

The Impact of Cognitive-Behavioral Therapy on Enhancing Self-Control and Reducing Anger among Individuals Recovered from COVID-19

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ABSTRACT

Objective: The COVID-19 pandemic not only poses physical health challenges but also has significant psychological implications. This study aimed to examine the effectiveness of cognitive-behavioral therapy (CBT) in enhancing self-control and reducing anger among individuals recovered from COVID-19.

Methods and Materials: A quasi-experimental design with pre-test, post-test, and follow-up assessments and a control group was used. The study population included individuals diagnosed with COVID-19 who sought treatment at a private center in Iran. A total of 30 participants were selected through convenient sampling and randomly assigned to either an experimental group (n = 15) or a control group (n = 15). The experimental group received nine sessions of CBT, while the control group received no intervention. Data were collected using Tanji's (1999) Self-Control Questionnaire and Buss and Perry's (1992) Aggression Questionnaire. Data analysis was conducted using analysis of covariance (ANCOVA) and repeated measures ANOVA to evaluate treatment sustainability.

Findings: The results indicated that CBT significantly improved self-control and reduced anger among individuals recovered from COVID-19.

Conclusion: CBT appears to be an effective intervention for enhancing self-control and reducing anger in individuals who have recovered from COVID-19.

Keywords: cognitive-behavioral therapy, self-control, anger, COVID-19

1. Introduction

The COVID-19 disease, caused by the novel coronavirus, has brought about a multitude of

challenges and issues for individuals worldwide. Among these challenges, psychological problems have emerged as a significant concern for both those who have contracted the disease and those who have recovered from it. Studies

revealed that over 18 percent of those who had recovered from the disease were facing a condition known as Post COVID-19 Syndrome. This syndrome is characterized by persistent symptoms such as headaches, severe fatigue, and anger. The impact of the 2019 coronavirus pandemic on the mental and physical health of individuals in various countries cannot be understated (Lange, 2021; Sood, 2020). The mysterious nature of the virus, and its uncontrollable and unpredictable spread, has created fertile ground for the development of psychological problems (Asanjarani et al., 2023; Asanjarani et al., 2021).

The mental health dimension has been significantly affected, providing individuals with new challenges to navigate. Those who have recovered from COVID-19 have often endured immense hardships and experienced failure, requiring them to possess a high level of psychological toughness (Bonazza et al., 2022). Moreover, these individuals have gained a deeper understanding of the meaning of life, as they have constantly faced anxiety and the fear of death (Sun et al., 2021).

The psychological impact of COVID-19 extends beyond the physical symptoms of the disease itself. The fear and uncertainty surrounding the virus, coupled with the challenges of isolation, economic instability, and loss of loved ones, have contributed to a significant rise in psychological distress among the population. This distress manifests in various ways, including increased rates of depression, anxiety, and post-traumatic stress disorder (PTSD) (Clemente-Suárez et al., 2020; Zsido et al., 2022).

The global response to the pandemic has highlighted the importance of addressing the psychological well-being of individuals affected by COVID-19. Mental health services and support systems have become essential components of the overall public health response. Self-control, also known as self-monitoring, is a crucial skill that plays a significant role in individuals' mental health and well-being (Zhao et al., 2021). It refers to the degree to which behavioral characteristics align with the current conditions and situation and signifies the level of flexibility or stability a person exhibits in their circumstances (Hofmann et al., 2014).

Individuals who possess self-control are adept at prioritizing realistic goals and effectively balancing their emotions and reason when making decisions (Duckworth et al., 2018). On the other hand, those lacking self-control are more susceptible to succumbing to tempting and seductive moments. In sensitive situations like the occurrence of dangerous diseases, individuals with low self-control often

experience heightened levels of panic and stress, losing their inner peace (Tangney et al., 2018).

Another common variable among COVID-19 patients is anger and violence. Throughout history, anger and violence have been part of the human experience. Violence can impact people's lives from adolescence to old age, and it is a complex phenomenon with various biological, psychological, and social dimensions (Macmillan, 2001). Today, violence is a widely researched topic that has attracted the attention of many scholars around the world, yet it remains a prevalent social issue. Individuals who experience violence can cause significant problems for their families due to physical and mental complications (Moeller, 2001).

