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Research Paper

The mediation of self-regulated learning strategies in the relationship between achievement goals and test anxiety

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ABSTRACT

Objective: This study was conducted to investigate the mediation of self-regulated learning strategies in the relationship between achievement goals and test anxiety.

Methods: The present study was a descriptive-correlational research. It included 408 Participants (234 female and 174 male students) of University of Birjand who were selected by convenience sampling method in 2021. Pintridge and DeGrutte self-regulatory learning strategies questionnaire (1990), Friedman and Jacob test anxiety questionnaire (1997) and Middleton and Midgley progress goals questionnaire (1997) were used to collect data and the online links of these questionnaires were provided for the participants. Descriptive and inferential statistical methods such as Pearson correlation and structural equation were used to analyze the data.

Results: Findings showed that achievement goals had an effect on self-regulated learning strategies and test anxiety ($p < 0.05$).

Conclusion: Results showed that attention to self-regulated learning strategies and achievement goals was important in improving students' test anxiety. Therefore, the therapists are recommended to improve test anxiety in their treatment meetings consider self-regulation learning strategies.

1. Introduction

Test Anxiety is an extensive excitement and mainly harmful which is in relation with acquisition and successful academic education; Therefore, this phenomenon has taken the attention of researchers and its measurement is considered as an important issue (Roos et al., 2021). This kind of anxiety is common and normally 10 to 20 percent of people suffer from it during their study (Lotz and Sparfeldt, 2017). In this situation, the learner provides a set of emotional reactions during the test, which can be harmful for his performance. This negative emotional reaction is perceived as anxiety that is an unpleasant emotional reaction (Trigueros et al, 2020). In fact test anxiety is a kind of distress or social fear that makes the person doubtful of his abilities, and its consequence is reducing the capability to cope with conditions requiring an assessment such as test condition (Vaiskarami, Advari, Azad Bakht and Amirian, 2017).

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In another definition, test anxiety is a kind of mental self-immolation which is characterized with self-sufficiency and doubt about self – capabilities that more often lead to negative cognitive assessment, lack of consideration and low academic performance. (Mohatt, Bennette & Walkup, 2014). Putwain & Danyel (2010) suggest that test anxiety involves vast, multi-dimensional structure that is one of the excitements related to the exam situation which relates to individual differences in threatening methods of assessing the exam.

In fact test anxiety is a physical, cognitive and behavioral response that is formed by the worry about acquiring negative results and poor or inappropriate performance in evaluating situations (Abolghasemi, Beigi and Narimani, 2011). Therefore, its symptoms are sense of worry, rapid heartbeat, lack of concentration, distracted thoughts, mental tension and being restless (Clark, Crandall & Robinson, 2018). In fact the anxious student knows the answers of the questions but the severity of anxiety prevents him to use his knowledge (Kader ,2016). Among the reasons of test anxiety appearance we can indicate to student's ignorance to unrelated activities, self -criticizing and physical concerns. Thus, he will focus with less attention and effort on homework oriented activities which will have negative effect on his performance (Devine, Fawcett, Szucs & Dowker, 2012).

One of the elements related to test anxiety is achievement goal. This issue is so important because educating and training of motivated, targeted, progressive and efficient students is the most important goal of educational system (Moshtaghi, 2012). The theory of achievement goals is one of the most promising studies for understanding the motivation of progress, especially motivation in educational and skill fields (Kaplan & Flum, 2010). Elliot (2010) suggested that orientation of goals is a methodology according to which an individual judges his merits and includes goals and meanings that he takes into account for his progress and achievements (Ryan & Printrich, 2011).

From Malemberg's point of view (2010), goal orientation divides in to two forms: skillful and functional orientations. In skillful orientation, individuals are trying to experience mastery, progress and success in new fields, but in Functional orientation they try to attract the popularity and desirability of others and avoid critical judgment toward themselves.

Newly theories suggest four goal orientation types as: skillful – tendency, skillful – avoidance, functional – tendency and functional – avoidance orientations (Pirāni, Yar Ahmadi, Ahmadian and Pirāni, 2017).

