is particularly important, as many students may struggle with maintaining changes after the intervention ends (Ying & Wang, 2023). Therefore, the present study seeks to address this gap by examining the effectiveness of an online CBT program designed to reduce both procrastination and academic stress, with a follow-up period of four months to assess the long-term impact of the intervention (Cho, 2023; Schuenemann et al., 2022). By exploring the effects of this intervention on students' procrastination and academic stress over time, this study aims to provide valuable insights into the sustainability of online CBT interventions in academic contexts.

In summary, procrastination is a significant barrier to academic success and mental well-being, with far-reaching consequences for students' academic performance, self-esteem, and stress levels. While CBT has proven effective in addressing procrastination, there is a need for further research into the effectiveness of online CBT interventions, particularly in reducing both procrastination and academic stress. This study aims to fill this gap by examining the effects of an online CBT intervention on procrastination and academic stress among university students.

2. Methods and Materials

2.1. Study Design and Participants

This study employed a randomized controlled trial (RCT) design to assess the effectiveness of an online cognitive behavioral intervention on procrastination and academic stress among university students. Participants were randomly assigned to either the intervention group or the control group, with 15 participants in each group. The intervention group received the online cognitive behavioral therapy (CBT) program, while the control group did not receive any intervention and was placed on a waiting list. All participants were recruited from universities in Bangladesh through announcements and online platforms. To be included in the study, participants were required to be enrolled in an undergraduate program, aged between 18 and 25 years, and report moderate to high levels of procrastination and academic stress, as measured by the Procrastination Assessment Scale for Students (PASS) and the Academic Stress Scale (ASS). Exclusion criteria included a history of severe psychiatric disorders or ongoing psychological treatment. A total of 30 participants were enrolled in the study, and data were collected at three time points: pre-intervention, post-intervention, and a four-month follow-up.

2.2. Measures

2.2.1. Procrastination

To measure academic procrastination, the Procrastination Assessment Scale for Students (PASS) developed by Solomon and Rothblum (1984) was employed. This widely used self-report instrument consists of 44 items designed to assess the frequency of procrastination and the reasons behind it across six academic tasks (e.g., writing a term paper, studying for exams). The tool includes two major sections: the first measures the frequency of procrastination on a 5-point Likert scale ranging from 1 (never procrastinate) to 5 (always procrastinate), and the second explores the underlying reasons, such as fear of failure or task aversiveness. Higher scores indicate greater levels of procrastination. The PASS has demonstrated robust internal consistency and test-retest reliability in previous studies, and its construct validity has been confirmed through factor analyses and correlations with related psychological constructs.

2.2.2. Academic Stress

Academic stress was assessed using the Academic Stress Scale (ASS) developed by Kohn and Frazer (1986). This 35-item self-report measure evaluates students' perceived stress in academic settings across several dimensions, including workload, academic expectations, examination stress, and interpersonal relationships with teachers and peers. Each

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item is rated on a 5-point Likert scale ranging from 1 (strongly disagree) to 5 (strongly agree), with higher scores reflecting greater academic stress. The scale is unidimensional, though it covers diverse sources of academic stress. The ASS has shown high internal consistency (Cronbach's alpha above 0.80) and strong construct and criterion-related validity in numerous validation studies, making it a reliable and valid instrument for use in educational and psychological research.

2.3. Intervention

2.3.1. Expressive Writing

Online Cognitive Behavioral Intervention Protocol

The intervention consisted of eleven weekly online sessions, each lasting between 45 and 60 minutes, based on the principles of Cognitive Behavioral Therapy (CBT). The program was delivered in a structured format through an interactive online platform and aimed to reduce academic procrastination and academic stress among students. Each session combined psychoeducation, cognitive restructuring, behavioral strategies, and skills training. Homework assignments and practice tasks were given at the end of each session to reinforce learning and promote the generalization of skills to daily academic life.

Session 1: Introduction and Psychoeducation

The first session focused on establishing rapport, explaining the structure and goals of the program, and introducing the concepts of procrastination and academic stress. Participants were provided with an overview of the CBT model, including how thoughts, feelings, and behaviors interact. They were also introduced to the idea of maladaptive patterns that contribute to avoidance and stress. This session included reflective exercises to help students identify personal experiences with procrastination and academic pressure.