In the context of the COVID-19 pandemic, with the requirement for quarantine, increased family cohabitation, and the possibility of multiple family members contracting the virus, violence has become a common problem in many households (Wood et al., 2021). This issue poses a serious crisis for all countries. Violence can severely damage the foundations of a family and lead to its collapse (Peterman et al., 2020).

Smith et al. (2021), in a study titled "Anger and Confrontation during the COVID-19 Pandemic: A National Cross-Sectional Survey in the United Kingdom," concluded that the majority of participants reported having arguments, feeling angry, or being at odds with someone because of COVID-19. Other factors associated with anger and coping included younger age, experiencing significant financial hardship due to the pandemic, perceiving a higher risk of COVID-19, and receiving information about COVID-19 from social media.

Different interventional methods have been used to improve the mental health of patients during and after hospitalization. One of these methods is Cognitive-behavioral therapy (CBT). CBT is one of the approaches used in the treatment of depression, anxiety, and anger. CBT is an effective treatment method that helps individuals address psychological issues and modify patterns of behavior. Considering that many people with the coronavirus still experience mental problems after physical recovery (Liyanage-Don et al., 2021), CBT can be utilized as an effective treatment method for them. CBT consists of three main elements: learning, behavior change, and cognitive restructuring. Through this approach, individuals learn how to choose adaptive behaviors and develop effective strategies for problem-solving in situations that

cause anxiety, stress, and depression (Asanjarani & Zarebahrabadi, 2021).

Research studies examining the effectiveness of the cognitive-behavioral approach have shown that it is effective in managing anxiety and depression (Asanjarani & Zarebahrabadi, 2021), increasing satisfaction with life, enhancing tolerance, and improving overall quality of life (Alavi et al., 2021; Kunzler et al., 2018), as well as improving mood and reducing anxiety symptoms (Driessen & Hollon, 2010).

Considering the extensive dimensions and physical and mental consequences of the coronavirus disease, it is crucial to improve the mental and cognitive well-being of individuals after recovery. Self-control and anger management are two key concepts in mental health that play a significant role in preventing mental disorders and enhancing individuals' quality of life. Therefore, investigating the effectiveness of cognitive-behavioral therapy in improving these factors among individuals who have recovered from COVID-19 is an important area of research for mental health professionals. Based on the information presented, the research question can be formulated as follows: Does cognitive-behavioral therapy have an effect on self-control and anger reduction in individuals who have recovered from COVID-19?

2. Methods and Materials

2.1. Study Design and Participants

This research has a semi-experimental (quasi-experimental) design and a practical purpose. The study employed a pre-test, post-test, and follow-up plan, along with a control group. The statistical population of the research includes all patients with COVID-19 who were admitted to a private center in 2022 and had recovered at least one month prior. The sampling method used was availability sampling, where one hospital was selected. A total of 30 individuals were selected as the research sample from the available pool and divided into two

groups: an experimental group (15 people) and a control group (15 people). The subjects were alternated between the experimental and control groups, whereby one group was exposed to the experimental variable, while the other served as a control group where the experimental variable was not implemented. The independent variable, cognitive-behavioral therapy, was applied to the experimental group, while the control group received standard medical treatment. The changes in the dependent variables were measured

during the post-test phase. Additionally, one month after the post-test phase, a follow-up stage was conducted for both groups using the research tools.

2.2. Measures

2.2.1. Self-control

This questionnaire was prepared by Tangen (1999). This questionnaire consists of 13 questions and aims to measure individuals' level of self-control. The questionnaire is one-dimensional. The scoring method for this questionnaire is as follows: never (1), rarely (2), sometimes (3), a lot (4), and very much (5). However, the scoring method has been reversed for questions 2, 3, 4, 5, 7, 9, 10, 12, and 13. To obtain the total score of the questionnaire, add up the scores of all the questions. The maximum score for Tangen's self-control questionnaire is 65, and the minimum is 13. A higher score indicates higher self-control, and vice versa. The validity and reliability of Tangen's self-control questionnaire have been calculated and confirmed in the research conducted by Mousavi Moghadam et al. (2014). Additionally, Tangen et al. (2004) confirmed the validity of this scale by evaluating its correlation with scales of academic achievement, adaptability, positive relationships, and interpersonal skills. The reliability of the questionnaire was also established through Cronbach's alpha test, with values of 0.83 and 0.85 obtained from two statistical samples.

