The Quarterly Journal of New thoughts on Education

Faculty of Education and Psychology
Journal homepage: https://jontoe.alzahra.ac.ir/

Research Paper

The Effectiveness of a Cognitive Rehabilitation Program on Learning Behaviors and Academic Perseverance in Female Students with Mathematical Anxiety

Rahim Badri Gargari[1]*, Shahrooz Nemati[2], Davoud Tahmasebzadeh Sheikhlar[3], Mahak; Naghizadeh Alamdari[4]

1. Corresponding Author: Professor In Educational Psychology, Department of Education, Faculty of Education and Psychology, University of Tabriz, Tabriz, Iran
2. Professor, Department of Education, Faculty of Education and Psychology, University of Tabriz, Tabriz, Iran
3. Professor of Curriculum Planning, Department of Educational Sciences, Faculty of Educational Sciences and Psychology, Tabriz University, Tabriz, Iran
4. PhD Candidate in Educational Psychology, Faculty of Educational Sciences and Psychology, Tabriz University, Tabriz, Iran

Received: 2024-06-23 **Accepted: 2024-08-05**

Abstract

Aim: This study was conducted to determine the effectiveness of a cognitive rehabilitation program on learning behaviors and academic perseverance in female students with mathematical anxiety. The research had a pretest-posttest quasi-experimental design with a control group. The statistical population included all the female adolescent students of a senior high school in Julfa city in academic year 2022-2023. Among them, 30 female students with mathematical anxiety were selected by purposive sampling and were randomly assigned to experimental and control groups (n=15 per group). The samples were evaluated using Plake and Parker's Mathematics Anxiety Rating Scale (1982), McDermott's Learning Behavior Scale (1999) and the Academic Grit Scale by Duckworth (2007). The findings from the post-test and follow-up revealed the mean scores of learning behaviors and academic perseverance to have increased in the experimental group compared to the controls.

***Keywords**: Academic Perseverance, Cognitive Rehabilitation Program, Learning Behaviors, Mathematical Anxiety*

Introduction

Mathematics is one of the most important subjects of teaching and learning in schools. According to research literature, increased anxiety among students reduces the quality of learning (Supriadi, Jamaluddin & Suherman, 2024). Learning behaviors are therefore one of the components of students' academic progress and success in educational activities (Anthony, Ogg & Winkelman, 2024). One of the characteristics of students with mathematical anxiety is their lack of interest and perseverance in studies, especially in the field of mathematics, which causes a lack of stability and persistence in efforts or desire to achieve long-term goals (Lohbeck & Muller, 2023). The current research aims to investigate the effectiveness of a cognitive rehabilitation program on learning behaviors and stability of academic progress in students with mathematical anxiety.

Methodology

This quasi-experimental research had a pretest-posttest design and a control group. The statistical population included all the female adolescent students of a senior high school in Julfa city in the academic year 2022-2023. A total of 30 students who scored higher than 60 in the Mathematics Anxiety Rating Scale (MARS-R) were selected and randomly assigned to experimental and control groups. For the pre-test, the Learning Behavior Scale (LBS) and Academic Grit Scale (Grit-S) were administered in both groups. After the pre-test, Captain's Log cognitive rehabilitation program was implemented for the experimental group. After completion of the training course, each of the students in the experimental group and also the controls were administered the post-test. In the end, in order to check the stability of effectiveness of the cognitive rehabilitation program, a follow-up was also carried out after one month. SPSS software version 22 was used for the statistical analysis of the data, and mixed analysis of variance test was used to check the research hypotheses.

Results

According to the results obtained, there was a significant difference between the experimental and control groups in the post-test, and group-by-time interaction effects were found for competence motivation, attention/persistence, attitude towards learning, and strategy/flexibility. Therefore, the hypotheses related to the variable of learning behaviors and its components are confirmed and it can be argued that the cognitive rehabilitation program had a positive effect on the learning behaviors of female students with mathematical anxiety. Based on the coefficients obtained, the effect of the cognitive rehabilitation program was 52% on the

competence motivation variable, 67% on attention/persistence, 69% on attitude towards learning and 71% on strategy/flexibility. Also, there was a significant difference in the interaction effect for the component of stability in interest and persistence in effort between the two groups in the post-test. Therefore, the hypotheses related to stability of academic progress and its components are confirmed and the cognitive rehabilitation program had an effect on the stability of academic progress among female students with mathematical anxiety. Based on the coefficients obtained, the effect of the cognitive rehabilitation program was 91% on stability in interest and 89% on persistence in effort.

