Vol. 3, No. 3, (2022), 1-15
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***Published online* October, 2022**

Journal of Preventive Counselling (JPC)

The Effectiveness of Virtual Training in Stress Management Skills and Problem Solving Techniques on Students' Mental Health and Test Anxiety

DOI: 10.22098/JPC.2022.1733

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Abstract

Background and purpose: This study aimed to determine the effect of stress management skills training and problem-solving methods virtually on the mental health and test anxiety of high school students. **Cases and Methods:** The research method is quasi-experimental and the research design is pre-test-post-test with a control group. The statistical population consisted of 700 high school male students in dandi city. 93 people were selected by available sampling and randomly in two experimental groups (problem-solving and stress management) and A control group was placed. Research tools include ten sessions of stress management Anthony et al. (2007) and a summary of the problem-solving training program (Heidari and Rasoulzadeh Tabatabai, 2007; Adapted from Dixon and Glover, 1984), Goldberg Mental Health Scale (1979) and Anxiety Scale The exam was Friedman (1997). **Results:** The results of the analysis of covariance showed that the two groups that had been trained in stress management and problem-solving skills had higher mental health ($f = 25.02$ and $P<0.001$) and lower test anxiety ($f = 16.65$ and $P<0.001$) than the control group. **Conclusion:** The results of this study showed that stress management training and problem-solving skills virtually can be used as an effective intervention to increase mental health and reduce test anxiety. Therefore, using virtual education, stress management skills, and problem-solving methods can improve students' mental health and reduce stress and anxiety in students.

Keywords: Stress Management Skills, Problem-Solving Techniques, Mental Health, Test anxiety, Virtual training.

Introduction

Stress means being under stress and is a physical, mental, and chemical reaction to events that cause fear, excitement, embarrassment, a sense of danger, or anger. Stress is a state of mental stress caused by a set of internal and external physical, psychological, and social forces and pressures (Xia & Ma, 2020). Hans Selye (1980) called stress the body's vague response to any pressure, which reduces the production of pleasure (Stewart, Watson & Clark, 2016). Although stressors can facilitate motivation and increase performance (Strack et al., 2017), chronic stress with the onset of mental health problems including sleep problems (Amaral et al., 2018), anxiety (Bergdahl and Bergdahl, 2002; Young and Dietrich, 2015) Substance use (Lijffijt et al., 2014) and suicide (Liu et al., 2019) are associated with lower academic achievement (Shields, 2008). Life in our day and age constantly sends stress responses on time. Given that stress has unpleasant consequences for us, we can help our body regain its natural balance. We can activate the relaxation response. Stress management is a set of skills including stress awareness, problem-solving training, anger management, self-management, activity planning, etc. (Urizar, Vim, Rodriguez & Schetter, 2019). It is not possible to eliminate stress, but people can learn to manage it. Stress management is a necessary variable to lower the level of anxiety and frustration and increase the level of courage. Stress management is described as the ability, capacity, and skill to perceive, evaluate, and manage the emotions of an individual and others. It is important to use prevention methods, including training methods to recognize stress in the early stages and deal with it properly. Stress management training as one of the life skills increases adaptation and psychological and social abilities of people to face life difficulties and reduce their anxiety (Saeedi Taft et al, 2021). Due to the unavoidable existence of stress in people's daily lives, teaching this skill has a significant role in promoting mental health and reducing its destructive effects on personal and professional life (Zaeri, Neasi & Khaje, 2020). The purpose of stress management training is to empower people to deal with stress, which makes people feel more comfortable and healthy and can cope better with stressful events (Sherwood, Smith, Hinderliter, Georgiades & Blumenthal, 2017). One of the variables that can be effective in reducing test anxiety is problem-solving skills. Problem-solving skills are a type of cognitive process in which a person not only combines previously learned principles to be able to solve a new problem but also provides new ways of learning (Farnam, 2018). Problem-solving is thinking and behaving to achieve a goal that is not easily available (Aein, 2018). It is a situation in which decisions are made, information is collected, reviewed, and analyzed and the current situation is assessed (Pakarinen & Kikas, 2019). It includes a range of behavioral, cognitive, and emotional responses that are expressed to adapt to internal and external challenges (Jin & Lee, 2020). Problem-solving is an excellent mental activity and is a type of learning in which the definition and conditions of learning are stated. In the problem-solving training process, the goal is not to find a specific solution to a problem, but to achieve principles or laws that are achieved by problem-solving and can be generalized to other situations (Kozikoglu, 2019). In other words, problem-solving is an important coping strategy that increases personal and social ability and progress and reduces stress and psychological problems (Barghandan, Enayati Mir Salahuddin, & Mehrabizadeh, 2017). These coping strategies

