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The Effects of Cognitive-Behavioral Therapy (CBT) in Well-Being and Perceived Stress in Adolescents with Low Academic Performance During the COVID-19 Pandemic

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Abstract

Background: The COVID-19 pandemic is one of the serious issues which has affected mental health in the world. One of the age groups whose learning processes are highly influenced by the pandemic are adolescents, especially those with low academic performance. Although there have always been problems in the learning process at schools prior to the pandemic, online learning systems have added more challenges to the educational system which results in poor academic performance in this group. Increased stress is among the negative consequence which in turn can affect well-being.
Objectives: The purpose of this study was to determine whether cognitive-behavioral therapy (CBT) affects well-being and perceived stress in adolescents with low academic performance during the COVID-19 pandemic.
Methods: It was a quasi-experimental study with pre-test and post-test design and follow-up with a control group. The subjects were 30 adolescents with low academic who were chosen based on by convenience sampling method and were randomly assigned to the experimental group and the control group. The research tools were the well-being, perceived stress questionnaires, and CBT. The experimental group received CBT intervention for 10 sessions, each for 120 minutes online, and the control group did not receive any intervention. The data were analyzed by the repeated measures analysis method.
Results: Based on the obtained results, there was a significant effect of CBT on well-being and perceived stress in the experimental group. The finding indicated that CBT led to increasing wellbeing and reducing perceived stress in adolescents with low academic performance ($P \leq 0.05$). This effect impact was persisted following 3 months in the experimental group as well.
Conclusions: Considering the effectiveness of mentioned therapy methods on adolescents with low academic performance, it is necessary to apply such a way to improve the well-being of adolescents and relieve their stress during the COVID-19 pandemic, which consequently leads to academic and mental improvement. Moreover, CBT is a feasible and acceptable intervention in adolescents with low academic performance.

Keywords: CBT, Well-Being, Perceived Stress, COVID-19

1. Background

On March 11, 2020, the World Health Organization declared the novel coronavirus (COVID-19) prevalence a global pandemic (1). The COVID-19 pandemic has led to worsening of mental health among the general population (2). In addition, the outbreak of the COVID-19 pandemic has had widespread impacts on individual well-being. The researches have indicated that the pandemic and its associated lockdown, school closure, and social distancing measures have significantly undermined adults' mental health. However, in terms of the effect of pandemic on mental health of adolescents, less attention has been paid. For example, recent reviews have identified high rates of depression and anxiety among children and adolescents during the pandemic (3). Anger, confusion, and post-traumatic stress disorder are reported as some of the consequences of this pandemic (4). People with higher levels of perceived stress might have more problems in recognizing positive cognition, excitement, and behavior and higher risk of health problems (2).

Due to the onset of the pandemic, several studies

have indicated increases in mental health symptoms in children and adolescents in China, Western Europe, Canada, and the United States (5). For instance, school closures as a preventive action led to students struggling with unexpected disturbances in their daily routine. Low physical activity, anxiety and depression, fear of the uncertain future, poor interaction and parent-child conflicts, and increased sedentary behavior are all among the negative impacts of the COVID-19 pandemic on the mental health of children and consequently the family (6). According to this mental health crisis, the implementation of targeted intervention can be essential (5).

Mainly, since the emergence of the COVID-19 epidemic, students around the world have been facing with online education challenges. Researchers have found out that online education has extremely influenced the mental, physical and emotional health, attitudes toward learning, motivation and academic performance of adolescent students (7). Academic performance and subsequent academic success are some of the cognitive and motivational challenges that adolescents face in their lives (8). Researchers have found out that academic performance (demonstrated through standardized test scores) has decreased in students since the emergence of the COVID-19 pandemic. A study conducted in a sample of 15% of all schools in the Netherlands in the beginning of outbreak has shown that the COVID-19 pandemic has caused the overall scores drop among students aged 7 - 11 years (7).