Skillful- tendency orientation goals indicate increasing competence and earning skills in doing assignments. Skillful – avoidance orientation goals are characterized by avoiding incomplete perception, lack of learning, not being dominated on the subject and also with factors such as avoiding mistakes, incomplete and unfinished performances. Functional – tendency orientation goals focus on the merit and approval of others and functional – avoidance orientation goals focus on avoiding lack of competence in other people's view (Goodarz Naseri, Shokri, Kamari,2017).

In the most recent researches Emami and Hafezian (2019), suggest that achievement goals are predictive for test anxiety, i.e. all factors of achievement goals like skillfulness, tendency – functional, tendency – avoidance can predict test anxiety. Sheykholeslami, Bashashi and Jafari (2019) showed that in students with high test anxiety, achievement goals are among the variables that are necessary to be noticed. In the research studies abroad, Stan & Oprea, (2015) showed that dominative goals had meaningful, negative correlation with test anxiety and avoidance goals had meaningful, positive correlation with it. Also, Yang & Taylor (2013) studies on students showed avoidance goal orientation can predict test anxiety. In addition, Huijun,Dejun, Hongli & Peixia, (2006) showed that the relationship between functional goals with test anxiety in students is meaningful and negative; therefore achievement goals and test anxiety have a mutual and negative influence on each other (Pekrun, Elliot, Maier 2006, Tuominen – Soini, Salmela – Aro & Niemivirta 2011, Karshki, Mohammad Taghi Zadeh, and Miri 2017).

The relationship between achievement goals and test anxiety requires interferential variable. In other words, in addition to the direct effect of learners goals on their test anxiety, they can be affective through another variable named Self – Regulatory Learning Strategies (Linnenbrink and pinntrich ,2003). The learners who apply self-regulatory learning strategies effectively will be able to regulate the sense and learning objects realistically, maintain emotion, monitor and evaluate their progress in achieving learning goals (Panadero & Alonso – Tapia, 2014). Among the skills that these learners apply, we can point out, planning, time management, and using strategies in order to understand the subject, i.e. we can suggest that self – regulatory learning strategies are oversight measures to attract educational content (García, Fraile & Panadero, 2021). According to Price, (2004) Learning Strategies are cognitive, characteristics, emotional and physiological features which act in the field of understanding interact and response of the learners to the environment as relatively constant indicators.

Understanding of learning strategies is important from several points of views:

First, teacher adjusts his own learning strategies with student's strategies. Second, if students are not familiar with learning strategies, or they don't use them properly , they can be thought how to use. Mohammad Amini, 2008, Mazloumian, Rastegar, Seyf and Ghorban Jahromi ,(2014) found out that the value of academic self-efficacy and achievement goals through interventional of superficial and deep learning strategies have indirect effect on mathematical achievements. The research results of Bakhshi, Ahanchian, and Amiri (2012), showed that achievement goals have meaningful and positive correlation with self- regulatory learning strategies. Motivational strategies have direct effect on problem solving and dominative tendency goals have direct effect on cognitive, metacognitive, motivational and resource management (Kadivar, Farzad and Dasta, 2012).

Also Karshki, Amin Yazdi and Ekhteraee Toosi, (2011) indicated that teaching and learning strategies have intermediately role in decreasing test anxiety in students. Achievement goals have intermediately roles between the feeling of belonging to school and learning self – regulation (Won, Wolters & Mueller, 2017). The study of Ghulam ali Lavasani, Ejeyee and Davoodi, (2013) about test anxiety and self- regulation learning strategies showed that teaching self – regulating learning strategies decrease test anxiety in students.