enable the individual to control daily problem-solving situations and their emotional impact, thereby preventing, minimizing, and reducing psychological stress (Ertekin Pinar, Yildirim & Sayin, 2018).

Exam anxiety is one of the variables that reduce a person's academic performance and is affected by a person's problem-solving ability. One of the concerns and worries of the educational system is the issue of learners' anxiety (Jenaabadi & Salarpoor, 2021). Anxiety refers to a state in which a person is overly concerned about the occurrence of terrible events in the future (Shoaei, Heidarie, bakhtiarpour & Asgari, 2020). Attendance in educational settings such as school and university is associated with anxiety experiences for some people, and one of the most important types of anxiety in educational settings is test anxiety (Burton & Baxter, 2019). The academic performance of students with high test anxiety is weaker than others and test anxiety leads to a decrease in students' performance during the test (Jalilzadeh and Zarei, 2018: Owa, Bassey & Etuk, 2020). Exam anxiety is defined as a state of stress and fear that is associated with anxious thoughts and autonomic nervous system activity and plays an important role in causing psychological disorders in students (Von der Embse, Barterian, Segool, 2013). Test anxiety is defined as a behavioral, emotional, and cognitive response that evokes negative feelings about assessment. These physical and cognitive responses lead to negative cognitions and feelings about test situations. (Olorunfemi-Olabisi, 2014). According to cognitive models, test anxiety includes two cognitive elements of anxiety (worrying thoughts and mental rumination) and behavioral (physiological reactions in test position and decreased performance) (Knoll, Valentiner & Holzman, 2019). Failure to pay attention to the diagnosis and treatment of test anxiety in students, in addition to endangering their mental health, may also threaten their physical health (Segool, Carlson, Goforth, 2013).

Another variable that can affect a person's stress management and problem-solving skills is mental health. Franklin argues that the definition of mental health has been constantly changing so that the accepted definition in the 21st century seems incomplete today (Lai, Ma, Wang, Cai, Hu & Wei et al, 2020). Mental health is a set of characteristics that acts as a protective shield against stressful life events and helps people to function better in situations. It is also a state of ability and well-being that gives a person the ability to cope and Gives life to every day tensions (Manwell, Barbic, Roberts & Durisko, 2015). Mental health is a state of well-being that enables people to function comfortably within their community and to be satisfied with their personal development and characteristics. Such a concept requires balance in all aspects of life, including physical, intellectual, social, and spiritual (Kaplan & Saduk, 2015). Psychological health is one of the important dimensions of general health and includes mental comfort, feeling of self-empowerment, autonomy, self-sufficiency, communication with others, and recognizing competencies in realizing their capacities (Lindstrom, Nystedt & Rosvall, 2020). Mental health is associated with improved interpersonal communication and better performance in various aspects of life (Vaillant, 2012). This variable helps people to achieve a better, happier life and prevents the occurrence of mood and personality disorders (Seymour, Giallo & Wood, 2017). The structure of mental health is to accept oneself and love oneself and to become a person who is physically healthy, mentally sound, mentally happy, socially

balanced, politically aware, economically productive, and culturally responsible (Sadeghian et al, 2012). The World Health Organization (2020) points out that by having mental health, individuals realize their abilities, can cope with stressors, work productively, and can participate in society. Mental health includes physical, mental, and social well-being, not just the absence of disease. Mental health includes four dimensions, physical symptoms, lack of anxiety and sleep disorders, social functioning, and lack of depression (Shamloo, 2011). People with low mental health face more psychological, emotional, and personality problems, while people with high mental health are happier and more hopeful in life and use appropriate coping strategies to solve challenges (Mahadevan, Gregg, Sedikides, 2019).