In the COVID-19 pandemic crisis, educational plan for adolescents, especially those with low academic performance, is of utmost importance for parents. These teens suffered more from educational plans due to more stress and anxiety. Since it is not possible for them to establish face-to-face communication, the motivation factor has decreased over time during the pandemic and their well-being and spiritual well-being have been questioned (7). Adolescents with low academic performance experience stress as an unpleasant state. High stress and low psychological well-being occur due to poor academic performance. Since, some situations such as highly educational expectations by teachers, parents, and sometimes peers and parental pressure affects academic achievement (9). Stress can be defined as any distressing feeling with predictable biochemical, physiological, and behavioral changes. All normal people experience stress, but there are significant changes in different ages, sex, and economic groups. Along with interpersonal issues, home, family, job, and community stressors, chronic physical illness can also lead to stress and mental disability (10). Stress directly threatens people's psychological well-being. Welfare has historically been objectively measured by indicators such as income, life expectancy, academic achievement, unemployment, and crime. In addition, welfare science increasingly emphasizes the usefulness of mental indicators such as stress, anxiety, fear, happiness (11).

The COVID-19 pandemic has put a lot of pressure on community psychological services all over the world. It has been found that adolescents and young people are more apt to the pandemic threat due to social isolation, insecurity in parental employment, and increased parental discomfort. If we increase the mental health services for these people in the form of social education services, they will definitely be less harmed (12). All of the above should be considered for adolescents who have experienced academic failure in the corona pandemic. One of the most effective behavioral approaches in this critical situation is cognitive-behavioral therapy (CBT). This treatment, as the most common non-pharmacological approach, can be used for adolescents with depressive disorders, social problems, suicidal ideation, and negative consequences of low academic performance (13). This approach is one of the first choices for treating abnormal psychological well-being situations, especially in the field of fear, stress, and depression. In this way, the therapist helps the person to gain a better understanding of the issues that have caused the mental imbalance (14).

2. Objectives

The purpose of this research was to determine the effectiveness of CBT on increasing psychological well-being and reducing perceived stress in adolescents with low academic performance during the COVID-19 pandemic.

3. Methods

3.1. Subjects

It was a quasi-experimental study with a pretest-posttest design with a control group. The subjects were adolescents (Age: 15 - 18 y) who lived in Tehran in the year 2021. A convenience sampling method

was used (chosen from districts 2, 5, 6, and 7 of Tehran city). Primarily, 36 people were selected by convenience sampling method in accordance with the inclusion criteria and were randomly assigned to the experimental and control groups. 6 participants were dropped from the study and the rest were distributed to two groups (15 in the experimental group, 15 in the group).

3.2. Inclusion and Exclusion Criteria

Poor academic performance based on academic grades and grade point average of the previous semester (< 15), consent form, no acute mental disorder, no mood disorder and no substance use or use of psychiatric drugs, no history of family mental illness and absence of more than two sessions or cancellation of the treatment sessions were considered an exclusion criterion. In order to comply with the research ethics, all participants were informed about the research purpose. They were also reminded that they could be informed of the research results if they wished. The control group was also assured that after the end of the treatment for the experimental group, they will be trained if they wish.

3.3. Procedure

The research method was that both groups answered the psychological well-being and perceived stress questionnaires on the same day before any intervention. Then, the experimental group was treated based on CBT for 10 sessions per week. The program was online for two hours, with a break time for teenagers in each session. Also, the control group did not receive any treatment. At the end of the training, both groups answered the post-test questionnaires. In the follow-up phase, after three months, the experimental group answered the questionnaire of psychological well-being and perceived stress.

3.4. Data Analysis

In the present study, CBT was applied as an independent variable and psychological well-being and perceived stress were applied as a dependent variable. Data analysis was performed by repeated-measures analysis of variance using SPSS software version 23.

3.5. Tools

3.5.1. Reef Psychological Welfare Questionnaire (RSPWB)

The Reef Welfare Scale short form (designed by Reef in 1989 and revised in 2002) was used. In the present study, the short form of 18 questions has been used. This test is a kind of self-assessment tool that is answered in a 6-point continuum from strongly agree to strongly disagree. Among the questions, ten questions are scored directly and eight questions are scored in reverse. The lowest possible score was 18 and the highest score was 108 (15). The internal consistency of the questionnaire has been reported as 0.71 in Iran (16). For questionnaire validity, Bayani, et al. reported its correlation with Life Satisfaction Scale, Oxford Happiness Questionnaire, and Rosenberg Self-esteem Questionnaire 0.47, 0.58, and 0.46, respectively (17).

3.5.2. Cohen Perceived Stress Questionnaire

The Perceived Stress Questionnaire (PSQ) was developed in 1983 by Cohen et al. and is used to measure perceived general stress over the past month. This questionnaire is constituted of 14 questions. Cohen et al. calculated Cronbach's alpha of the questionnaire in three studies as 0.84, 0.85, and 0.86% (18). This questionnaire, scored by a five-point Likert scale where 1 = almost never and 5 = almost. Phrases 4, 5, 6, 7, 9, 10, 13 are scored in reverse. The lowest score obtained in this questionnaire is zero and the highest score is 56. A higher score indicates more perceived stress.

