Effect of a supportive-educative program in the math class for stress, anxiety, and depression in female students in the third level of junior high school: An action research

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ABSTRACT

Background and Aim: Students in junior high school, particularly in the third level, are prone to a variety of stressors. This in turn might lead to stress, anxiety, depression, and other health-related problems. There are a very limited number of action research studies to identify the effect of stress management techniques among students. Therefore, a study was conducted to assess the effect of a program used in the math class to decrease the student’s level of stress, anxiety, and depression. Material and Methods: This was an action research study, which was conducted in region three of the Education and Training Office of Isfahan, in the year 2012. Fifty-one students in a junior high school were selected and underwent a comprehensive stress management program. This program was prepared in collaboration with the students, their parents, teachers, and managers of the school, and was implemented approximately during a four-month period. The student’s stress, anxiety, and depression were measured before and after the program using the DASS-21 questionnaire. Findings: The t-test identified that the mean scores of stress, anxiety, and depression after the intervention were significantly lower than the corresponding scores before the program. One-way analysis of variance (ANOVA) also showed that the students from the veterans (Janbaz) families had higher levels of stress compared to their classmates, who belonged to the non-veteran families ($P < 0.05$). Results: Education and implementation of stress management techniques including cognitive and behavioral interventions along with active and collaborative methods of learning in the math class might be useful both inside and outside the class, for better management of stress and other health-related problems of students.

Key words: Action research, anxiety, depression, Iran, mathematics, stress management, stress, student

INTRODUCTION

Adolescence is a critical stage in an individual’s life, because it coincides with the completion of the maturity period, changes his/her identity and personality that might lead to many physiological changes, such as, stress, anxiety, and depression.[1,2] In a study outside Iran, for example, the prevalence of depression in adolescents varied between 10 and 70% and its incidence in females was notably more than males.[3,4] Similarly in Iran, results of a survey indicated that 78% of the girls and 57% of the boys in the age group of 13–17 years had mild-to-severe depression.[5] Another study stated that 61.7% of the teenage female students in Tehran...
had some degree of anxiety. Stress, anxiety, and depression might, in turn, lead to negative consequences in socialization, communication, and even affect the individuals’ educational attainment.

A significant part of the adolescent period is spent in school, where learning of some lessons like mathematics (math) may be very stressful for a number of students. Math deals with numbers and usually requires more concentration, reasoning, and problem-solving abilities. Many students consider math to be a rigid lesson and math teachers are regarded as serious and strict individuals, who have nothing to say, except put forward some formulas and difficult issues and theories. According to this group, math not only cannot solve their problems, but can also increase their anxiety and worries. Often such concerns may prevent students from carrying out simple analytical actions and lead to educational failure. Also, it appears that the math anxiety is higher in girls than boys. The results of some studies, for example, show that female students, particularly in the junior high school, have a negative attitude toward math and math teachers play an important role in changing students’ attitudes.

In addition, the principal investigator was a female math teacher, who had more than 15 years of experience teaching girls in junior high school. The main part of this experience was in Shaheed schools that mainly covered students belonging to martyred or veteran (janbaz) families. On account of the absence or deficiency of students’ loved ones, particularly their fathers, such students might experience more stress, and therefore, might seek strategies to get rid of such concerns. For example, research findings showed that in families where there was a war veteran suffering from posttraumatic stress disorder, anxiety and depression in their children might be higher than in non-veteran families. These children could be repeatedly exposed to violent behaviors, aggression, and anger, leading to a secondary posttraumatic stress disorder.

Such findings imply that more attention and appropriate interventions need to put in the place to solve the students’ concerns, with their own participation and collaboration. To the best of our knowledge, no action research study has been conducted in the Iranian culture, to explore if implementation of active and collaborative interventions in a math class can reduce stress, anxiety, and depression in students, in Shaheed schools. It is also a matter of importance, to know what factors may influence the effect of such actions. The aim of this action research study was, therefore, to identify the effect of a supportive-educative program in the math class for reducing the stress, anxiety, and depression in female students, in the third level of junior high school, in the selected Shaheed school.

