



Comparing the effectiveness of cognitive behavioral game therapy and education based on acceptance and commitment on cognitive flexibility and academic resilience in students with specific learning disorders

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ABSTRACT

Background and Aim: Studies show the effect of learning disorder on cognitive flexibility and academic resilience of students. The purpose of this research was to determine the effectiveness of cognitive behavioral game therapy on cognitive flexibility and academic resilience of students with learning disabilities. **Method:** In this research, a semi-experimental method and a pre-test and post-test design with a control group were used. The statistical population of this research included female elementary school students in six districts of Tehran, who had learning disabilities and were referred to learning disabilities rehabilitation centers. 60 students were selected by purposeful sampling and randomly without replacement in two groups (20 people in each group). Data were analyzed using covariance test at 5% level using SPSS-23 tool. **Results:** The results of the research showed that the adjusted average of the cognitive behavioral therapy game group was higher than the acceptance and commitment based training group, as a result, the cognitive behavioral therapy game has a greater effect on increasing the cognitive flexibility and resilience of students with specific learning disorders. It is committed to education based on acceptance and commitment. **Conclusion:** According to the results, this study shows that cognitive-behavioral game therapy and education based on acceptance and commitment have a positive effect on cognitive flexibility and academic resilience in students with specific learning disorders.



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Introduction

Among childhood developmental disorders, learning disorder is one of the most common. Specific learning disorders refer to defects in which the affected child cannot acquire the expected reading, writing, speaking, or mathematics skills compared to children of the same age and has a suitable intelligence capacity at a lower level. So far, several definitions of learning disorders have been provided. According to the fifth statistical and diagnostic manual of mental disorders, a learning disorder is diagnosed when a person for at least six months in one of the following cases: incorrect or slow reading of words, understanding the meaning of what is read, spelling, written expression, calculating and mathematical reasoning. have defects and problems, and these abilities are much lower than what is expected of a person according to their chronological age and significantly interfere with the daily life activities and educational progress of the person (Pourtaieb, 2020). Specific learning disabilities are considered the most important cause of poor academic performance. Every year, many students need help learning course material due to this reason. Usually, these students cannot learn in specific fields (reading, writing, mathematics) despite having favorable educational conditions, as well as the absence of obvious biological wastes and acute social and psychological problems. Among the problems that students with specific learning disorders have, low resilience plays a decisive role in most of the students' problems (Pourtaieb, 2020). Resilience is a type of ability that establishes biological-psychological balance in situations where a person feels threatened. Resilience in the educational situation of the school and other life situations is considered as a very high probability of success despite the hardships and environmental difficulties. Academic resilience is defined as the capacity of students to overcome acute and chronic risks that are considered major threats in the educational process (Martin & Marsh, 2014). Academic resilience in students with particular learning disabilities has been reported to be lower than their typical peers. So, in the research of Paniker and Cheliah (2016), 75% of the subjects had low levels of resilience. In such situations, students have insufficient coping skills and fewer internal resources to manage stressful situations. Therefore, they experience high levels of stress. It is also

necessary to use methods that can improve the level of academic resilience and reduce the amount of stress.

Among the factors that can be both the cause of specific learning disabilities and the result of them is a failure in executive functions. Executive functions are actually a general term for cognitive processes, including working memory, attention, problem-solving, verbal reasoning, cognitive flexibility, planning, response inhibition, and activity initiation and monitoring. Cognitive flexibility means a person's ability to perform different actions or change thoughts in response to changing situations (Narimani, Mohajeraval, Ensafi, 2017). During the last decade, increasing attention has been paid to executive functions in children. Executive functions include a wide range of processes involved in performing goal-oriented behaviors. These processes include inhibitory function, mental flexibility and planning, and some basic brain processes. These behaviors depend on multiple cortical networks, including prefrontal cortical areas and posterior association areas, especially the dorsal and lateral prefrontal cortex (Yazdi et al., 2018). There is convincing evidence that cognitive flexibility is essential to students' academic performance. In fact, a student's academic success largely depends on his ability to plan, organize and prioritize information, regulate his attention, manipulate information in working memory, and monitor his progress: flexibility, the ability to review and modify plans when Facing obstacles, new information, and mistakes. In fact, flexibility is the ability to adapt to changing conditions (Dawson & Guare, 2018). The main element in the operational definitions of cognitive flexibility is the ability to change cognitive cues to adapt to changing environmental stimuli. The relationship between cognitive flexibility and learning disabilities has been studied in various studies. These studies show that students with specific learning disorders (reading, writing, math disorders) had a weaker performance in executive functions, including cognitive flexibility, than normal students (Atadokht et al., 2018). Acceptance and commitment therapy is one of the cognitive-behavioral treatments based on functional contextualism. This therapy, with a fundamentally different perspective on the role of cognition and emotions in psychological