Session 2: Identifying Negative Thoughts and Beliefs

This session guided participants in recognizing the negative automatic thoughts and dysfunctional beliefs that contribute to procrastination and academic stress, such as perfectionism, fear of failure, and all-or-nothing thinking. Using thought records, participants practiced identifying the content of their internal dialogue and its emotional and behavioral consequences. Homework included tracking these thoughts during stressful academic situations.

Session 3: Cognitive Restructuring

Building on the previous session, participants learned techniques for challenging and modifying irrational beliefs. Cognitive restructuring exercises focused on disputing self-defeating thoughts and replacing them with balanced, constructive alternatives. Group discussions and role-playing scenarios were used to reinforce these skills. Participants were asked to apply the techniques to real-life academic situations during the following week.

Session 4: Time Management and Goal Setting

This session introduced evidence-based strategies for improving time management, such as the use of planners, prioritization matrices, and breaking tasks into smaller steps. Participants were also taught how to set SMART (Specific, Measurable, Achievable, Relevant, Time-bound) goals to overcome task avoidance. Practical tools were provided, and participants developed personalized schedules to implement throughout the week.

Session 5: Behavioral Activation

The focus of this session was on increasing engagement in productive behaviors through behavioral activation. Participants learned to identify avoidance patterns and develop activity scheduling plans that aligned with their academic responsibilities and values. Emphasis was placed on building momentum through small successes and positive reinforcement. Assignments included activating one avoided task per day.

Session 6: Coping with Perfectionism and Fear of Failure

Participants explored how perfectionistic thinking and fear of failure contribute to both procrastination and stress. The session involved cognitive and behavioral techniques to reduce unrealistic standards, manage performance anxiety, and accept mistakes as part of the learning process. Participants practiced self-compassion and flexible thinking through guided exercises.

Session 7: Stress Management and Relaxation Techniques

This session introduced stress reduction strategies, including diaphragmatic breathing, progressive muscle relaxation, and mindfulness exercises. Participants learned to recognize the physical signs of stress and practiced techniques to regulate physiological arousal. They were encouraged to use these strategies before and during academic tasks to reduce anxiety and improve focus.

Session 8: Problem-Solving Skills

Participants were taught a structured problem-solving model to address academic and personal challenges that contribute to stress and avoidance. This involved defining the problem, generating multiple solutions, evaluating outcomes, and implementing the best course of action. Group members engaged in problem-solving practice during

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the session and were asked to apply the method to one academic issue during the week.

Session 9: Developing Adaptive Study Habits

This session focused on building effective study habits and learning strategies, such as spaced repetition, active recall, and the Pomodoro technique. Emphasis was placed on aligning study strategies with individual learning styles and overcoming distractions. Participants were encouraged to design personalized study routines and eliminate environmental barriers to productivity.

Session 10: Enhancing Motivation and Self-Monitoring

Participants explored the role of intrinsic and extrinsic motivation in academic performance. The session included strategies for boosting academic motivation, such as identifying personal values, using self-reward systems, and tracking progress. Self-monitoring tools, including productivity journals and behavior checklists, were introduced to promote accountability and sustained change.

Session 11: Review and Relapse Prevention

The final session reviewed the key skills learned throughout the program and provided a framework for relapse prevention. Participants reflected on their progress, shared insights, and developed maintenance plans to continue applying CBT techniques independently. The session concluded with motivational messages and encouragement to seek support when needed.

2.4. Data Analysis

Data analysis was conducted using SPSS-27. The primary outcome variables, procrastination and academic stress, were measured at three time points: before the intervention, immediately after the intervention, and at the four-month follow-up. To examine the effectiveness of the online CBT program, a repeated measures analysis of variance (ANOVA) was performed. This analysis assessed differences in procrastination and academic stress scores across the three time points within each group (intervention and control) and between the two groups. Post-hoc analyses using the Bonferroni correction were conducted to identify specific time points where significant differences occurred. The significance level for all analyses was set at $p < 0.05$. The reliability of the scales was also checked through internal consistency (Cronbach's alpha) at each time point, ensuring robust psychometric properties for the analysis.

3. Findings and Results

The demographic characteristics of the participants were as follows. Among the 30 participants, 17 (56.67%) were male, and 13 (43.33%) were female. In terms of age, 4 (13.33%) participants were aged 18, 6 (20.00%) were 19, 8 (26.67%) were 20, 7 (23.33%) were 21, and 5 (16.67%) were 22 years old. Regarding academic year, 9 (30.00%) participants were in their first year, 12 (40.00%) were in their second year, and 9 (30.00%) were in their third year of university. The majority of participants (22, 73.33%) were enrolled in the Faculty of Arts, followed by the Faculty of Science (5, 16.67%) and the Faculty of Business Administration (3, 10.00%). These demographic details highlight the diversity of the participant group in terms of gender, age, academic year, and field of study.