2.2.2. Aggression

This questionnaire was prepared by Bass and Perry (1992). The test consists of 29 five-choice questions that are scored using a five-point Likert scale. The scale ranges from 1=completely similar to me to 5=extremely not similar to me, where a score of 1 indicates the lowest level of control and a score of 5 indicates the highest level of anger control in a person. However, two questions are scored in reverse. The questionnaire measures four different dimensions of aggression, with 29 items in total. These dimensions include physical anger control (questions 2, 5, 8, 11, 13, 16, 22, 25, 29), verbal anger control (questions 4, 6, 14, 21, 27), aggression control (questions 1, 9, 12, 18, 19, 23, 28), and hostility control (questions 3, 7, 10, 15, 17, 20, 24, 26). The validity of this questionnaire has been confirmed by Bass and Perry (1992), and its reliability has been reported as 0.78, indicating favorable reliability."

2.3. Intervention

2.3.1. Cognitive-Behavioral Therapy (CBT)

The cognitive-behavioral therapy sessions were structured based on the framework summarized by Hoffman et al. (2013), and are outlined as follows.

Session 1: Introduction and Pre-Test

The first session focused on establishing rapport with participants, introducing the goals and structure of the cognitive-behavioral therapy (CBT) program, and conducting the pre-test assessments. This session aimed to build trust between the therapist and the participants, provide a safe environment for self-expression, and explain the overall therapeutic process. The participants were informed about the expectations of the sessions and the importance of their active involvement in the program.

Session 2: Understanding the Relationship Between Thoughts, Emotions, and Behaviors

In the second session, core CBT concepts were introduced, particularly the cognitive model which explains how thoughts influence emotions and behaviors. Participants were educated on the interplay between cognition, emotion, and behavior using practical examples and worksheets. The therapist highlighted different types of cognitive distortions and taught participants how to identify automatic negative thoughts. The session included a therapist-modeled worksheet and assigned daily homework to reinforce the concepts learned.

Session 3: Cognitive Restructuring

This session was dedicated to deepening the participants' understanding of cognitive restructuring. The process of challenging and modifying irrational or dysfunctional thoughts was discussed. Participants were encouraged to practice identifying negative thoughts and replacing them with more balanced and realistic cognitions. Techniques for restructuring were introduced through guided exercises and examples relevant to participants' experiences.

Session 4: Behavioral Activation and New Behavior Creation

In the fourth session, the focus shifted to behavioral techniques. Participants were taught strategies for creating new, adaptive behaviors using behavior chaining and reinforcement principles. The therapist introduced step-by-step methods for shaping desired behavior patterns, emphasizing the importance of gradual change and consistency. The goal was to empower individuals to take proactive steps in modifying unhelpful behavioral patterns.

Session 5: Assertiveness Training

This session addressed assertiveness as a key component of healthy interpersonal functioning. The therapist explained the definition and types of assertive behavior, the goals and benefits of assertiveness, and the negative outcomes associated with passive or aggressive communication styles. Participants explored personal barriers to assertiveness and were introduced to practical techniques for expressing needs and boundaries confidently and respectfully.

Session 6: Self-Control Techniques and Pleasant Activity Scheduling

Session six introduced cognitive strategies for enhancing self-control, including thought monitoring and the use of positive reinforcement. Participants engaged with structured worksheets to identify and plan enjoyable and meaningful activities, aiming to promote positive affect and self-regulation. The importance of self-directed motivation and delay of gratification was emphasized.

Session 7: Coping Skills and Relaxation Training

The seventh session focused on teaching adaptive coping strategies, including both problem-focused and emotion-focused approaches. Participants learned the differences between constructive and unconstructive coping methods. The session also included Jacobson's progressive muscle relaxation technique, providing participants with practical tools to manage physiological symptoms of stress and emotional arousal.

Session 8: Enhancing Self-Esteem

In this session, participants explored the foundations of self-esteem and its role in psychological well-being. Exercises were conducted to identify personal strengths and challenge self-critical thoughts. The therapist guided participants in building a more positive self-concept through affirmations, feedback exercises, and self-appreciation techniques aimed at reinforcing personal value and competence.