Hosseinzani, Enayatullah, and Hoshyar (2016) in a study entitled The Effectiveness of Problem-Solving Skills Training on Exam Anxiety in High School Students concluded that problem-solving skills training is effective in reducing students' test anxiety. Chiniforoushan, Taher Neshat-Dust & Abedi (2016) in a study entitled. The effectiveness of group intervention of cognitive-behavioral stress management on test anxiety of girls applying for the national entrance examination concluded that group intervention of cognitive-behavioral stress management on the anxiety of test-taking of national entrance examination candidates had effects. Jacka, Maes, Pasco, William & Berk (2012) found that problem-solving therapy reduced depressive symptoms in elderly patients with depression. Anthony Michael, Ironson Gill, Schneider I Neil (2007) Stress management techniques have been used successfully for many emotional and physical problems such as anxiety, depression, insomnia, diabetes, hypertension, heart disease, arthritis, and cancer. Considering that the effectiveness of stress management training and problem-solving skills has not been studied virtually and the research has been done with a low statistical sample; Also, due to the different educational conditions and the existence of educational and psychological problems during the covid-19 outbreak, and due to the existing problems in the field of student's mental health and the existence of test anxiety and the need to design interventions to prevent psychological problems and anxiety test in Students need research in this area. Also, due to the importance of reducing psychological problems such as anxiety and stress, as well as increasing students' mental health, it is necessary to identify effective interventions. Due to the prevalence of covid-19 and increased anxiety and stress endangering the mental health of students, it is necessary to identify the necessary interventions, and considering that in covid-19 conditions, students' communication with the school and school counselors has decreased, the need to identify Virtual effective interventions to provide services and increase mental health and reduce students' anxiety and stress is significant.

Methods

The research method is a pre-test and post-test with the control group. The statistical population consists of all-male high school students in Dandi, whose number is 700 and the average age of students is 14 to 18 years. All students are in high school and are studying humanities, experiments, and industrial electricity. 93 students were selected by convenience sampling method and randomly assigned to two experimental groups (stress

management and problem-solving) and a control group. The number of members in each group was 31. The Mental Health and Exam Anxiety Questionnaire was sent virtually and completed by students. After obtaining complete information about the study method and its objectives and obtaining satisfaction, participants entered the research process. Then the first group was trained in stress management skills online in ten sessions for five weeks and each session lasted 1.5 hours. The second group was taught problem-solving skills online in ten sessions over five weeks, each lasting 1.5 hours. The control group also did not receive any training. At the end of the post-test, all three groups answered the mental health and anxiety questionnaires online.

Anthony Michael, Ironson Gill, Schneider & Neil (2007)

sessions	aims
First session	Introduction, the definition of stress and expression of stressors and stress responses, muscle relaxation training for 16 muscle groups.
Second session	Explain the effect of stress on the body and increase people's awareness of the physical symptoms of stress, gradual muscle relaxation training for 8 muscle groups.
Third session	Expressing the connection of thoughts and emotions, training diaphragmatic imaging and breathing, and training gradual muscle relaxation for 4 muscle groups.
Fourth Session	Evaluation of the effect of negative thinking and cognitive stimuli, diaphragmatic breathing training along with imaging, and passive gradual muscle relaxation training.
Fifth session	Replacing negative thoughts, spontaneous training for weight and warmth, and integrating relaxation with stress management.
Sixth Session	Implementation of effective coping responses, spontaneous training with illustration, and self-induction.
Seventh session	Implementation of effective coping responses, spontaneous training with illustration, and self-induction.
Eighth session	Anger control and management training, Mantza meditation
Ninth session	Expression training, meditation, breathing counting
Tenth session	Expressing the benefits of social support and applying it and teaching a personal stress management program

In this study, Dixon and Glover's five-step method (Heidari and Rasoulzadeh Tabatabai, 2007 taken from Dixon and Glover, 1984) was used, which includes all variables related to problem-solving. This method includes problem definition, goal selection, strategy selection (decision-making), strategy implementation, and verification.