So, unlike the past that it's been assumed the ability to learn, depends on intelligence and talent of each person just, in the recent year, this theory has been grew among psychologists that despite the critique role of intrinsic intelligence and talent in Learning, non- intrinsic factors are also important in this regard. These mentioned factors are learning resource management strategies and learning strategies. New research approaches in teaching are mostly focused on learning strategies in order to facilitate the process and promotion of academic progress. Also, due to conducting studies on effective factors in learning such as test anxiety and achievement goals, this study has been done in our country with the aim of determining the intervening role in self – regulation strategies in order to take an effective step for improving school training goals. Because according to experts, recognizing the capabilities, skills and effective strategies are suitable for educational interferences and improves the students through identifying the strengths and weaknesses in learning and choosing suitable interferences.

2. Materials and Methods

The present study was considered to be descriptive (non-experimental) in terms of its applicable purpose and methodology. In terms of methodology – this research – was categorized in correlational research category and by using structural equation modeling, examined the relationship between variables of test anxiety (dependant variable), self-regulatory learning strategy (intervening variable) and achievement goal (independent variable).

The statistical population of this study consist of 13500 students in the academic year 2021-2022 at the University of Birjand. According to the Cochran formula, the least sample size was obtained according to the following values were 373 people:

$$n = \frac{\frac{z^2 pq}{d^2}}{1 + \frac{1}{N}[\frac{z^2 pq}{d^2} - 1]} = \frac{\frac{2/94(0/5 \times 0/5)}{0/0025}}{1 + \frac{1}{13500}[\frac{2/94(0/5 \times 0/5)}{0/0025} - 1]} = 373$$

Therefore, a sample of 408 students was selected by available sampling method of which 234 of them were female students and 174 were male students.

Regarding the prevalence of corona virus and the impossibility of distributing the physical questionnaire due to the lack of presence of students at the university, online link of questionnaires, were prepared by Google and were provided to Birjand students through cyberspace and class groups in 2021. The advantages of this method were including access to subjects that were not available in terms of physical distance, and also the data was collected by computer and online method human errors which might occur during data entry. The limitations of this method include reducing the possibility of monitoring and controlling in participants.

In order to prevent sensitivity and desirable views in participants, title was not referenced in the form and they were only asked to reply the questions with enough accuracy and proper time. Due to the necessity of ethical considerations, confidential information or name or any other identifier were not received from participants, and test scores were only used to perform statistical analysis and only research authors had

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access to them. One of the factors for entering the research was the satisfaction and desire of subjects for participation, which was done on line and by justifying the purpose of the test. Another factor was the age of 18 years old and incase of lack of complete response to questions or random answers participant should leave the test. Data analysis was performed using SPSS26 and AMOS 24 statistical softwares.

Self- Regulation Quationnaire, This questionnaire (Pintrich and Degroot, 1990), it includes 55 items that consists of two parts: motivational beliefs and self-regulatory learning strategies. 22 items are related to self – regulation learning strategies that were given to the participants according to the research objectives. Answered questions were categorized based on the 7-degree Likert spectrum from quite disagree to quite agree. The method of scoring for this test is completely direct, the minimum score is 22 and the maximum score is 154. In the research which is done by Ansar – al – Hosseinin et al. (2021), data confirmatory factor analysis has been done in order to data validity review, the results for self-regulation learning strategies is as bellow:

RMSEA = 0.048, PCFI = 0.71, PNFI= 0.69, CMIN/DF =3.2, CFI=0.9, TLI= 0.91

Therefore, it can be said that the model of measuring in this questionnaire was fit, also, in this research, the amount of reliability coefficients for self-regulatory learning strategies has been reported 0.79 (Ansar – AL – hosseinin, 2021). In addition pintrich and Degroot (1990) survey showed that reliability of this questionnaire for two sub-scale learning self – regulatory strategy i.e. self -regulatory strategies and cognitive strategies were 0.74 and 0.83 (Hejazi and Azimi, 2019).

Test Anexiety Quationaire, this questionnaire which is made by Friddman and Jackob (1997) consists of 23 item and 3 dimension of social humiliation, cognitive error and tension. Answered questions were categorized based on Likert spectrum as from completely disagree to completely agree.