problems, is rooted in a new theory about language and cognition. This theory is called the relational frame theory (Gillard, Flaxman, & Hooper, 2018). This method, taking into account implicit behavioral theories, emphasizes the individual. Mindfulness, acceptance, and cognitive strategies promote conscious judgment and purposeful life. The strategies used in this method, through the use of responses inconsistent with the intended behavior and emotion regulation strategies, encourage patients to distance themselves from dry and inflexible thoughts, increase presence in the present moment, and reduce avoidance experiences (Davis et al., 2015). Another treatment widely used in this field and has recently received the attention of experts is game therapy based on the cognitive therapy approach. This method combines traditional play therapy methods with more cognitive-behavioral methods. The systematic use of game therapy is a theoretical model in order to establish an interpersonal key process in which using the therapeutic power of game helps to prevent or solve the client's problems and achieve his desired growth and education. One of the most important advantages of cognitive-behavioral play therapy compared to other play therapy methods is its specific goals and treatment methods. Such procedures make it possible to determine therapeutic goals and predict specific methods to achieve them (Springer, Misurell, & Hiller, 2012). Therefore, since students with special learning disabilities form a large group of students with special needs, it is necessary to carry out interventions that help improve cognitive flexibility and thus reduce the problems of this group. Therefore, this study aims to determine whether the effectiveness of education based on acceptance and commitment and cognitive-behavioral therapy is effective on the cognitive flexibility of students with special learning disabilities.

Method

The current research was semi-experimental with a pre-test and post-test design with a control group. The research population included all female elementary school students in the six districts of Tehran in 1401. Students with special learning disabilities were diagnosed as students with special learning disabilities and were referred to rehabilitation centers for learning disorders. In order to sample 60 students from the learning disability centers in Tehran (20 people

for each of the experimental and control groups in such a way that each group consisted of an equal number of students with specific learning disabilities. They were selected via purposive sampling method after meeting the conditions for entering the research. Then they were randomly divided into two experimental groups (cognitive-behavioral therapy and acceptance and commitment training) and the control group. The entry criteria included: diagnosis of a specific learning disability, absence of physical illness and severe mental illness and not participating in other psychotherapy sessions at least one month before the research, not having a severe physical and mental illness and not participating in other psychotherapy sessions at least one month before the research.

Tools

1. Structured clinical interview based on the symptoms listed in DSM-5: In this research, a structured clinical interview based on the symptoms described for this disorder according to DSM was used to diagnose the symptoms of specific learning disorders and their characteristics.

2. Dyslexia Test: This test was developed by Shafiei et al. (2007) in a study titled Designing and Constructing a Screening Test for Reading Disorder Diagnosis in First to Fifth Grades of Elementary School Students in Isfahan City. The main body in each grade consists of a hundred-word text and four comprehension questions, which senior experts and speech and language pathology experts have carefully controlled. As a result of this test, students of each grade are classified into three levels of reading ability. The grading of this test is as follows: If he gives the correct answer (his understanding of the material is 75%), he will be placed in the educational level. If the student reads less than 90% of the words correctly and his comprehension score is less than 50%, that is, if he has more than 10% errors and answers less than two questions, he is at the level of dyslexia (low reading). This test has been measured on 200 male and female students in all grades 1 to 5 of elementary school and a total of 1000 students who were randomly selected from all five districts of Isfahan city. In addition, the test was conducted on two dyslexic and normal groups. The findings of this study showed that the correlation between accuracy and reading speed scores with the test's total score was high.