Summary of the problem-solving training program

(Heidari and Rasoulzadeh Tabatabai, 2007, taken from Dixon and Glover, 1984)

levels	Step description	Skills to be taught
Explaining the problem	The first step in solving the problem is to represent the problem correctly.	Start, invite free speech, categorize topics, follow up the problem, open-ended and closed-ended questions, small incentives, active listening, thinking long-term, urgency, use of silence, recognizing emotions, expressing emotions, and reflecting on understanding.
Goal setting	How the goal is expressed has a tremendous impact on problem-solving efficiency. If the goal is stated in a vague and general sentence, it will be impossible to achieve it, therefore, in problem-solving training, people should be helped to express their problems as accurately and explicitly as possible.	Direct questions, addressing inconsistencies, setting goals, supporting and encouraging, interpreting, providing information, providing advice, influencing, providing guidance, using personal examples, suggesting delay (delaying and making a commitment).
Strategy selection	The task of people in this stage is to consider different fissures and choose one of them, one of the possible methods in this stage is to teach the method of brainstorming.	Predicting situations, modeling, and role-playing
Implement the strategy	At this stage, what has been achieved is examined against what we hoped to achieve.	Chronicle writing, awareness, relaxation of thoughts and mental imagery, desensitization, and the combination of strategies, is a homework assignment.
Check	At this stage, what has been achieved is examined against what we hoped to achieve.	Evaluate results, summarize, generalize, refer, and conclude.

Research tools

General Mental Health Questionnaire Form 28 questions

This questionnaire was first developed by Goldberg. The main questionnaire has 60 questions, But the abbreviated forms of 30 questions, 28 questions, and 12 questions have also been used in various studies. The questionnaire includes four subscales of physical symptoms, anxiety, social dysfunction, and depression. The different forms of this questionnaire have high validity and reliability and the efficiency of the 28-question form is almost the same as the efficiency of the 60-question form. Studies conducted in Iran

also indicate the high validity of this tool. The 28-question form of the questionnaire was designed by Goldberg (1979) through the implementation of the factor research method in its long form. The 28-item general health questionnaire consists of 4 subtests, each of which has 7 questions. Goldberg (1980; quoted in Namdar, 2003) reported a correlation between GHQ scores and the results of clinical evaluations of the severity of the disorder 80%. In a study conducted by (Taghavi 2001; quoted by Mashhadi Mikhati, 2005) for the reliability of the 28-item mental health questionnaire, the validity of the questionnaire by three methods of reassessment, descriptive and Cronbach's alpha Validity coefficient of 70%, 93%, and 90% was obtained, respectively, and the validity of the questionnaire was determined by three methods of simultaneous validity, correlation of subtests with the total score and factor analysis, which were 55%, 72%, and 87%, respectively was obtained. Cronbach's alpha of this questionnaire was obtained at 0.84.

Friedman Exam Anxiety Questionnaire

This questionnaire was developed by Friedman in 1997 and has 23 questions and its purpose is to measure different dimensions of test anxiety (social humiliation, cognitive error, stress). Its response range is of the Likert scale, which is scored from 0 (strongly disagree) to 3 (strongly agree); But this scoring method is reversed for questions 1 to 22 and is scored as 3 (strongly disagree) to 0 (strongly agree). The above questionnaire has three dimensions social humiliation, cognitive error, and stress. In the research of Bazat et al. (2011), structural validity and factor analysis tests were used to evaluate the validity of this test. In the factor analysis, all 23 items were included in the analysis, and none of the items correlated less than 0.3. Also, the reliability of the questionnaire with its reliability was calculated using Cronbach's alpha measurement method of 0.91, and also Cronbach's alpha was obtained after social humiliation at 0.90, cognitive error at 0.85, and stress at 0.83. Cronbach's alpha of this questionnaire was obtained in this study at 0.81.

Results

Table 1. Descriptive information on mental health and test anxiety for research groups

group	Variable	pre-exam		Post-test	
		Average	Standard deviation	Average	Standard deviation
stress management	mental health	39.45	3.16	46.09	2.74
	exam stress	46.64	3.59	41.83	4.09
Problem - solving	mental health	39.80	3.13	45.58	2.84

	exam stress	47	5.93	42.93	2.99
Control	mental health	44.96	3.43	44.74	3.55
	exam stress	43.70	5.62	44.16	5.55

As shown in Table 1, describes descriptive information including mean and standard deviation for different test situations. The mean of stress management training on mental health in the experimental group was 46.09 and the test anxiety in the experimental group was 41.83. The mean of problem-solving training on mental health in the experimental group was 45.58 and the mean of test anxiety was 42.93 for the control group. The mean of mental health was 44.74 and the mean of test anxiety was 44.16.