Pour Hamidi, Sarvghad, Rezaei & Begholi (2017) used validity test and factor analysis in order to investigate test validity in their research. The results showed that none of items had correlation less than 0.3, therefore, it can be said that the test validity is acceptable (Pour Hamidi et al., 2019).

In addition, the reliability amount for the questionnaire using Cronbach's alpha method was obtained 0.87 (Jahani et al., 2018).

Achievement Goals Quationaire, this questionnaire made by Midelton and Midgoli (1997), its items are 18 that consist of 3 parts: skillful, functional–approaching and functional–avoiding goals. Answered questions were categorized based on the 5-degree Likert spectrum. The validity of this questionnaire has been confirmed by Kamaee et al (2020). The reported reliability coefficients using Cronbach's alpha method for scales, are respectively 0.83, 0.83 and 0.63. Also reported reliability coefficients using Cronbach's alpha respectively were 0.87, 0.86 and 0.81 (Kamaee et al., 2020).

3. Results

To describe demographic variables and the main variables in statistical section, the statistical frequency index, frequency, mean and standard deviation were used. The normalization of variables was investigated using skewed and elongation. In the field of inferential findings and reliability the relationship between variables, Pearson correlation was tested by using the confirmatory factor analysis and research model was also tested with structural equation modeling. The maximum standard error of alpha for testing hypotheses was determined 0.05.

3.1. Statistical characteristics of sampling population

The characteristics of respondents are mentioned in Table 1

Table 1. Statistical characteristics of sampling population (N= 408)

Characteristics		Quantity	percentage
Gender	Male	234	57.4
	Female	174	42.6
Education	Associate degree	23	5.6
	Bachelor	236	57.8
	Master	128	31.4
	PhD and Higher	21	5.1
Age	18-25	296	72.5
	26-35	81	19.9
	36-45	28	6.9
	46-55	3	0.7

According to the results, 57.4% of respondents were female and 42.6% male. Total respondents were categorized to 4 level according to their education (Associate Degree, Bachelor, Master PhD and higher). Frequency of education in terms of the most up to the lowest is: Bachelor with 57.8%, Master with 31.4%, 40.5%, Associate Degree and Ph.D. or higher with 1.5%. In terms of age, the highest percentage of 72.5% belongs to 15 to 25 years old and the lowest percentage with 0.7% belongs to 46 to 55 years old.

3.2. Describing the main variables and examining the normalization

In Table 2, the main variables were described. They were described using mean statistics and standard deviation. Normality distribution of variables was evaluated by skewness and elongation tests.

In the case skewness and elongation if the values of these statistics are between -2 and +2, it represents the normal distribution of single-variable distribution (George and Mallery, 2010).

Table 2. Describing the main variables and examining normalization

variables	Mean	The standard deviation	skewness	elongation
Skillful goals	22.95	4.18	-0.517	0.655
Functional – approaching goals	22.55	5.08	-0.441	-0.263
Functional – avoiding goals	20.16	5.33	-0.051	-0.497
Achievement goals	62.36	9.50	-0.261	0.644
Cognitive strategies	71.80	10.47	-0.862	1.45
Metacognitive strategies	39.47	6.92	-0.236	0.428
Learning strategies	111.28	15.34	-0.447	0.824
Social humiliation	13.92	6.16	-0.295	-0.502
Cognitive error	18.13	4.30	-0.244	0.110
Tension	11.69	4.41	-0.412	-0.562
Test anxiety	43.73	11.86	0.221	-0.630

Checking the means indicated that the average of achievement goals was equal to 62.36, which the highest average belonged to skillful goals with an average of 22.95 and the lowest average belonged to functional-avoidance goals with an average of 20.16. The average of self-regulation learning, cognitive and metacognitive strategies were 111.28, 71.80 and 39.47, respectively. The average of test anxiety was 43.73 and the highest average belonged to cognitive error factor which was 18.69 and the lowest amount belonged to tension factor which was 11.69. Checking the amounts of skewness and elongation values showed that, due to the fact that the values of skewness and elongation of all variables obtained in the range of 2+ to 2, it can be concluded that all variables had normal or close to normal distribution and default amounts of Pearson correlation parametric tests and covariance structural equations modeling (with Amos software) were confirmed.