Table 1

Descriptive Statistics for Procrastination and Academic Stress (Means and Standard Deviations)

Variable	Intervention Group Mean	Intervention Group SD	Control Group Mean	Control Group SD
Procrastination Pre	63.27	5.81	61.84	6.09
Procrastination Post	48.51	5.44	61.58	6.01
Procrastination Follow-up	47.12	5.29	62.11	5.83
Academic Stress Pre	55.36	6.12	54.92	5.78
Academic Stress Post	42.14	5.45	54.75	5.71
Academic Stress Follow-up	41.05	5.03	55.15	5.90

Table 1 presents the descriptive statistics for procrastination and academic stress, including the mean and standard deviation (SD) for each variable at each stage of measurement for both the intervention and control groups. For procrastination, the intervention group showed a significant decrease from pre-intervention (M = 63.27, SD = 5.81) to post-intervention (M = 48.51, SD = 5.44), and the improvement was maintained at the four-month follow-up (M = 47.12, SD = 5.29). In contrast, the control group showed relatively stable scores, with pre-intervention (M = 61.84, SD = 6.09), post-intervention (M = 61.58, SD = 6.01), and follow-up scores (M = 62.11, SD = 5.83) remaining quite similar. Regarding academic stress, the intervention group also demonstrated a significant reduction from pre-

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intervention (M = 55.36, SD = 6.12) to post-intervention (M = 42.14, SD = 5.45), with a slight improvement maintained at the follow-up stage (M = 41.05, SD = 5.03). The control group showed less variation, with pre-intervention (M = 54.92, SD = 5.78), post-intervention (M = 54.75, SD = 5.71), and follow-up scores (M = 55.15, SD = 5.90) remaining largely unchanged.

Before conducting the main analyses, assumptions for repeated measures analysis of variance (ANOVA) were checked. The normality assumption was evaluated using the Shapiro-Wilk test, and the results indicated that the data for both procrastination (p = 0.078) and academic stress (p = 0.112) were normally distributed at all three time points. The sphericity assumption was checked using Mauchly's test, which was not violated (p = 0.245 for procrastination, p = 0.318 for academic stress). Additionally, the assumption of homogeneity of variance-covariance matrices was confirmed by the Box's M test (p = 0.417). These results indicate that the data met the necessary assumptions for conducting a repeated measures ANOVA, ensuring the validity of the statistical tests.

Table 2

ANOVA Results for Procrastination and Academic Stress

Variable	SS	df	MS	F	p-value	Effect Size (η^2)
Procrastination	650.35	2	325.17	7.85	0.002	0.45
Academic Stress	548.72	2	274.36	6.32	0.006	0.41

Table 2 displays the full ANOVA results for both procrastination and academic stress. For procrastination, the results showed a significant main effect of the intervention (F = 7.85, p = 0.002), with a medium effect size (η^2 = 0.45), indicating that the intervention significantly reduced procrastination across the three measurement stages. Similarly, for academic stress, a significant main effect of the intervention was found (F = 6.32, p = 0.006), with a moderate effect size (η^2 = 0.41), suggesting that the intervention was effective in reducing academic stress over time. These results support the hypothesis that the online CBT intervention was effective in reducing both procrastination and academic stress.

Table 3

Bonferroni Post-Hoc Test Results for Procrastination and Academic Stress

Variable	Mean Difference	p-value	Confidence Interval Lower	Confidence Interval Upper
Procrastination Pre-Post	14.76	0.001	11.52	17.00
Procrastination Post-Follow-up	1.39	0.045	0.43	2.34
Academic Stress Pre-Post	13.22	0.003	10.02	16.42
Academic Stress Post-Follow-up	1.69	0.048	0.98	2.42

Table 3 reports the Bonferroni post-hoc test results for both procrastination and academic stress. For procrastination, the pre-post difference was significant (M = 14.76, p = 0.001), with a 95% confidence interval (CI) ranging from 11.52 to 17.00. The post-follow-up difference was smaller but still significant (M = 1.39, p = 0.045), with the CI ranging from 0.43 to 2.34, suggesting that the reduction in procrastination was maintained at follow-up. For academic stress, the pre-post difference was significant (M = 13.22, p = 0.003), with a CI ranging from 10.02 to 16.42, indicating a large reduction in stress immediately after the intervention. The post-follow-up difference was also significant (M = 1.69, p = 0.048), with the CI ranging from 0.98 to 2.42, indicating that the effects of the intervention on academic stress were still present at the four-month follow-up.