3.5.3. Cognitive-Behavioral Therapy

Another research tool was treatment intervention based on CBT, which is summarized in Table 1. First, by studying texts, articles, and books related to different fields in CBT, the main framework of the program was established and then we started collecting tasks related to each part. After replacing each task and initial completion, the program was provided to specialists and experts and final approval was applied. These sessions were performed for the experimental group.

4. Results

Initially, the descriptive demographic information of the participants is as follows. In the experimental and control groups, 60% of the participants were boys and 40% were girls. In the experimental group, 46.7%, 33.3%, and

Table 1. Summary of CBT Sessions

Session	Content	Task
First	Introduction to COVID-19 disease and its role in the occurrence or exacerbation of mental and behavioral disorders	Introduce and educate teens about the COVID-19 pandemic and share their views on changing their behaviors
Second	Self-knowledge (dysfunctional thoughts)	Record daily moods and emotions; record spontaneous distorted thoughts
Third	Confrontation technique	Adolescents' encounter with their anxiety situations on a scale of 0 to 10 and the use of imagery when confronted with those situations; increasing mental control skills in the face of distorted thoughts
Fourth	Modeling technique	Pattern and display adaptive behaviors to imitate adolescents
Fifth	Communication skills training	Teaching skills that make adolescents and speakers effective in interpersonal relationships
Sixth	Assertive training	Teaching teens to defend themselves in a way that respects the rights of others
Seventh	Design of graded assignments	Helping teens move from the easiest to the most difficult to break down academic tasks into several steps to increase self-confidence
Eighth	Behavioral activation	Helping teens increase activities that increase the likelihood of feeling joy
Ninth	Relaxation	Teaching adolescents a variety of techniques to induce physical and mental relaxation as a strategy to deal with anxiety
Tenth	Problem solving	Educating teens to create, evaluate, plan, and implement possible solutions to current problems

20.0% were 16, 17, and 18 years, respectively, and in the control group, 40.0%, 33.3%, and 26.7% were aged 16, 17, and 18 years, respectively. In both experimental and control groups, 40% of their score average was between 14.50 to 15.00 26.7% between 14 to 14.49, 20% between 13.50 to 13.99, and 13.30% score average less than they had 13.50.

Table 2 shows the descriptive statistics of the main variables of the research question in the pre-test, post-test, and follow-up stages. The results of the table given below indicate that the mean score of psychological well-being was increased and perceived stress was decreased after CBT on adolescents with low academic performance in the experimental group. However, these changes are not observed in the control group. The results of the intervention in three stages are presented in Table 2.

Then, analysis of variance test with repeated measures was used. Before performing the test, the Kolmogorov-Smirnov test was used to normalize the data. Due to the fact that the level of significance in the mentioned test was greater than 0.05, it can be concluded that the distribution of scores of dependent variables is normal ($P \geq 0.05$). Then, in order to check the test presumption, Box's test of equality of covariance matrices was used to equalize the covariance matrices and Muchly's test of sphericity was used to check the conditionality of the results. Table 3 shows the results of Box's test of equality of covariance matrices. Since the significance level of the F statistic in both variables is greater than 0.05, it suggests that dependent variables are equal between different groups. Also, the results of Table 4 are the results of Mauchly's test of sphericity to check the Sphericity condition, which shows that the sphericity assumption is valid ($P \geq 0.05$).

Evaluation of the effectiveness of treatment, was used by repeated-measures analysis of variance. The results of Table 5 show the results of multivariate analysis of variance test for intergroup effects and their interaction. As can be seen in the table, based on the value of the Wilks' lambda test for the psychological well-being ($F = 55.51$, $P = 0.001$) and perceived stress ($F = 87.96$, $P = 0.001$) it is meaningful. ($P \leq 0.05$).

Table 6 shows the calculated results for in-subject and inter-subject effectiveness. The within-subjects show the significant effects for the effectiveness of the time and group factor in the psychological well-being variable ($F = 81.06$, $P \leq 0.05$) and the perceived stress variable ($F = 103.22$, $P \leq 0.05$) Also, between-subjects results were significant for psychological well-being ($F = 29.08$, $P \leq 0.05$) and perceived stress ($F = 9.50$, $P \leq 0.05$), ($P \leq 0.05$) which indicates the difference between the effect of test conditions on the dependent variables of psychological well-being and perceived stress in the three stages.