3.3. Correlation of variables

In Table 4, Pearson correlation test (due to the normal variables of the research) was used to investigate the correlation of variables. The research variables include achievement goals, self-regulation learning strategies, test anxiety and relevant factors of these three variables. Also, divergent validity was investigated by using Funell and Larker method in Table 3.

Table 3. Divergent validity through Funell and Larker method

variables	Skilful goals	Functional – approaching goals	Functional – avoiding goals	Achievement goals	Cognitive strategies	Metacognitie strategies	Self – regulating Learning strategies	Social humiliation	Cognitive error	Tension	Test anxiety
Skilful goals	0.79										
Functional – approaching goals	0.15**	0.77									
Functional – avoiding goals	0.02	0.49**	0.79								
Achievement goals	0.51**	0.83**	0.71**	0.78							
Cognitive strategies	0.57**	0.25**	0.14**	0.46	0.83**						
Metacognitie strategies	0.46**	0.17**	0.05	0.32	0.54**	0.82					
Self – regulation learning strategies	0.60**	0.25**	0.12*	0.46	0.92**	0.82**	0.82				
Social humiliation	-0.10	-0.42	-0.53**	-0.43	-0.05	0.03	-0.01**	0.75			
Cognitive error	-0.34**	-0.02	-0.18**	-0.06	-0.24**	-0.32**	-0.31**	0.31	0.79		
Tension	-0.24**	-0.14**	-0.24**	-0.07	-0.11*	-0.13**	-0.14**	0.48**	0.58	0.81	
Test anxiety	-0.26**	-0.28**	-0.43	-0.23	-0.12*	-0.16	-0.16	0.81	0.74	0.83	0.78

**P≤0.01, *P≤0.05

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The results showed that there was a significant correlation between the three main variables of the research ($p<0.05$), and there was a positive relationship between achievement goals and self-regulatory learning strategies, but between test anxiety factor with two variables- achievement goals and self-regulatory learning strategies- the direction of relationship was negative. The correlation coefficients showed that the correlation intensity of achievement goals with self-regulatory learning strategies was 0.46 and with test anxiety was -0.23. Also correlation intensity between learning strategies with test anxiety was -0.16. The results showed that achievement goals only had meaningful relation with one of the factors of test anxiety, namely, social humiliation, and self – regulation learning strategies had meaningful correlation with two anxiety factors namely cognitive error and tension ($p<0.05$).

To evaluate the divergent validity, the method of Fornell and Larker (1981) was used, which can be inferred from the results showed in table 4. In this method, if the root of the mean variance extracted is higher than the correlation scale of the structure with other structures, it means that divergent validity is confirmed. In table 4, the original diameter related to the extracted variance was (AVE) and other numbers were related to the correlation between variables. As it is observed, all amounts of the average variance extracted from each variable are larger than the correlation of that variable with other main variables and indicates the verification of divergent validity.

3.4. Test Model

The conceptual model of the research using structural equation modeling (SEM), was tested by using AMOS software. Figure 1 is the research model with standard coefficients.