MATERIALS AND METHODS

This was an action research study that was conducted in 2012, in a selected Shaheed Junior High School affiliated to District three of the Education and Training Office of Isfahan. The study was approved by the Deputy Vice Chancellor of Research, of District three, of the Education and Training Office of Isfahan and the principal of the selected school. The study was conducted in the framework of the Fifteenth Action Research Program of school teachers in collaboration with 5 students of level three, whom the principal researcher had taught math to. On the basis of the principles of an action research, the principal researcher, as a teacher, approached the math class in a manner in which she could investigate and solve the students’ learning difficulties. As stated, an attempt was made to include all the individuals who were involved in the problem, in the following phases:

(A) Data collection using a focus group session: This session was implemented in the school with the collaboration of the principal researcher as a math teacher and the head of the group, the principal of the school, the assistant to the principal of the school, the psychological consultant of the school, student representatives, and some students’ parents. The session was conducted in a friendly atmosphere and lasted for one hour. To begin with, the principal researcher put forward some of her experiences with students and what she understood to be the problem. The members had the opportunity to critically discuss about the students’ issues, which finally led to the following conclusions: (1) There are quite a number of stressors for students, particularly in the third level, (2) the students are under pressure from their families to get better results and scores, (3) unconstructive competition exists between students, and (4) students receive low encouragement from their teachers. It was finally concluded that having stress was the main concern among the students. Therefore, the decision was to focus on reducing the students’ stress. Also, in order to provide more details about the students’ stress, it was decided to conduct a survey in the next phase.

(B) Data collection using a survey by questionnaire: This part of the study was a descriptive correlational research study. The questionnaire consisted of two parts: (1) The first section consisted of a form for collecting demographic data including age, the residential area, father’s job, mother’s job, number of siblings, the average score of the previous school term, having a father as a martyr or a veteran, and the father’s and mother’s educational level. The aim of collecting this information was to identify if there was any relationship between these data and the students’ level of stress, anxiety, and depression; (2) The second section consisted of the Depression, Anxiety, and Stress Scales-21 (DASS-21) to measure the three related negative emotional states of depression, anxiety, and tension/stress. DASS-21 is a short version of the basic DASS-42 questionnaire with seven items per scale. The Depression scale assesses dysphoria, hopelessness, devaluation of life, self-deprecation, lack of interest/involvement, anhedonia, and inertia (questions numbers 3, 5, 10, 13, 16, 17, and 21). The Anxiety scale assesses autonomic arousal, skeletal muscle effects, situational anxiety, and subjective experience of an anxious affect (questions numbers 2, 4, 7, 9, 15, 19, and 20). The Stress scale assesses difficulty in relaxing, nervous arousal,
and being easily upset/agitated, irritable/over-reactive, and impatient (questions numbers 1, 6, 8, 11, 12, 14, and 18). The items ranged in a four point Likert scale from ‘not at all’ to ‘very much’ (0 – 3 score). The participants were asked to rate the extent to which they had experienced each state over the past week. The DASS questionnaire is accessible, free of charge for public, and can be accessed from the Psychology Foundation of Australia in the University of New South Wales (UNSW) website. This questionnaire can be used for children as young as 12 years.

The DASS-21 was used because it was a short version of DASS-42, which was more convenient for students to answer. The students spent approximately 10 minutes to complete the questionnaire in the math class. The students had an opportunity to ask any questions related to the questionnaire’s items, if they so desired. Subsequently, the mean scores for stress, anxiety, and depression scales were calculated separately, using the scores of the relevant items. The reliability and validity of the questionnaire were confirmed in several studies (16 and 19). In a study, for instance, the Farsi (Persian) version of the questionnaire used in a study with 400 high school students in Kermanshah, Iran, the results of the internal consistency using the Cronbach’s alpha for depression, anxiety, and stress were 0.94, 0.85, and 0.87, respectively. In our study, the Cronbach’s alpha values were also calculated, which were 0.82, 0.80, and 0.82, for depression, anxiety, and stress, respectively.

