Original Research

The Relationship Between Irrational Beliefs And Sense Of Agency With Mathematical Self-Efficacy Beliefs In Sirjan Azad University Students

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Abstract:
Students are the future generation of society, and their irrational beliefs and sense of agency can spread to society, especially if it is related to the problem of mathematical self-efficacy. Therefore, this research was conducted with the aim of determining the relationship between irrational beliefs and sense of agency with mathematical self-efficacy in students of Sirjan Azad University. The research was of the correlation type and the students were studying in the second semester of the academic year 1400-401 of the researched society. The sample was 351 students who were selected using the available method. The data were obtained by Jones (1969), mathematical self-efficacy of Betz and Hackett (1983), Rutter's sense of agency (1966). The data was analyzed by Pearson's correlation coefficient statistical method and SPSS software version 22. Data analysis showed that there is a significant relationship between irrational beliefs and sense of agency with math self-efficacy in students of Sirjan Azad University. Also, the results showed that there is a significant difference between male and female students in terms of irrational beliefs, sense of agency ($p<0.001$).

Keywords: Sense of Agency, Non-Negative Beliefs, Mathematical Self-Efficacy

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Introduction

Self-efficacy beliefs play a very important role in math performance. Self-efficacy refers to a person's judgments about their confidence in learning, doing homework, and succeeding in their educational activities. According to Bandura, how people behave is mostly determined by their beliefs about their ability in that area and the impact these beliefs have on their tendency to use previous knowledge and skills to perform that action (1). Studies consistently show that self-efficacy beliefs are an important mediator for all activities related to progress, such as persistence in assignments, use of self-regulation strategies, career and academic choices. Feelings of self-efficacy are completely dependent on specific situations and specific tasks (2). Therefore, to identify the pattern of progress in math, math self-efficacy beliefs are important, which include different factors, including the feeling of agency. In the last decade, the sense of agency has attracted the increasing attention of psychologists, philosophers, and neuroscientists, and it has been explained that disturbance in the sense of agency is related to anxiety and psychiatric disorders (3) as well as emotional and psychological well-being. There is a positive relationship between individuals (4). Feeling the power of initiative and guiding it in the direction of achieving the goal, in other words, exerting will on the material phenomena around you, is a manifestation of the feeling of agency (5), however, there is still a long way to go before the concept can be understood. Agency has achieved its role in human life and further researches can open the way to understanding the meaning of agency (6). According to the characteristics of the sense of agency, it can be said that it has an effect on the level of mathematical self-efficacy among students.

Mathematics has been of special importance in various fields for a long time, most people have had and still have problems in this important matter and think it is difficult. Self-efficacy refers to one's judgments about one's confidence in learning, doing homework, and succeeding in one's educational activities (7). Empirical evidence shows that there is a relationship between self-efficacy and academic achievement. Mathematical self-efficacy beliefs have created a new field in psychological research. Any research in this field can have an exploratory aspect and help to understand its nature and activity. From a scientific point of view, considering the wide effects of hope with mathematical self-efficacy beliefs, it shows the importance of such research to some extent. Mathematical self-efficacy is one of the concepts emphasized in learning theories.

In this research, we intend to investigate the relationship between irrational beliefs and sense of agency with mathematical self-efficacy.

Methods

The current research is one of the applied research types and in terms of descriptive method, it is of the correlational type. In this research, all the students of Sirjan Azad University were in the academic year of 1401-1400, and the total number of students was 4000.

According to Morgan's table, the sample size in this research was estimated to be 351 people. Since the instrument was three questionnaires and there was a high possibility of incomplete questionnaires, according to the supervisor's opinion, 351 samples were considered, of which 351 acceptable samples were collected. The sampling method was stratified random sampling. The classes considered included humanities, technical and engineering sciences, basic sciences and nursing from 4 disciplines, 3 sections and 15 classes. The ratio of the size of each class to the whole society was determined. Then samples were collected within each class by random cluster sampling

where each class was considered as a cluster. It should be noted that the number of clusters was 15 classes.

In this research, the following questionnaires were used to collect the necessary information to analyze and test the research hypotheses:

Jones Irrational Beliefs Questionnaire

This questionnaire has 100 questions and examines 10 subscales through these questions. Each 10 questions are a subscale. These subscales are: 1- Need for approval from others 2- High self-expectation 3- Tendency to blame others 4- Reaction to failure 5- Emotional irresponsibility 6- Excessive worry accompanied by anxiety 7- Problem avoidance 8- Dependence 9- Helplessness towards change 10- perfectionism. This questionnaire is scored as 5 options (strongly disagree, somewhat disagree, neither disagree nor agree, somewhat agree, and strongly agree). In this questionnaire, each option is given from 1 to 5 points. Finally, after answering all the questions, the scores are added together.