3. Dysgraphia test: In this research, the dictation test prepared and validated by Falah Chai was used. The applicants and experienced teachers have confirmed the validity of these tests, and its reliability has been estimated from 91% to 955% by the reliable method of the correctors.

4. Key-math math test: Key-math math test has been standardized by Connolly (1988). This test is a benchmark test with rules for normative interpretation. In terms of scope and sequence, this test includes three sections: concepts, operations, and application. These sections are divided into 13 sub-tests, and each section is divided into three or four. After the above test has been translated, its questions have been organized according to the questions of the elementary school mathematics book and then standardized in eleven provinces of the country. Its validity was calculated through discriminant validity, and also its concurrent validity was obtained between 55% and 67%. Its reliability is reported between 80% and 84% by Cronbach's alpha method.

5. Cognitive flexibility questionnaire: This scale was created by Martin and Robbins (1995). This scale has 12 items and measures three aspects of cognitive flexibility (awareness of available options in any given situation, willingness to adapt and adapt to the situation, and self-efficacy in being flexible). The scoring of this scale is done using a 6-point Likert scale from 1 (completely disagree) to 6 (completely agree). The makers of this scale have shown that it has adequate concurrent validity, structure, criterion, and internal consistency (Martin & Robbins, 1995). Oshiro, Sawako, and Shimizu (2016) have also investigated and reported the validity and reliability of this scale in the Japanese population. The results showed that the internal homogeneity for this scale was calculated at 85% and evaluated as appropriate. In the present study, the scale of cognitive flexibility of translation and then its validity and reliability are measured by Cronbach's alpha method and confirmatory factor analysis. Based on results, the average variables of cognitive flexibility and resilience in the two experimental groups of cognitive-behavioral game therapy and training based on acceptance and commitment were higher, but not much changed in the control group. To determine that these differences are statistically significant, multivariate covariance analysis and LSD post

Confirmatory factor analysis confirmed its factor loading (GFI: 94%, AGFI: 91%, RMSEA: 7%). Its reliability was also obtained by Cronbach's alpha method, 72%.

6. Academic Resilience Questionnaire (ARQ): This questionnaire was invented by Samuels (2004; quoted by Soltaninejad & et al., 2014), and its suitability was confirmed in two studies. Then, with the expansion of the study, it was published in 2009. In the academic resilience questionnaire, participants are asked to rate their academic resilience on a five-point Likert scale from completely disagree (1) to completely agree (5). Soltaninejad et al. (2014) have standardized the academic resilience questionnaire in Iran. In this standardization, the reliability of the questionnaire was obtained in two samples of students and students, the reliability of the communication skills component among students and students was 77% and 76%, respectively, and the reliability of the future orientation component among students and students was 63%, and 62% respectively. So, the questionnaire has good validity.

Implementation

Twenty subjects who were randomly assigned to each of the experimental and control groups were analyzed. Then the members of the experimental groups underwent the intervention of cognitive-behavioral therapy and acceptance and commitment training, and the control group members were placed on the waiting list for training. After the completion of the training sessions, the experimental and control groups were subjected to a post-test under the same conditions. In order to comply with ethical considerations, all subjects were given information about the research and its objectives. They were assured that all information would remain confidential. After the training sessions on the experimental groups and the post-test on the experimental and control groups, the training sessions were also implemented in the control group.

Results

hoc test were used. Before testing the research hypothesis based on the results of multivariate covariance analysis, the assumption of normality using the Kolmogorov-Smirnov test, checking the homogeneity of variances using Levene's F test, the assumption of homogeneity of the regression slope using the variance test and the assumption of the equality of the variance-

covariance matrices using Mbox test was checked. All assumptions of this test were confirmed with a significance level greater than 0.05.

The results of multivariate covariance analysis showed that the difference between the two experimental and control groups is significant in the two variables of cognitive flexibility and academic resilience. That is, the effect of cognitive behavioral game therapy and acceptance and commitment therapy on the linear combination of cognitive flexibility and academic resilience is significant (Wilk's Lambda = 0.31, $F(4,110) = 21.16$, $P < 0.01$). The results of univariate covariance analysis are reported in the text of multivariate covariance analysis.