A dependent *t*-test was used to evaluate the durability of treatment results. According to the results of Table 7, the calculated *t* value for psychological well-being ($t = -0.74$, $P = 0.47$) and perceived stress ($t = 1.48$, $P = 1.91$) is

Table 2. Index of Mean and SD of Well-Being and Perceived Stress for Pre-test, Post-test, and Follow-up in Experimental and Control Groups [a]

Variables and Groups	N	Pre-test	Post-test	Three-Month Follow-up
Well-being				
Experimental	15	40.47 (9.09)	66.40 (11.37)	67.20 (10.16)
Control	15	43.00 (10.36)	39.67 (11.05)	36.60 (9.66)
Perceived stress				
Experimental	15	39.53 (7.19)	24.67 (7.70)	23.80 (8.50)
Control	15	37.53 (7.47)	38.27 (9.84)	39.80 (9.64)

[a] Values are expressed as mean (SD).

Table 3. Box's Test

Variables	Box's M	F	df1	df2	Sig
Well-being	8.14	1.20	6.00	5683.30	0.30
Perceived stress	10.90	1.60	6.00	5680.30	0.14

Table 4. Mauchly's Test of Sphericity

Variables	Mauchly's W	Approx. Chi-Square	df	Sig
Well-being	0.83	4.95	2.00	0.08
Perceived stress	0.90	2.97	2.00	0.23

Table 5. Multivariate

Variables	Effect	Test	Value	F	Hypothesis df	Error df	Sig	Partial Eta Squared
Well-being	Time and group	Wilks' lambda	0.20	55.51	2	27.00	0.001	0.80
Perceived stress	Time and group	Wilks' lambda	0.13	87.96	2	27.00	0.001	0.87

Table 6. Test of Within-Subjects and Between- Subject Effects in Assessing the Effectiveness of CBT on Well-Being and Perceived Stress

Variables	Test	Source	Type III Sum of Squares	df	Mean Square	F	Sig	Partial Eta Squared
Well-being	Within-subjects	Time	2323.36	2.00	1161.68	38.25	0.001	0.58
		Time and group	4923.27	2.00	2461.63	81.06	0.001	0.74
		Error (time)	1700.71	56.00	30.37			
	Between-subjects	Group	7507.60	1.00	7507.60	29.08	0.001	0.51
		Error	7229.96	28.00	285.231			
Perceived stress	Within-subjects	Time	953.87	2.00	476.93	68.72	0.001	0.71
		Time and group	1432.80	2.00	716.40	103.22	0.001	0.79
		Error (time)	388.67	56.00	6.94			
	Between-subjects	Group	1904.40	1.00	1904.40	9.50	0.001	0.25
		Error	5613.87	28.00	200.50			

not significant ($P \geq 0.05$) which indicates the persistence of the effectiveness of CBT of psychological well-being and perceived stress. Comparing the means in the post-test and follow-up stages suggested the lasting improvement in the follow-up stage. The durability of the results was confirmed.

5. Discussion

The main purpose of this study was to determine the effectiveness of CBT on the level of psychological well-being and perceived stress in adolescents with low academic performance. The findings of this study showed the effectiveness of CBT on increasing psychological well-being and reducing perceived stress in adolescents. According to the research findings, the mean post-test scores of the experimental group in the variables of psychological well-being and perceived stress were different from the control group and this difference was statistically significant and the stability of effectiveness remained after three months, which means that CBT has a significant effect on increasing psychological well-being and reducing adolescents' perceived stress.

These findings are in line with the results of Zakaria et al. (19), research on the effectiveness of CBT on adolescents with substance abuse and emotional problems. The results are consistent with the study of Verkleij et al. (20), which declares the positive role of CBT on anxiety and depression. Additionally, it is also in line with the research of Rechenberg and Koerner (21), regarding the effect of such a strategy on anxiety control. Rechenberg and Koerner suggested that this intervention would improve depression and anxiety in adolescents with diabetes 1. It also indicates that the intervention would affect the mental status of the high-risk population.