Math self-efficacy questionnaire

This questionnaire is the Persian translation of the "Revised Scale of Mathematical Self-Efficacy Beliefs" (MSE-R) which was developed by Betz and Hackett (8) to evaluate the mathematical self-efficacy of university students. This scale contains 52 items and consists of three subscales in the areas related to mathematics, which are: 1. the subscale of math homework includes 18 items, 2 the subscale of math lessons includes 16 items, and 3. The math problems subscale contains 18 items. Questioning was carried out as a group, during which the subjects were asked to rate their level of confidence in doing homework, lessons and mathematical problems raised in the questionnaire on a 5-point continuum, from zero "no confidence" to four "full confidence".

Sense of agency questionnaire

Considering that the sense of agency is synonymous with the source of control, with the approval of the professors, Rater's control scale (internal-external) was used. This questionnaire was prepared by Rutter to evaluate the generalized expectations of the individual, in the field of internal or external control of reinforcement, social learning theory was used as a theoretical framework in making this measurement tool. Rater's Control Questionnaire has been prepared to measure the expectations of people in the source of control, which has 29 items, each item has a pair of questions (A and B). The subject is asked to choose one item between each pair of questions and it is clearly marked that this choice will be based on the deep and clear belief of the subject. Rutter compiled 23 items of this questionnaire with a specific purpose, in order to clarify people's expectations about the source of control, and the other 6 items follow the purpose of the test in a disguise, which makes these neutral items of the structure and measured dimension ambiguous for the subject.

First, the questionnaires used in the research were approved by the professors, and then the information about the attendance of students in the university and the days off due to the corona situation was asked, and then the questionnaire was multiplied to the number of samples and then it was referred to the University for sampling. Sampling was done in different universities. Sampling measures all four technical bases, nursing, basic sciences and humanities. Sampling was done from 15 classes, which was done in coordination with the professors before distributing the questionnaire, so that sampling was done either in the first half hour of the class or in the last half hour of the classes. In each class, it was explained how to answer the questionnaires. Finally, after sampling and separating the questionnaires that were completed

incompletely or randomly, the data was prepared for analysis.

To analyze the hypotheses after collecting the data, a quantitative approach is used according to the needs of the research. The (quantitative) approach included descriptive statistics (mean, standard deviation and variance) and inferential statistics for the research hypotheses of Pearson's correlation coefficient, focal correlation and step-by-step regression. In this research, the researcher analyzed the data obtained from the questionnaire after extracting and classifying it using SPSS software.

Results

According to the results of this study, out of 351 people, 72.1% were women and 27.9% were men. Out of 351 people, the most people were 52.4% between 18 and 20 years old and the least people were 0.6% between 33 and 35 years old. According to these statistics, most people (77.8%) were in bachelor's degree and the least (22.2%) were in associate degree. The statistics of the most people (22.5%) were studying in psychology and the least (5.4%) in mechanics and electricity. The most people (44.4%) were from the experimental field and the least (14.8%) were from the math field. 70.1 % of participants were in average financial status and the least (6.6%) were in poor financial status.

According to the obtained results, it can be seen that the average variable of irrational beliefs is 317.69 and it is in the average range. The average sense of agency (control) is equal to 11.66, a score greater than 9 indicates external control, and here, on average, people have external control. The math self-efficacy score is equal to the average of 77.29, which is more than the average.

Based on the results, there is a relationship between irrational beliefs and sense of agency with math self-efficacy in Sirjan Azad University students. According to the data analysis, it was found that the Pearson correlation coefficient between the two variables of irrational beliefs and mathematical self-efficacy is equal to -0.513 and the p-value (significance) is equal to 0.035, which is significantly smaller than the level It is significant, therefore, at this level, the assumption that there is no relationship is rejected, and as a result, there is a significant relationship between irrational beliefs and students' mathematical self-efficacy. This relationship is negative and indirect, that is, with the increase of irrational beliefs, math self-efficacy decreases. On the other hand, it can be seen that the Pearson correlation coefficient between the two variables of sense of agency and mathematical self-efficacy is equal to 0.54 and the p-value (significance) is equal to 0.033, which is smaller than the significance level, so assumption that there is no relationship is rejected, and as a result, there is a significant relationship between students' sense of agency and mathematical self-efficacy. This relationship is positive and direct, which means that as the feeling of agency increases, the self-efficacy of mathematics also increases.

The significant value for the variables of illogical beliefs and sense of agency is less than 0.05, so it can be said that these variables predict math self-efficacy with 95% confidence. On the other hand, the effect of irrational beliefs on mathematical self-efficacy is negative and indirect, and the effect of sense of agency on mathematical self-efficacy is direct and positive.

According to the data analysis, it was found that the Pearson correlation coefficient between the dimensions of irrational beliefs and mathematical self-efficacy with p-value is smaller than the significance level. As a result, there is a significant relationship between the dimensions of irrational beliefs and students' mathematical self-efficacy. This relationship is negative and indirect, that is, as the dimensions

of irrational beliefs increase, students' mathematical self-efficacy decreases.