Session 9: Relapse Prevention and Post-Test Evaluation

The final session reviewed the key concepts and skills learned throughout the program. Relapse prevention strategies were discussed, including the identification of high-risk situations, coping planning, and maintaining therapeutic gains over time. Participants were encouraged to develop a personalized maintenance plan. The session concluded with the administration of the post-test to assess the outcomes of the intervention.

2.4. Data analysis

To analyze the data, univariate analysis of covariance tests was used to test the research hypotheses. Also, in order to follow the stability of the effect, analysis of variance with repeated measurements and Bonferroni's post hoc test were used.

3. Findings and Results

In this study, the demographic characteristics of the participants, including gender, education level, and age, were examined. The sample consisted of 30 individuals, of whom 20 (66%) were female and 10 (33%) were male. In terms of education level, 7 participants (23%) held a diploma or associate degree, 16 participants (53%) held a bachelor's degree, and 7 participants (23%) held a master's degree. Regarding age distribution, 9 participants (30%) were under 30 years old, 11 participants (36%) were between 30 and 35 years old, and 10 participants (33%) were between 35 and 40 years old.

Table 1

Means and Standard Deviations of the Research Variables

Variable	Group	Pre-test		Post-test		Follow-up	
		M	SD	M	SD	M	SD
Self-control	Experimental	22.07	6.61	46.07	5.08	49.20	6.14
	Control	25.53	7.48	28.07	7.63	31.73	8.15
Anger	Experimental	54.67	18.24	90.27	12.54	95.53	13.12
	Control	52.20	17.99	54.40	18.29	59.93	17.17

In order to examine the main hypothesis of the study, which posited that cognitive-behavioral therapy (CBT) is effective in improving self-control and reducing anger among COVID-19 survivors, a multivariate analysis of covariance (MANCOVA) was conducted. Prior to performing the analysis, key statistical assumptions were assessed.

First, the normality of data distribution was evaluated using the Shapiro-Wilk test, which indicated that the assumption of normality was met ($W = 0.98$, $p = 0.43$). Next, the homogeneity of covariance matrices was assessed with Box's M test. The results showed that this assumption was not met (Box's $M = 34.75$, $p = 0.01$), and caution was exercised when interpreting the results.

To ensure the presence of correlations among the dependent variables, Bartlett's test of sphericity was conducted and confirmed a significant relationship between the variables ($\chi^2 = 18.84$, $p = 0.02$). Additionally, the

The descriptive results, including the means and standard deviations of the pre-test, post-test, and follow-up scores of participants in the experimental and control groups for the variables of self-control and anger, are presented in Table 1. These results were examined to compare the changes across different stages of the study between the two groups. An increase or decrease in scores for each variable may indicate the effectiveness of the experimental intervention compared to the control group.

For example, in the variable self-control, the mean score of the experimental group increased from 22.07 in the pre-test to 46.07 in the post-test and to 49.20 at follow-up, while the scores of the control group showed relatively minor changes from 25.53 to 28.07 and then to 31.73. Similarly, in the anger variable, the mean score of the experimental group increased from 54.67 in the pre-test to 90.27 in the post-test and to 95.53 at follow-up, whereas the scores of the control group showed smaller increases from 52.20 to 54.40 and then to 59.93.

homogeneity of regression slopes was examined by testing the interaction between pre-test scores and group membership. The results demonstrated that this assumption was satisfied ($p > 0.05$).

After examining the assumptions, a multivariate analysis of covariance (MANCOVA) was conducted, and the results of the Pillai's trace, Wilks' lambda, Hotelling's trace, and largest root tests were reported. Among these, Wilks' lambda is the most commonly used test, while Pillai's trace is considered the strongest, being robust to small sample sizes and violations of assumptions. Given that all assumptions were met, Wilks' lambda was used for the conclusion, which is reported in Table 2.