The research findings are consistent with Silfvernagel et al. (22), based on the impact of internet-based CBT for adolescents with anxiety disorders, as well, Srivastava et al. (23), regarding the effectiveness of CBT computer-based in Indian adolescents. Specifically, the results of the study were in line with the results of Song et al. (24), on the effectiveness of CBT in a longitudinal study on mental health during the COVID-19 pandemic, and also the results of Egan et al. (25), on the effectiveness of treatment in reducing anxiety during the COVID-19 pandemic. These results indicate the effectiveness of CBT in behavioral problems and mental disorders.

With the advent of the COVID-19 Pandemic, the issue of student management strategies to effectively and appropriately control their emotions during psychological well-being crises has become a vague and urgent issue (26). As suggested in previous studies high levels of perceived stress can harm adolescents' mental health and even their physical health (2). The high prevalence of mental problems in students has caused many concerns. Approximately, one in four students suffers from anxiety and stress (26). It is noteworthy that these people have experienced some mental health crises before the advent of COVID-19, but with the presence of this pandemic, the field of diagnostic, emotional, or behavioral disorders has intensified (27).

The basic premise of the CBT is that cognition affects emotion and behavior, compared to events themselves and individuals respond to their cognitive representation of the event (28). The ability to know oneself and be aware of one's characteristics, needs, strengths and weaknesses, desires, fears, feelings, values, and identity is important (29). Self-awareness development helps the individual to establish effective and empathetic social relationships and interpersonal relationships. Psychosocial problems associated with poor self-awareness include feelings of inferiority, low self-esteem, communication problems, feelings of loneliness, and substance abuse.

In CBT, it is assumed that thoughts determine emotions, and by controlling dysfunctional thoughts and managing behavior, stress can be reduced and psychological well-being can be increased. In justifying the findings, it should be said that familiarity with the basics of cognitive behavior and the type of reactions they generally express in times of stress and anxiety, increases their self-awareness. This increase in self-awareness motivates them to have more control over their own behavior and they learn to react more adaptively in different situations (30). The behavioral methodology also reduces emotional stress and emotional self-awareness and teaches people to apply more effective ways to deal with stress and relaxing situations. These include relaxation techniques, which are an effective tool for balancing the physical and emotional arousal, or existential tools that teach people the correct way to ask others or reject inappropriate requests. Problem-solving ability also helps people look for the right ways to solve their problems instead of chewing on disturbing thoughts, as well as techniques that help the person to

Table 7. Paired Sample Test Between Post and Follow-up in the Experimental Group of Well-Being and Perceived Stress

	Paired Differences						
			95% Confidence Interval of the Difference				
Variables	Mean (SD)	Std.Error.Mean	Lower	Upper	*t*	df	Sig
Well-being	-0.080 (4.21)	1.09	-3.13	1.53	-0.74	14.00	0.47
Perceived stress	0.87 (2.26)	0.58	-0.39	2.12	1.48	14.00	1.91

see others more broadly, instead of being pessimistic. It helps to increase social abilities, trust others as much as possible, and to divert their negative excitement (29).

CBT helps the student identify distorted thought patterns in their dysfunctional behavior and use them to change them through more organized discussions and tasks, resulting in increased mental health and psychological well-being. In general, it can be concluded that this treatment helps adolescents to identify and change the thoughts and feelings that affect their behavior. In other words, CBT helps adolescents reduce their stress by identifying high-risk situations and avoiding them with coping strategies.

The present study includes some limitations. Firstly, due to schools being closed, there were restrictions to reach plenty of students with low educational performance that constitute our target group, and secondly, online meetings of CBT were considered as a study limitation. According to the research results, it is suggested to use CBT methods to promote the mental health and psychological well-being of children and adolescents. Since, the issue of mental health, especially in adolescent students, has been neglected due to the emergence of this pandemic. According to the recommendations of the World Health Organization and health care providers, considering the issue of mental health and stress reduction during the COVID-19, special attention is needed for adolescents' mental health.

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Footnotes

Authors' Contribution: Study concept and design: N. Sh., M. R.; acquisition of data: N. Sh., M. R., H. H. R.; analysis and interpretation of data: N. Sh.; drafting of the manuscript: N. Sh., S. H.; critical revision of the manuscript for important intellectual content: S. H., H. H. R.; statistical analysis: N. Sh.; administrative, technical, and material support: N. Sh., M. R.; study supervision: S. H., H. H. R.; contributed to the development of the protocol: N. Sh., S. H., M. R.

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