For data collection in this phase, first, informed consent was taken from the principal of the school. There were four classes in the third level, each of which had 30 students. Two of these classes (consisting 60 students) had math lessons with the principal researcher, which were selected as intervention groups. Second, the aims of the study were explained to the students and they were asked to consult with their families about their participation in the study. From a total of 60 students, 51 got the consent and completed the whole process. The data were entered into the SPSS version 16 and analyzed using descriptive and inferential statistics (t-test and ANOVA).

(C) Data analysis and decision-making regarding interventions: The research findings of the previous phase were presented in three focus group discussions involving the principal researcher, the assistant to the principal of the school, the psychological consultant of the school, and some student and parent representatives. Several interventions to solve the problems were presented and those that were more feasible and suitable to be implemented in a short time were selected.

(D) Implementation of interventions: All the selected interventions were implemented in the form of a supportive-educative program, in a four-month period, lasting approximately from January to April 2012, in two classes where the principal researcher taught math. These interventions were as follows:

- Behavioral approach: This approach attempted to teach individuals new ways and methods to control their stress. In the first five to ten minutes of the math class, the students were invited to use progressive muscle relaxation techniques, while listening to music with closed eyes. The music was named ‘relaxation in a dream’ and was selected by consultation with the psychological consultant of the school. Before starting the intervention, the principal researcher learnt the technique herself to use in the class. An attempt was made to eliminate extra lights and sounds in the math class and the technique was implemented in a relatively quiet and concentrated atmosphere.

- Cognitive approach: The aim of this approach was to help individuals to find the negative thoughts in themselves and explore ways to replace them with positive thinking. This in turn might alleviate individuals’ bad feelings and decrease their stress. Using this method, the principal researcher allocated approximately five to ten minutes or an appropriate time to teach the students how to say no, how to enhance their self-esteem and assertiveness, ways to take notes and make priorities. In collaboration with the head of the school, a book named ‘Self-esteem in 10 days’ was also introduced to students. In this process, students were encouraged to talk about their experiences whenever possible. For example, some students shared experiences where they were not able to say no to others in some situations, and the stresses and problems this caused them. Others talked about responsibilities that they accepted to undertake, when it was better for them not to do so. Some students who were successful in managing themselves in similar situations also shared experiences and tried to role-play situations in front of the class for other students.

- Collaborative learning methods: As recommended, in order to decrease the rigidity of the math class and improve the sense of respect, tolerance, responsibility, and other social skills among students, collaborative learning methods were used. In this part, class exams were implemented in small groups in which students with higher math scores were mixed with those with lower scores. Each group received two open questions and had to answer them in a specific time period (for example 10 minutes for easy and 20 minutes for difficult questions). The students in each group could collaborate with each other actively and answer questions in any way they desired. Working in this way not only decreased the students’ stress, but also was time saving and more creative.

(E) Secondary data collection following implementation: In order to measure the efficacy of the interventions used, the DASS-21 questionnaire was completed again by the participants. Moreover, in order to have an in-depth understanding of the situation following implementation, some interviews were conducted by students’ families and school managers, who were engaged in the research process.

RESULTS

Fifty-one students took part in the study and their mean age and the mean score in their previous school term were 13.71 (SD = 0.70) and 19.52 (SD = 0.50), respectively.
Other demographic characteristics of the students are shown in Table 1.

Also, the students’ mean scores of stress, anxiety, and depression, before and after the intervention, are shown in Table 2.

The results indicate that the students’ mean scores of stress, anxiety, and depression decreased after the intervention compared to the corresponding figures before the intervention. The relationship between some demographic and educational variables and students’ mean score of stress, anxiety, and depression are shown in Table 3.