The results of the multivariate test showed that Wilks' lambda was 0.92, with an F-value of 62.99 and a significance level of $p = 0.001$, indicating a statistically significant effect at the 95% confidence level ($\alpha = 0.05$). These findings suggest that, after controlling for pre-test scores, the

independent variable (type of training) had a significant impact on the linear combination of the dependent variables (post-test scores). In other words, the multivariate analysis of covariance was overall significant, and it can be concluded that cognitive-behavioral therapy had an effect on at least one of the dependent variables. After confirming the significance of the multivariate test, which indicated that the

linear combination of dependent variables was affected by the independent variable, the results of the univariate analysis of covariance are presented in Table 2. These results show whether the independent variable had a significant effect on each dependent variable (Self-control and Anger) individually.

Table 2

Results of covariance analysis of self-control and anger variable

Variable	Source of changes	Degrees of freedom	mean square	F	P	η^2
Self-control	pre-exam	1	540.26	22.18	0.001	0.48
	group	1	2758.11	113.22	0.001	0.83
	error	24	24.36			
Anger	pre-exam	1	1484.59	13.30	0.01	0.36
	group	1	7661.32	68.63	0.001	0.74
	error	24	111.63			

The results indicated that, after controlling for the effect of pre-test scores, there was a significant difference in the mean post-test scores of the self-control variable between the experimental and control groups ($F = 113.22$, $P = 0.001$, $\eta^2 = 0.83$). Similarly, a significant difference was observed between the mean post-test scores of the anger control variable in the two groups after adjusting for pre-test scores ($F = 68.63$, $P = 0.001$, $\eta^2 = 0.74$).

To assess the stability of the intervention effect in the experimental group, based on the follow-up data, a repeated measures analysis of variance (ANOVA) along with Bonferroni post hoc tests was conducted. It is important to note that, for valid application of this analysis, the assumption of homogeneity of variances across all group combinations must be met. Therefore, Mauchly's test of

sphericity was employed to examine the equality of variances. The results of Mauchly's test of sphericity for the variable self-control showed a Mauchly's W of 0.98 with a chi-square value of 0.21, degrees of freedom (df) = 2, and $p = 0.90$, indicating that the assumption of sphericity was met. Similarly, for the variable anger, the Mauchly's W was 0.84 with a chi-square value of 2.24, $df = 2$, and $p = 0.33$, which also suggests that the sphericity assumption holds.

Since both p -values are greater than 0.05, it can be concluded that the assumption of equal variances in the differences between repeated measures is satisfied for both variables. Therefore, the use of repeated measures ANOVA is justified to assess the effectiveness of cognitive-behavioral therapy on self-control and anger. The results of this analysis are presented in Table 3.

Table 3

Self-control and anger within-subjects test

Variable	Group	Source of changes	Degrees of freedom	mean square	F	P	η^2
Self-control	Experiment	levels	2	5318.42	217.35	0.00	0.94
		error	28	24.47	-	-	-
	Control	levels	2	5.76	1.12	0.61	0.03
		error	28	4.37	-	-	-
Anger	Experiment	levels	2	18832.96	100.95	0.001	0.88
		error	28	186.55	-	-	-
	Control	levels	2	5.51	1.03	0.67	0.02
		error	28	5.30	-	-	-

As shown in Table 3, the results of the repeated measures ANOVA revealed statistically significant differences across the three time points (pre-test, post-test, and follow-up) in

the experimental group for both self-control and anger variables. Specifically, for self-control, the analysis yielded $F(2, 28) = 217.35$, $p < 0.001$, with a very large effect size (η^2

= 0.94), indicating a substantial improvement over time. Similarly, the results for anger showed a significant difference with $F(2, 28) = 100.95$, $p < 0.001$, and a strong effect size ($\eta^2 = 0.88$), suggesting that cognitive-behavioral therapy was effective in reducing anger levels across the measurement stages. In contrast, no significant changes were observed in the control group across the three stages for either variable. The self-control scores showed $F(2, 28) =$

1.12, $p = 0.61$, $\eta^2 = 0.03$, and the anger scores resulted in $F(2, 28) = 1.03$, $p = 0.67$, $\eta^2 = 0.02$, indicating negligible changes over time. These results confirm that the observed improvements in the experimental group were due to the intervention rather than natural changes or measurement error. The detailed results of pairwise comparisons between time points using the Bonferroni post hoc test are provided in [Table 4](#).