Table 1. The results of the mixed analysis of variance test to investigate the intra-group and inter-group effects of the variables

Variable	Source of changes	Sum of squares	df	Mean squared	F	Mean Squared	Discriminant squared
Competence motivation	Group	3528.80	1	3528.80	365.12	0.001	0.73
	Time	241.53	1	241.53	26.69	0.001	0.61
	Group×Time	263.62	1	263.62	24.43	0.001	0.52
Attention/persistence	Group	3860.21	1	3860.21	231.23	0.001	0.74
	Time	338.60	1	338.60	34.54	0.001	0.52
	Group×Time	356.15	1	356.15	39.67	0.001	0.67
Attitude towards learning	Group	4035.32	1	4035.32	294.61	0.001	0.88
	Time	350.75	1	350.75	68.62	0.001	0.63
	Group×Time	366.49	1	366.49	72.89	0.001	0.69
Strategy/flexibility	Group	3824.32	1	3824.32	217.20	0.001	0.70
	Time	290.49	1	290.49	29.24	0.001	0.45
	Group×Time	312.34	1	312.34	45.65	0.001	0.71
Stability in interest	Group	2431.45	1	2431.45	141.27	0.001	0.31
	Time	211.32	1	211.32	39.21	0.001	0.85

Persistence in effort	Group×Time	245.56	1	245.56	48.67	0.001	0.91
	Group	2754.36	1	2754.36	398.75	0.001	0.82
	Time	247.75	1	247.75	51.43	0.001	0.85
	Group×Time	299.56	1	299.56	61.64	0.001	0.89

Discussion and conclusion

The present study was conducted to determine whether cognitive rehabilitation has a positive impact on learning behaviors and academic perseverance in female students with mathematical anxiety. The results showed that the cognitive rehabilitation program had a significant positive effect on academic behaviors. Also, cognitive rehabilitation was effective in increasing the stability of academic progress in female students with mathematical anxiety. The most important limitation of this study was that the sample population was restricted to female students of senior high school with mathematical anxiety in Julfa city. It is recommended to conduct a similar research on male subjects in order to understand the differences between girls and boys in this regard. It is also suggested to hold workshops and training courses in cognitive rehabilitation for school counselors and teachers, so that they can get familiar with this type of program and utilize it for their students.

Reference

Anthony, C., Ogg, A., & Winkelman, E. (2024). Dynamics of a dynamic interrelationship: Exploring whether bidirectional learning behaviors-achievement relations differ across student-teacher relationship profiles. *Journal of School Psychology*, 104, 101308. https://doi.org.10.1016/j.jsp.2024.101308

Duckworth, A. (2007). Grit: Perseverance and passion for long-term goals. *Journal of Personality and Social Psychology*, 92, 1087-1101. http://dx.doi.org/10.1037/0022-3514.92.6.1087

Lohbeck, A., & Moller, J. (2023).Students social and learning behavior at school: Applying the generalized internal/external frame of reference model. *Learning and Individual Differences*, 105, 102301. http://doi.org/10.1016/j.lindif.2023.102301

McDermott, P. A., Green, L. F., Francis, J. M., & Stott, D. H. (1999). *Preschool learning behaviors scale.* Philadelphia, PA: Edu metric and Clinical Science.

Mhamed, A. M., Vossensteyn, H, & Kasa, R. (2021). Stability, performance and innovation orientation of a higher education funding model in Kazakhstan.

International Journal of Educational Development, 81, 102324. http://doi.org/10.1016/j.ijedudev.2020.102324

Nauta, I., Bertens, D., Fasotti, L., Fieldhouse, J., Uitdehaag, B., Kessels, R., Speckens, A., & de Jong, B. (2023). Cognitive rehabilitation and mindfulness reduce cognitive complaints in multiple sclerosis (REMIND-MS)}: A randomized controlled trial. *Multiple Sclerosis and Related Disotders*, 71, 104529. https://doi.org/10.1016/j.msard.2023.104529

Plake, B. S., & Parker, C. S. (1982). The development and validation of a revised version of the Mathematics Anxiety Rating Scale. *Educational and Psychological Measurement*, 42(2), 551-557. https://psycnet.apa.org/doi/10.1177/001316448204200218

Supriadi, N., Jamaluddin, W., & Suherman, S. (2024). The role of Learning anxiety and mathematical reasoning as predictor of promoting learning motivation: The mediating role of mathematical problem solving. *Thinking Skills and Creativity*, 52, 101497. http://dx.doi.org/10.1016/j.tsc.2024.101497