The above findings indicate that the student’s family situation was the only variable that had a relationship with the students’ mean score of stress. Post hoc tests (not reported in the table) indicate that the students from a veteran’s family had a significantly higher mean score of stress than students from martyred or other family groups.

### DISCUSSION

This action research was a new approach used, to decrease the students’ level of stress, anxiety, and depression, with collaboration of students, their families, and some key school officials. The statistical results were generally promising indicating that the interventions used could decrease the students’ level of stress, anxiety, and depression. These quantitative results were also supported with some qualitative findings explored in the interviews. One student, for example, stated that:

*I used the methods for a couple of weeks and I got good results not only in the math class, but also outside of the school…. Our math class was very joyful… not just some rigid formulas…*

One of school consultants also mentioned:

*She (the researcher) in several sessions conducted and followed students and I see as a student’s consultant that students are happier and express low level of stress and want to take part more in such classes….*

These findings are very similar to the intervention trials conducted in this area, indicating that stress management techniques and collaborative ways of learning in the math class can decrease the students’ level of stress, anxiety, and depression. For example, results of a study with male and female students in high schools, in Isfahan, indicated that the inoculation training and commitment therapy significantly decreased math anxiety, when compared with the control group. In another study with female students in the third year, in Mashhad, the intervention group who received creativity training techniques in the math class had a better math performance than did the control group. In another study with the participation of high school students in the first grade, the results showed that students in the experimental group, who learned math collaboratively in small groups, had experienced less math anxiety, when compared with students in the conventional (traditional) group. Similarly, results of a study with female students in Isfahan demonstrated that the inoculation method against stress significantly reduced the students’ anxiety, resulting in a better performance in math. However, few studies revealed that despite

### Table 1: Demographic characteristics of the students

| Statistics characteristics | Frequency | Percent |
|----------------------------|-----------|---------|
| Residential status         |           |         |
| Private                    | 39        | 76.5    |
| Rental                     | 7         | 13.7    |
| Organizational             | 3         | 5.9     |
| Other                      | 2         | 3.9     |
| Total                      | 51        | 100     |
| Father’s job               |           |         |
| Private                    | 7         | 13.7    |
| Educational                | 6         | 11.8    |
| Retired                    | 7         | 13.7    |
| Employed                   | 17        | 33.3    |
| Military                   | 8         | 15.7    |
| University                 | 2         | 3.9     |
| Other                      | 1         | 2       |
| Not reported               | 3         | 5.9     |
| Total                      | 51        | 100     |
| Student’s family situation |           |         |
| Martyred                   | 6         | 11.8    |
| Veterans                   | 20        | 39.2    |
| Other                      | 16        | 31.4    |
| Not reported               | 9         | 17.6    |
| Total                      | 51        | 100     |

### Table 2: Students’ mean scores of stress, anxiety, and depression, before and after the intervention

|                         | Before intervention | After intervention | t results |
|-------------------------|---------------------|--------------------|-----------|
|                         | Mean | SD  | Mean | SD  |           |
| Stress                  | 0.91 | 0.68| 0.60 | 0.46| 2.70*     |
| Anxiety                 | 0.59 | 0.60| 0.40 | 0.36| 1.98*     |
| Depression              | 0.77 | 0.68| 0.48 | 0.44| 2.55*     |

*Significant at P≤0.05

### Table 3: The relationship between some demographic and educational variables and students’ mean score of stress, anxiety, and depression

|                         | Residential status | Father’s job | Mother’s job | Number of siblings | Student’s family situation (martyred, veterans, other) | Mother’s educational level | Father’s educational level |
|-------------------------|--------------------|--------------|--------------|--------------------|------------------------------------------------------|--------------------------|---------------------------|
| Stress                  | 1.51               | 0.67         | 2.06         | 1.83               | 4.00*                                                | 2.24                     | 0.40                      |
| Anxiety                 | 1.20               | 0.93         | 0.57         | 1.78               | 1.80                                                 | 1.20                     | 1.35                      |
| Depression              | 0.85               | 1.10         | 1.94         | 1.32               | 38/2                                                 | 0.83                     | 1.10                      |