Table 2 reports the results of the analysis of covariance to investigate the effect of problem-solving and stress management on mental health. Table 3 reports the results of the analysis of covariance to investigate the effect of the analysis of covariance on students' test anxiety.

Two univariate analyses of covariance were used to perform the analyzes. Before performing the analysis of covariance, two important assumptions, namely homogeneity of variance with the Levin test and homogeneity of regression coefficients, were performed by examining the interactive effect of the independent variable with the test on the dependent variable. Levin's test of mental health with a value of F equal to 0.36 and a significance level of 0.69 supported the assumption of homogeneity of variance. The value of F was 2.39, which showed that the homogeneity of the regression coefficients was not significant at the error level of 0.05. Variance supported. The value of F was 16.65, which was not significant at the error level of 0.05, so the homogeneity of regression coefficients has been observed in the research data. Table 1 provides descriptive information for pre-test and post-test research variables.

Table 2. Results of analysis of covariance to investigate the effect of problem-solving and stress management on mental health and test anxiety

Source of changes	Total squares	Degrees of freedom	Average squares	The value of F	The significance level	Eta coefficient
pre-exam	464.17	1	464.17	107.01	P<0.05	0.54
group	303.85	2	451.92	35.02	P<0.05	0.44
Error	386.02	89	4.33			
Total	193185	93				
pre-exam	1302.54	1	1302.54	132.37	P<0.05	0.59

group	327.74	2	163.87	16.65	P<0.05	0.27
Error	875.71	89	9.83			
Total	174047	93				

As shown in Table 2, the control variable, the mental health pre-test, with a value of F 10.107 is significant at an error level of less than 0.05. This result indicates the correct choice of it as an auxiliary variable in this study because it explains some of the changes in the dependent variable (post-mental health test). The effect of independent variables, stress management training, and problem-solving on mental health changes has also been significant. The group in which the training took place showed more mental health than the control group. In this way, the research hypothesis is confirmed.

The results of the Tukey post hoc test showed that there was no significant difference between the means of the two groups that received problem-solving and stress management training, But the mean mental health of both groups was significantly higher than the control group.

As shown in Table 2, the control variable, the test anxiety test, with a value of F=132.37, is significant at an error level of less than 0.05. This result indicates the correct choice of it as an auxiliary variable in this study because it explains some of the changes in the dependent variable (post-test anxiety test). The effect of independent variables, stress management training, and problem-solving on changes in test anxiety has also been significant. The group in which the training took place showed less test anxiety than the control group. In this way, the research hypothesis is confirmed.

The results of the Tukey post hoc test showed that there was no significant difference between the means of the two groups that received problem-solving and stress management training, But the mean test anxiety of both groups was significantly lower than the control group.

Discussion

The results showed that stress management skills training is effective in improving the mental health of high school students. The result of this finding with the findings of Kiani et al. (2017), Hashemi et al. (2014), Mirzaei et al. (2011), Aghaei et al. (2013), Shirbim et al. (2008), Anthony et al. (2007), Keogh Et al. (2006) and Bowin (2003) are consistent. Explaining this finding, we can say that stress is the physical, mental, and emotional reactions that are experienced as a result of changes and needs in a person's life. Changes can be small or large. People respond differently to life changes. Positive stress can be a motivator, while negative stress can occur when these changes and needs fail. Stress management helps students identify the situations in which they cause stress and then teaches coping strategies to deal with these situations. Improving cognitive assessments and improving coping skills and exercises provided to integrate learned techniques with

real-life situations can reduce cognitive stress. Cognitive-behavioral stress management therapy is not only effective in improving a person's psychological problems but also has a wide range of applications in providing solutions to anxiety problems and interpersonal relationships; Because one of the goals of treatment, sessions is to teach the correct and courageous communication styles with the tools of existence and anger control. The program licenses participants to a variety of integrated techniques that they can use to reduce stress and improve their quality of life. Lazarus and Folkman (2000) believe that when people believe that they have the resources to help them cope with stress, they will be less vulnerable to stress. Mental health can be ensured by challenging negative future thoughts, encouraging patients to increase enjoyable activities, planning activities, and increasing success.