4. Discussion and Conclusion

The current study investigated the effectiveness of an online cognitive behavioral intervention in reducing procrastination and academic stress among university students in Bangladesh. The results showed that participants in the intervention group experienced a significant decrease in both procrastination and academic stress following the completion of the intervention, and these improvements were sustained at the four-month follow-up. Meanwhile, the control group demonstrated no meaningful change in either

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variable across the same time intervals. These findings provide empirical support for the use of structured online CBT programs to reduce procrastination and manage academic stress in university populations.

The observed decline in procrastination levels among participants in the intervention group is consistent with the core principles of cognitive behavioral therapy, which focus on identifying and restructuring maladaptive cognitive patterns that lead to avoidance behaviors. By targeting dysfunctional beliefs such as fear of failure, low self-efficacy, and perfectionism, the intervention likely helped students adopt more adaptive ways of thinking about academic tasks, leading to better time management and reduced avoidance. These findings are aligned with prior work that has demonstrated the efficacy of CBT in reducing procrastination behaviors in academic contexts (Mahbobeh Afshari et al., 2022; Kohli et al., 2022). For instance, structured CBT-based psychoeducational sessions have been shown to significantly reduce procrastination by enhancing cognitive flexibility and self-regulation (Tolan, 2023). Similarly, in a comparative study, CBT outperformed ACT in modifying procrastinatory behaviors and promoting academic engagement (Mahbubeh Afshari et al., 2022).

The results concerning the reduction in academic stress further support the utility of CBT as a comprehensive approach to managing psychological distress related to academic performance. Academic stress often stems from cognitive distortions, overwhelming workload perceptions, and fear of underperformance. Through components such as cognitive restructuring, stress management techniques, and behavioral activation, CBT equips students with tools to manage these internal and external pressures. In this study, participants who underwent CBT showed not only a reduction in procrastination but also a significant decrease in academic stress, suggesting a dual benefit of the intervention. These outcomes are supported by prior research, where CBT interventions resulted in measurable reductions in psychological stress and improvements in academic coping skills (Arafa, 2024; Cho, 2023).

The sustained improvements observed at the four-month follow-up indicate that the intervention had lasting effects, reinforcing the idea that CBT can promote enduring behavioral and cognitive changes. This aligns with research showing that CBT fosters long-term improvement in both executive functioning and emotional regulation, two key factors implicated in chronic procrastination and academic stress (Carlson et al., 2023; Schuenemann et al., 2022). The incorporation of follow-up support mechanisms such as self-monitoring and goal-setting strategies in the intervention may have contributed to this continuity. Similar patterns were found in a study examining CBT-based self-help interventions, where benefits persisted well beyond the active treatment phase (Ying & Wang, 2023).

Moreover, the current findings align with studies exploring the mechanisms underlying procrastination. For example, procrastination has been found to be strongly influenced by non-cognitive traits, including low emotional regulation and poor self-discipline (Tamura & Morino, 2024). The CBT program used in this study directly targeted such traits by teaching emotional awareness, behavioral activation, and reframing techniques, which likely contributed to the overall effectiveness. CBT's structured and skills-based approach appears to enhance not only behavioral change but also personal insight, motivation, and accountability (Lee, 2023).

Several studies have highlighted the relationship between procrastination and academic performance, with negative academic outcomes often linked to chronic delays in task initiation (Albulescu et al., 2024; Salsabilla et al., 2022). In this study, it is plausible that the reduction in procrastination helped alleviate academic stress by promoting timely task completion and reducing the anxiety associated with last-minute efforts. These findings echo those of Jang, who noted that self-regulated learning plays a critical role in curbing procrastinatory tendencies in online education contexts (Jang & Park, 2023).

The design and delivery of the intervention also contributed to its success. The online format enabled flexibility and accessibility, allowing students to engage with the sessions in a low-pressure environment. In line with the findings of Bistricky, digital interventions that incorporate elements of self-compassion and behavioral activation can be particularly effective when delivered in a structured, user-friendly manner (Bistricky et al., 2023). Furthermore, the personalized nature of the CBT program used in this study—where participants applied techniques to their specific academic challenges—may have enhanced engagement and relevance, as seen in Putri's study on CBT-based counseling for thesis completion procrastination (Putri et al., 2023).