*Significant at P≤0.05
improving the students’ attitude toward math, collaborative learning in small groups with peers did not enhance students’ performance in these courses. All the above research studies were interventional (not action research) generally indicating that using collaborative learning methods and working in small groups in math classes can decrease the students’ stress and anxiety and in turn might improve the learning of math concepts.

Other findings of the study also showed that students belonging to veterans’ families had a significantly higher degree of stress compared to other family groups. This might indicate the challenges that the veteran’s families are faced with. These results are consistent with many other studies in this field. For example, a study was conducted in Isfahan to compare the aggression, anxiety, and social development of adolescents with posttraumatic stress disorder belonging to a veteran family with those in non-veteran families. The results indicated that the first group had higher aggression and anxiety, but their social development was relatively similar. Another study examined the mental health status of students between 15 and 18 years of age from veteran families. The results showed that 36% of the females and 26.8% of the males suffered from psychiatric symptoms, which had higher than normal values. Other research findings also indicated that aggression in children of veteran families was higher than in those of martyred families. However, both these families had a higher aggression rate than other non-veteran and non-martyred families.

However, some research results indicated that children of veteran families had a higher self-esteem than non-veterans ones. Similarly, children belonging to veteran and martyred families had higher religious attitudes than non-veteran and non-martyred families. In summary, it appears that children of martyred families can better coordinate themselves with the absence of loved ones, while children of veteran families are still struggling to exist with deficiencies of a veteran member.

In order to assess the validity of the results and inform people involved in the study, a session was established. In the meeting, the research process and research limitations, particularly in relation to the limited sample size, were reviewed. The positive effects of the study particularly in relation to encouraging students, their families, and even other teachers, to get rid of the routine and rigid ways of learning and using stress management techniques were emphasized. The group welcomed the results of the project and highlighted that if principles of stress management techniques were added to the active and collaborative method of math learning, which would be conducted in a loving atmosphere, it would be seen that a math class would be not only more attractive, but would also provide an opportunity to learn how to deal with stressors outside of the math class. In order to provide grounds for more research utilization, the final report of the project was given to the school principal and the Research Center of District three of the Education and Training Office of Isfahan.

The research findings of the study must be considered within its limitations. As mentioned earlier, the research project was conducted only in one school and with a limited number of students from third level and for approximately a four-month period. The aim of an action research is not to generalize results, but to deeply understand and solve the problem with collaboration of all individuals involved. However, to provide more witnesses to use stress management techniques and collaborative ways of teaching and learning, it is recommended that the project be repeated with more samples and for a longer period of time. In particular, the relationship between students’ demographic and educational variables and the levels of stress, anxiety, and depression need to be assessed with more samples and advanced statistical tests. Also, based on these results, the following suggestions are recommended:

- Reasons why students belonging to veterans’ families experience more stress and ways to help them need more attention
- It needs to take into the consideration that in order to use stress management techniques in the classes, teachers themselves need to be relaxed. Therefore, it would be a good option for teachers to learn these techniques to manage their own stresses as much as possible
- Finally, it is necessary that the main concerns of the teachers — which may act as obstacles for using more scientific and active methods of teaching — will be considered. Having this, might provide teachers with more opportunities to fulfill their divine teaching missions in their classes.

CONCLUSION

Education and implementation of stress management techniques, including cognitive and behavioral interventions, along with active and collaborative ways of learning in the math class might be useful both inside and outside of the class, for better management of stress and other health-related problems of the students. It is recommended that the project be repeated with more samples, at different levels, and for longer periods of time.

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