The results of single-variable covariance analysis in the text of the covariance analysis show the gender of the variable for the comparison of the 3 studied groups in the variables of cognitive flexibility and academic resilience. Based on the results of this test, there was a significant difference between the 3 studied groups in the cognitive flexibility variable with $F_{(2,55)} = 38.74$ and in the academic resilience variable with $F_{(2,55)} = 34.31$ at the alpha level of 0.01. $P < 0.01$). Based on the results of the post hoc LSD test, there was a significant difference in cognitive flexibility and academic resilience between the two groups of the cognitive behavioral therapy game experiment with acceptance and commitment therapy with a significance level of 0.001 ($P < 0.01$). The adjusted average of the cognitive behavioral game therapy group was higher than the acceptance and commitment based therapy. As a result, the cognitive behavioral therapy game has a greater effect on increasing the cognitive flexibility and resilience of students with specific learning disorders than the acceptance and commitment based therapy.

Conclusion

This research was conducted to compare the effectiveness of cognitive behavioral game therapy and acceptance and commitment therapy on cognitive flexibility and academic resilience in students with specific learning disabilities. The results indicate the effectiveness of the cognitive behavioral therapy game in students with specific learning disorders showed that the effectiveness of the cognitive behavioral therapy game has a significant effect in increasing the

cognitive flexibility and resilience of students with specific learning disorders. The explanation of the results shows that cognitive behavioral game therapy has been effective in students who suffer from learning disorders and who do not have high cognitive flexibility and resilience.

In explaining the findings, it can be said that although the initial beliefs about resilience considered it an inherent quality and considered resilient people as invulnerable and with unique characteristics. However, studies in recent years have shown that resilience is not an inherent capability. Instead, it can be changed and intervened (Rashidzadeh & et al. 2018), while the commitment to achieve goals in line with values is one of the important factors of psychological flexibility, which has been given special attention in the therapeutic approach of acceptance and commitment. Students have a special learning disorder and often evaluate their assignments beyond their ability and by neglecting themselves. They spend more time with assignments; by learning to observe themselves in the acceptance and commitment training program, they can increase their attention to themselves and experience more control over themselves, more resilience, and less stress. Cognitive flexibility means the ability of a person to perform a different action or change his thoughts in response to changing situations. In addition, acceptance and commitment therapy, with an emphasis on recognizing the value and teaching goals in line with values, enables students to have healthy expectations, a desire to study, tenacity and belief in a bright future, and a sense of foresight, considering that resilience is sustainable against injuries and threatening conditions. Moreover, it is not a passive state facing dangerous conditions but the resilience of an active company. It is in its surrounding environment (Connor & Davidson, 2003).

The research results showed that the adjusted average of the cognitive behavioral game therapy group was higher than the acceptance and commitment therapy group. As a result, the cognitive behavioral therapy game has a more significant effect than ACT in increasing students' cognitive flexibility and resilience with specific learning disorders. It is based on acceptance and commitment. The results of multivariate covariance analysis showed that the difference between the two experimental and

control groups is significant in the two variables of cognitive flexibility and academic resilience. In both variables of cognitive flexibility and academic resilience, there was a significant difference between the two experimental groups of cognitive behavioral therapy and education based on acceptance and commitment with the control group. The linear combination of two variables of cognitive flexibility and academic resilience is significant. Considering that the adjusted averages of the two experimental groups were higher than the control group, it can be concluded that both experimental variables of the cognitive behavioral therapy game and ACT significantly increase the cognitive flexibility and resilience of students with specific learning disorders. Conducting this research was faced with limitations, including intervention by the researcher, which distorts the internal validity, and the limited sample to girls, which limits the generalization of the results to male students. Therefore, it is suggested to conduct a similar survey with male subjects and other groups of students with special needs to increase the generalizability of the results. Also, it is suggested that the effectiveness of cognitive behavioral therapy and ACT should be further investigated. In addition to students, parents and guardians of the school are also trained, and the effectiveness of results should be compared with studies conducted only with students.

Conflict of Interest

According to the authors, this article has no financial sponsor or conflict of interest.

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