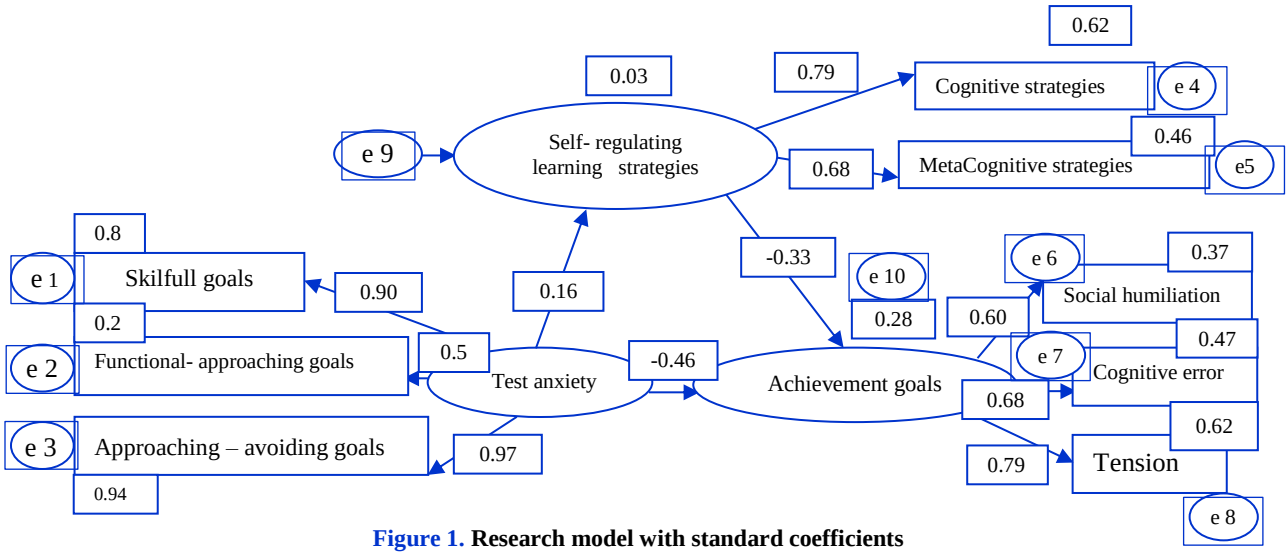

Figure 1. **Research model with standard coefficients**

Table 4. **Model fitting indicators were**

Chi-square to degree of freedom	RMSEA	GFI	CFI	NFI	IFI	PGFI	AGFI	R^2
2.96	0.062	0.92	0.92	0.89	0.93	0.72	0.84	0.28

In general, by evaluating all fitting indices, it can be concluded that the obtained fitting indices totally showed the appropriate and suitable data fit with the model and according to fitting indices the produced model was approximately acceptable.

The NFI index and the determining coefficient were moderate values (and of course acceptable), but other fitting indicators had a good and desirable amount. The determining coefficient was calculated 0.28 and showed that the achievement goals and self-regulatory learning strategies variables have been able to explain 28% of the variance belongs to test anxiety. In table 5 the result of structural model are reported.

Table 5. **Result of structural model is reported**

Relation	Standard factor	Standard error	T amount	Significance level
The effect of achievement goals on self- regulation learning sterategies	0.16	0.097	2.61	0.009
The effect of achievement goals on stest- anexiety	-0.46	0.048	7.05	<0.001
The effect of self- regulation learning sterategies on test anexiety	-0.33	0.036	4.12	<0.001

The result of the model showed that all three relationships and paths in the model were confirmed ($p<0.05$). So it can be concluded that the effect of achievement goal independent variant on self-regulation learning strategies mediator variable and dependent variable was confirmed and also the effect of self-regulation learning strategies mediator variable on test anxiety dependant variable was confirmed ($p<0.05$). Direction effect of achievement goals and self-learning strategies on text anxiety was negative. The most powerful effect in this model belongs to the effect of achievement goal on text anxiety with impact factor of -0.46.

The result of interference of self- regulation learning strategies in relation with achievement goals and text anxiety is indicated in table 6.

Table 6. Investigating of mediation role of self-regulation learning strategies

Relation	Direct effect	Indirect effect	Total effect
The effect of achievement goals on text anxiety	-0.46 **	-0.05**	-0.51

$^{**}P\leq 0.01$

The investigating of interference role of self-regulation learning strategies showed that self-regulation learning strategies had meaningful meditative role in relation with achievement goals and test anxiety ($p<0.01$). It can be concluded that achievement goals had direct and meditative effect of self-regulation learning strategies in text anxiety. Intensity of direct and indirect effects were -0.46 and -0.05, respectively.