According to the results, it was found that the Pearson correlation coefficient between the two variables of sense of agency and mathematical self-efficacy is equal to 0.54 and the p-value is equal to 0.033, which is smaller than the significance level, so at this level, the assumption means no existence of a relationship is rejected, and as a result, there is a significant relationship between students' sense of agency and self-efficacy. This relationship is positive and direct, which means that with the increase in the sense of agency, students' self-efficacy also increases.

Discussion

The results of variance analysis show that the explanatory variables are able to significantly predict and explain changes in the dependent variable (mathematical self-efficacy); In other words, the corrected explanatory model is significant. It can be said that these variables predict math self-efficacy with 95% confidence. On the other hand, the effect of irrational beliefs on mathematical self-efficacy is negative and indirect, and the effect of sense of agency on mathematical self-efficacy is direct and positive. In other words, an increase in irrational beliefs causes a decrease in math self-efficacy, and an increase in the sense of agency causes an increase in math self-efficacy.

The results of the research are in line with the results of Kashani et al. (9) and Ayongi et al. (10).

In explaining the following results, it can be said that since the self-efficacy belief affects the selection of challenging goals, the amount of effort and diligence in performing tasks, the amount of perseverance and perseverance in facing problems and the amount of tolerance of pressures, and mathematical self-efficacy through emotional reactions And a behavior about the value of mathematics and the ways of mathematical thinking, gives confidence and motivation to learn mathematics, and as a result, the progress of mathematics increases. In fact, mathematical self-efficacy is a person's beliefs about confirming their abilities to organize and implement the necessary actions to achieve the desired results, as the results of the research showed, irrational beliefs can affect the degree of belief that a student can trust himself. Have that he can handle math problems and by eliminating these illogical beliefs, he can increase math self-efficacy among students. Another factor that can affect the level of mathematical self-efficacy is the level of agency. The sense of agency is dependent on the student's ability to be effective in solving mathematical problems. The sense of agency refers to a person's sense of control over their own actions and influence on external events through these actions (10). Agency is the ability to control external events through one's own actions, which is one of the basic aspects of human experience. The sense of agency is a kind of declaration of a person's readiness that I am the initiator of my actions and refers to the experience of controlling actions in order to influence events outside the person or the environment (3), accordingly is that students can increase their mathematical self-efficacy by having a sense of agency.

In explaining the results of the research, it can be said that measuring the sense of positive agency can determine how much students in mathematics self-efficacy have control over their learning conditions, make decisions about their academic affairs, and consider the results of their actions as the logical consequences of their actions. They have the ability to control their actions in order to influence the events of the outside world, they have free will in doing various things, they can decide about the time of doing tasks and assignments, they have the ability to plan all kinds of educational matters in the class and to what extent they are like being present in mathematics courses, they

consider themselves responsible for the occurrence of positive and negative consequences. On the other hand, based on the measurement of the sense of negative agency in this tool, it is possible to determine to what extent students are able to determine the level of mathematical self-efficacy in themselves. Knows. In fact, it can be considered that the feeling of agency has an effect on the feeling of control over one's own actions and influence on external events, such as mathematical self-efficacy and solving arithmetic problems. Bandura, as one of the theorists in the field of human agency, states that agency refers to actions that are done intentionally and with intention. Students can practice influencing their math self-efficacy. It can be safely said that the focus of Bandura's social cognitive theory was to replace agency with the passive approach, because he considered individual agency to be the basis of human motivation, well-being, and sense of sufficiency (11).

According to Ellis, illogical beliefs are beliefs that are not in accordance with reality, and the consequences of them lead to anger and destructive emotions that threaten the mental and emotional health of a person (12). In recent years, researchers such as Felt (13) have studied the relationship between irrational personal beliefs and irrational beliefs and anger and role identity, perfectionism and documentary styles. Both gender stereotypes and irrational beliefs are dry and stable ways of thinking that affect people and their actions from the evaluation dimension. Gender stereotypes are actually conventional beliefs about emotional, behavioral and cognitive states, and in this research, girls scored more than boys in these variables, and these variables also cause certain expectations, often with a kind of inflexibility. It is associated with psychology, such as lack of courage and inability and lack of skill regarding a gender, and these types of role stereotypes can have adverse consequences. It is on this basis that the mean values of the variables of high self-expectation, avoidance of problems, dependence and irrational beliefs are more in the group of girls than in boys, because the society defines girls and the roles it defines for girls. Face such problems and instead, boys are expected to show more emotional reactions, which has also been found in the results of the research.

Considering the fact that the sampling was in the university and the class place and the students could not take the questions with them and answer them at the right time, therefore the sampling was faced with a fall due to the haste to answer. Considering the location and time of the research, it should be generalizing the results of the research to other universities and students and other cities was cautioned.

Due to the fact that few researches have been done on the variable of mathematical self-efficacy and its related factors, it is suggested that this variable be investigated further. Also, it should be noted that the factors affecting the sense of agency are less considered in psychological researches. Has taken, especially among students, it is suggested to conduct more investigations on this variable and the factors affecting it. Because the math problem and math self-efficacy are seen as irrational, it is suggested that the factors that increase the feeling of math self-efficacy should be investigated more.

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