Table 4

Bonferroni test results to compare the average of self-control and anger measurement steps

Variable	group	Stage	Mean Difference	Standard Error	P	confidence interval(0.95)	
						lower limit	upper line
self-control	experiment	Pre-test and follow-up	-27.13	1.81	0.00	- 32.07	-23.20
		Post-test and follow-up	-3.13	1.70	0.09	-5.76	1.51
anger	experiment	Pre-test and follow-up	-40.86	5.80	0.001	-66.62	-25.12
		Post-test and follow-up	-5.26	4.06	0.07	-8.29	2.24

According to the revised results based on the descriptive statistics in [Table 1](#), the Bonferroni post hoc test showed that in the experimental group, there was a significant increase in self-control from the pre-test to the follow-up stage, with a mean difference of 27.13. Similarly, for anger, the mean score increased by 40.86 points from pre-test to follow-up. However, the differences between the post-test and follow-up stages were relatively small (3.13 for self-control and 5.26 for anger), and not statistically significant. These findings suggest that the positive effects of CBT were not only significant but also sustained over time.

4. Discussion and Conclusion

This research was conducted with the primary aim of investigating the effectiveness of cognitive-behavioral therapy (CBT) in enhancing self-control and reducing anger among individuals who have recovered from COVID-19. The findings clearly indicate that CBT plays a significant role in developing and strengthening the personality trait of self-control in these patients. Specifically, the results demonstrate that the moral character of self-control and self-mastery notably increased among patients who received CBT during their recovery from COVID-19. In other words, there is a strong and positive correlation between participation in cognitive-behavioral therapy and improvements in self-control abilities. These findings are consistent with previous research ([Fiorillo & Gorwood,](#)

[2020; Sadri Damirchi & Aghazadehasl, 2018](#)), all of which highlight the beneficial impact of CBT on self-regulation and emotional management.

Self-control can be considered an internal regulatory mechanism that enables individuals to perform tasks responsibly and refrain from inappropriate behaviors, even in the absence of external supervision or control. When a person, regardless of environmental influences, strives to fulfill responsibilities and avoids behaviors such as laziness and negligence, they benefit from "a robust sense of internal regulation." The underlying purpose of self-control is to foster a psychological state that drives individuals to act in accordance with their duties and values autonomously. "Ultimately, self-control contributes to the formation of a well-adjusted personality characterized by cognitive maturity, emotional resilience, and the capacity for adaptive decision-making in both personal and professional domains."

In support of this conceptualization, [Sadri Damirchi and Aghazadehasl \(2018\)](#) investigated the effectiveness of group-based cognitive-behavioral therapy (CBT) on enhancing self-control and coping mechanisms in patients with multiple sclerosis. Their findings indicated that CBT significantly improves both self-control capacities and coping styles in these patients. "This suggests that CBT not only strengthens psychological resilience but also equips individuals with functional strategies to manage chronic

illness, which lends further support to the current research outcomes in the context of post-COVID-19 recovery."

Similarly, Fathi Ashtiani et al. (2020) explored the psychological consequences of the COVID-19 pandemic and reported that individuals, including both patients and healthcare workers, experienced heightened levels of anger, stress, fear, and a diminished sense of behavioral control during the crisis. However, implementation of CBT led to observable improvements in psychological flexibility and self-regulatory functioning. "These improvements underscore the therapeutic potential of CBT in mitigating the emotional dysregulation caused by traumatic public health events."

In another study, Zheng et al. (2021) found that CBT significantly reduced aggression and violent behavior while enhancing self-control in COVID-19 patients. "These cumulative findings across various populations and psychological contexts converge to reinforce the validity of the current study's conclusions." Hence, it can be confidently stated that cognitive-behavioral therapy effectively enhances self-control in individuals recovering from COVID-19, establishing a "statistically significant and clinically meaningful positive association between CBT intervention and increased self-regulatory competence in this population."