For determining the type and intensity of indirect effect, meditative variable VAF (variance accounted for) was used. This coefficient is between 0-1, and the more this amount becomes closer to 1, effect of mediator variance is stronger.

The obtained VAF amount was equal to 0.10 which was approximately low and indicated that 10% of the effects belonged to achievement goals in test anxiety was explained through self-regulation learning strategies that meant the effect of meditative is weak and the most effect of achievement goals on test anxiety was direct.

4. Discussion and Conclusion

In the present study, the goal was to investigate the mediator role of self-regulatory learning strategies in relation with achievement goal and test anxiety in students of the University of Birjand. The results of structural equations showed that achievement goals independent variable has a direct and significant effect on test anxiety. This finding was aligned with the research of Emami and Hafezian (2020), SheykholEslami et al. (2018), Kareshki et al. (2017), stan and Opra (2015), Yang and Taylor (2013), Taminen, Suny et al (2006) , Pekrun et al (2006).

In explaining the obtaining result, it can be pointed out that the objective – dominant orientation is related to the inner motivation of individuals, and students with internal motivation experienced less anxiety in exam situation, because they consider the educational tests and exams as part of the learning process. In contrast, the functional - avoidance orientation makes the individual to experience higher stress, because people with this type of goal orientation consider the exam as a challenging situation, which their success is supposed to be measured through test. It is reasonable that they have a high incentive to avoid failure in this position, and this fear of failure causes anxiety (Hamidi and Babrizi, 2016).

The skillful objectives cause the individual to use factors such as deep learning and individual growth in order to evaluate his performance quality, these factors can be controlled, but functional - avoiding goals are somehow dependent on the conditions of the outer environment to be achieved (for example the difficulty of a test) that may be out of control of the individual, therefore, functional -avoiding orientation can cause anxiety.

The results of structural equations also showed that the achievement goals have a significant positive effect on self-regulation strategies. This finding is in line with research of Bakhshi et al (2012), Kadivar et al. (2012) Van et al. (2017).

In the explanation of this finding, it can be assumed that skillful orientation due to relation to internal motivation causes deep learning, because the learner seeks to obtain knowledge and dominance to the content, and make more benefits from these methods. As a result, they mostly use self-regulation learning strategies. In contrast, learners with external motivated orientations study and learn to get better scores comparing to others and in such circumstances, learners may not looking for deep learning and are more seeking the ways to achieve a desirable result in educational tests and use self-regulatory learning strategies less (Delavar et al., 2015).

Also, the results of structural equations showed that self-regulation strategies are effective as a mediator variable in relation to achievement goals and text anxiety.

These findings are consistent with Kareshki et al (2011), Lavasani et al. (2013) and Tarazi and Khademi (2013). In explaining this finding, it can be assumed that people who benefit from self-regulation learning strategies are able to process information in a favorable manner and supervise their learning process more and are aware of their learning process, they are more confident of their memory function, and probably the amount of memory self-efficacy is higher in them: therefore, they experience less test anxiety (Khosh ravesh et al., 2016). Also people who have high emotional perception and use emotions and emotional
experience appropriately are inversely related to the severity of anxiety that they perceive (Sheybani, Mikaeili & Narimani, 2022).

One of The limitations of this research can be referred as available sampling method, because due to the prevalence of the corona virus, it was difficult to access students and the questionnaires were distributed online. Thus the generalization of the results should be done carefully. The above findings indicate the fact that paying attention to targeted orientation and self-regulation learning strategies can play an effective role in improving students test anxiety. Therefore, it is suggested that in future studies; researchers carry out interventions to determine the relationship between the cause and effect of these variables, also the therapist are recommended to improve test anxiety in their treatment meetings through considering self-regulation learning strategies.

5. Ethical Considerations

Compliance with ethical guidelines

In designing and compiling this research, ethical principles have been considered. The purpose of the research was explained to the participants and the information was received confidentially and used only for research purposes.

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Authors' contributions

All authors of this article participated in all stages of writing and conducting research.

Conflicts of interest

The authors of the article had no conflict of interest.

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