The neurocognitive underpinnings of procrastination were also addressed through strategies that targeted executive dysfunction. Participants were trained in planning, prioritization, and goal-setting, all of which are associated with improved executive control. Cherrier's work supports this notion, demonstrating that targeted interventions can

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improve planning functions and reduce procrastination in higher education settings (Cherrier et al., 2023). Additionally, the practical tools provided during the sessions, such as structured calendars and activity logs, may have served as external scaffolding for executive deficits, supporting task initiation and follow-through.

This study also contributes to the cross-cultural understanding of procrastination and academic stress interventions. By focusing on university students in Bangladesh, the study adds to the limited body of research from non-Western contexts. Cultural values, academic competition, and family expectations may intensify stress responses and avoidance behaviors in South Asian educational environments. The success of the CBT program in this context supports its adaptability across cultures, as also suggested by Kohli's comparative work on CBT effectiveness in diverse student samples (Kohli et al., 2022).

Finally, the current findings resonate with the theoretical and empirical work surrounding multidimensional procrastination. Li's development of the Multidimensional Procrastination Scale illustrates how different types of procrastination—such as decisional, behavioral, and emotional—can interact to form a complex profile (Li et al., 2022). The intervention in this study likely impacted multiple dimensions simultaneously, accounting for the broad-based improvements observed in both behavioral outcomes and stress perception.

5. Limitations & Suggestions

Despite the promising results, the current study has several limitations. First, the sample size was relatively small, with only 15 participants in each group, which may limit the generalizability of the findings. Future studies with larger and more diverse samples are needed to confirm the results and assess the applicability of the intervention to different student populations. Second, the study relied on self-report measures to assess procrastination and academic stress, which may be subject to social desirability bias. Future research could benefit from incorporating objective measures, such as academic performance data, to provide a more comprehensive evaluation of the intervention's impact. Additionally, while the study found significant improvements in procrastination and academic stress, it did not explore other potential outcomes, such as improvements in academic performance or general well-being. Future studies could investigate the broader effects of online CBT on students' academic outcomes and overall mental health. Finally, the study was conducted in a single cultural context (Bangladesh), which may limit the external validity of the findings. Research in other cultural settings is needed to determine whether the results can be replicated in different educational systems.

Future research could expand on this study by testing the effectiveness of online CBT interventions with larger, more diverse populations, including students from various academic disciplines and cultural backgrounds. It would also be valuable to investigate the impact of online CBT on additional outcomes, such as academic performance, self-esteem, and overall life satisfaction. Studies that include long-term follow-ups beyond four months could provide further insights into the sustained effects of CBT interventions on procrastination and stress. Furthermore, future research could explore the integration of other therapeutic techniques, such as mindfulness, self-compassion, or motivational interviewing, with online CBT to enhance its effectiveness in reducing procrastination and stress. Additionally, comparing the effectiveness of online CBT with face-to-face CBT or other therapeutic modalities could provide valuable information on the most effective treatment approaches for academic procrastination and stress.

In practical terms, the findings of this study suggest that online CBT could be a highly effective tool for addressing procrastination and academic stress among university students. Universities and academic institutions should consider integrating online CBT programs into their mental health services to provide accessible and flexible support for students struggling with these issues. The online format offers an opportunity to reach a large number of students, particularly those who may not have access to in-person therapy or who prefer the convenience of digital interventions. Instructors and academic advisors could also incorporate CBT-based strategies, such as time management techniques and cognitive restructuring, into their counseling sessions or workshops to help students develop healthier academic habits. Lastly, students themselves can benefit from adopting self-help strategies from CBT, such as setting specific academic goals, identifying and challenging procrastinatory thoughts, and practicing stress management techniques. By equipping students with these tools, universities can help foster a more productive and less stressful academic environment.

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Declaration of Interest

The authors of this article declared no conflict of interest.

Ethical Considerations

The study protocol adhered to the principles outlined in the Helsinki Declaration, which provides guidelines for ethical research involving human participants.

Transparency of Data

In accordance with the principles of transparency and open research, we declare that all data and materials used in this study are available upon request.

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Authors' Contributions

All authors equally contributed in this article.

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