In explaining this finding, it can be stated that cognitive-behavioral therapy (CBT), "particularly when integrated with structured training in adaptive coping strategies," enhances individuals' sense of internal control. In other words, patients who undergo this therapeutic approach develop "a strengthened perception of personal agency, self-efficacy, and psychological sufficiency," all of which contribute meaningfully to improved self-control. Generally, these individuals begin to view their illness as "a manageable challenge rather than an insurmountable threat," largely because they trust in their capacity to navigate stressful situations effectively. This perception leads them to "reappraise the emotional burden of illness more constructively and with reduced psychological reactivity." Moreover, the sense of personal control fosters the belief that one possesses sufficient "cognitive, emotional, and environmental resources" to cope with the demands imposed by the disease. This "resource sufficiency" in turn cultivates a "coherent, empowered sense of self, characterized by increased autonomy, goal-directed behavior, and resilience." Consequently, these individuals are more likely to engage in effective coping strategies, such as "adaptive self-disclosure, proactive information-seeking, and emotional regulation

techniques," which collectively contribute to "a measurable reduction in emotional dysregulation and psychological distress."

Additional research findings indicate that cognitive-behavioral therapy (CBT) and perceived control also play a pivotal role in "regulating emotional responses and significantly reducing levels of anger" among individuals who have recovered from COVID-19. Those who received CBT during their illness "demonstrated enhanced emotional regulation capacities, including increased tolerance to frustration and reduced emotional impulsivity," allowing them to exhibit greater control over their anger and respond less reactively to "provocative or stress-inducing stimuli."

The effectiveness of cognitive-behavioral therapy (CBT) in reducing anger can be attributed to its emphasis on "systematically identifying, challenging, and restructuring maladaptive cognitions", which directly impact emotional states and behavioral responses. Participants in CBT gain a heightened awareness of how their cognitive patterns influence both their "affective reactivity and behavioral tendencies." They learn to detect automatic negative thoughts and "core cognitive distortions" that arise in anger-provoking contexts, employing structured techniques such as the vertical arrow method to trace surface-level reactions back to deep-rooted negative schemas that drive their anger.

Through "guided discovery, cognitive reframing, and empirical hypothesis testing", patients generate and reinforce more adaptive alternative beliefs, which in turn facilitate schema reconstruction. This "cognitive restructuring process" leads to substantial reductions in the intensity and frequency of anger episodes by replacing irrational appraisals with rational interpretations.

Consequently, the modification of dysfunctional thought patterns and the development of more flexible cognitive frameworks result in "more adaptive emotional regulation and behavioral control." Overall, CBT emerges as a well-supported, evidence-based therapeutic approach for individuals recovering from COVID-19, offering considerable potential in both enhancing self-control and mitigating anger-related symptoms within this vulnerable population.

5. Limitations & Suggestions

Despite the significant findings of this study, there are several limitations that should be acknowledged. Firstly, the sample size was relatively small, consisting of only 30 participants from Tehran hospitals. This might limit the

generalizability of the results to a larger population. Additionally, the study utilized an available sampling method, which could introduce selection bias and affect the representativeness of the sample. Furthermore, the study design was semi-experimental with a control group, but a randomized controlled trial with a larger sample size would provide stronger evidence for the effectiveness of CBT in this context. It is important for future studies to address these limitations to enhance the validity and generalizability of the findings. This study opens up avenues for future research in several directions. Firstly, it would be beneficial to conduct larger-scale randomized controlled trials to validate and expand upon the findings of this study. Additionally, exploring the long-term effects of CBT on self-control and anger reduction among individuals who have recovered from COVID-19 would provide valuable insights into the sustainability of the treatment effects. Moreover, investigating potential mediators or moderators of the treatment outcomes, such as demographic factors or psychological characteristics, could help identify specific subgroups that may benefit the most from CBT interventions. Finally, incorporating qualitative methodologies to gain a deeper understanding of participants' experiences and perceptions of CBT would contribute to a more comprehensive understanding of the intervention's effectiveness. In conclusion, this study demonstrated the effectiveness of cognitive-behavioral therapy (CBT) in enhancing self-control and reducing anger among individuals who have recovered from COVID-19. The findings highlight the importance of addressing the psychological implications of the pandemic, in addition to physical health challenges. However, it is important to consider the limitations of this study, such as the small sample size and the use of an available sampling method. Future research should aim to replicate and expand upon these findings through larger-scale randomized controlled trials, examining long-term effects, exploring potential mediators or moderators, and incorporating qualitative methodologies.

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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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