The results also showed that stress management skills training has been effective in improving the anxiety of high school students. The result of this finding is consistent with the findings of China Vendors et al. (2015), Halamanandariz et Power (2009), and Anthony et al. (2007). Explaining this finding, it can be said that stress management is considered the ability of people to reduce stress and adapt properly to stressful situations. The student uses the cognitive reconstruction technique in stress management. This method helps the person to improve their perception of stress and how they interact with stressful situations. Numerous studies have shown that group intervention can provide social support to participants and be effective in reducing participants' anxiety and depression. Participants find that they are not alone in having this problem. Stress management helps students to recognize thoughts that trigger test anxiety and change logic and misconceptions. Stress management training helps students identify situations in which they are stressed and then strategies They use confrontation to deal with these situations. Improving cognitive assessments and improving coping skills can reduce cognitive stress. Negative emotions, such as anxiety, cause the mind to be limited to producing a defensive reaction to the issues that trigger these negative emotions, while positive emotions cause the mind to be open to stimuli, which in turn provides opportunities for wider attention to the environment And thus increase a person's creativity and find ways to reduce anxiety.

Conclusion

According to the research findings, the effectiveness of problem-solving training on the mental health of high school students was confirmed. The result of this finding is consistent with the findings of Barghandan et al. (1396), Khedri et al. (2014), Jaka et al. (2012), Bell et al. (2009), Malouf et al. (2007). Explaining this finding, it can be said that the problem-solving skills training program in the form of skills such as anticipating situations, categorizing topics, mental imagery, relaxation of thoughts, and desensitization has reduced negative thoughts, worries, and negative emotions. Confidence in the readiness or ability to perform well is associated with positive emotions such as self-confidence, pride, expansion of mind, and a sense of self-efficacy.

Techniques taught in problem-solving skills enable the individual to be successful in identifying and solving these problems, thereby reducing the pressures and stresses of these problems, which in turn increases the individual's general mental health. Problem-solving training also enables students to reduce their problems and conflicts with family, friends, and teachers, and to be able to improve their communication skills and communicate effectively. Research also shows that as much as one can solve the problems in one's life, it leads to increased self-confidence, reduced stress, positive emotions, and improved concentration, which ultimately leads to increased general mental health in students.

The results of this study also confirm the effectiveness of problem-solving training on the test anxiety of high school students. The result of this finding with the findings of Kazemi et al. (2016), Hosseinzani et al. (2015), Taher et al. (2014), Darabi et al. (2014), Akbari et al. (2010), Blazers et al. (2002) Is consistent; Therefore, problem-solving training can empower people to use effective and adapted strategies to deal with everyday problems. In fact, by using the problem-solving skills training and its stages, students learned not to think quickly about the solution to the problem, and after defining the problem and recognizing it, to consider different and multiple solutions. This ability enables a person to better control the environment and prevent unwarranted anxiety. In other words, the purpose of problem-solving training is to teach you how to think in problem-solving. This goal is a way to strengthen the argument and use personal values to make decisions about the problems that occur, which ultimately allows the person to have problem-solving skills and not to show anxiety, unlike people who do not have these skills. Problem-solving training, as a mechanism for controlling and preventing anxiety in an individual's life, can prevent anxiety and apprehension. By teaching problem-solving skills, students learn to overcome academic problems more effectively and reduce anxiety. Using problem-solving methods increases one's belief in one's abilities. Many human behaviors are spontaneous and controlled by mechanisms of influence.

One of the limitations of this study is the difficulty in implementing that some students do not have access to high-speed Internet and have fluctuations in the Internet and communication media, as well as the limited statistical sample of high school boys. It is suggested that due to the prominent role of students' mental health in society and its impact on students' academic achievement, special attention should be paid to the issue of students' mental health and this research should be studied in a wider and different statistical community. Also, considering the effectiveness of stress management programs and problem-solving methods, it is suggested that this training be included in the educational programs of schools.

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