Examining the Mediating Role of Test Anxiety in the Relationship between Procrastination and Self-Handicapping of Students

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Abstract

Background: Procrastination is a common phenomenon affecting many aspects of personal and academic life, especially among students.

Objectives: This research aims to examine the mediating role of test anxiety in the relationship between procrastination and self-handicapping of students in a structural equation modeling approach.

Methods: The present research was a cross-sectional study of descriptive-correlational type, performed in 2022 on 200 students. The census method was used for sample selection because of the limited sample size. Three standard questionnaires were used: Solomon and Rothblum Academic Procrastination, Sarason Anxiety Scale, and Johns and Rodwelt Self-Handicapping Scale. Structural equation modeling was used through AMOS 22 with a significance level of 0.05 for data analysis.

Results: The findings indicated that procrastination had a positive and significant effect on test anxiety ($\beta = 0.46$, $p < 0.001$) and self-handicapping ($\beta = 0.32$, $p < 0.001$). Also, the impact of text anxiety on self-handicapping ($\beta = 0.49$, $p < 0.001$) was positive and significant. There was also an indirect effect of procrastination on the self-handicapping of students through text anxiety (0.22), which was obtained as positive and significant at 0.01 levels via the Bootstrap method.

Conclusion: Procrastination causes increased self-handicapping of students and test anxiety, which promotes further self-handicapping.

Keywords: Test Anxiety; Procrastination; Self-Handicapping

Background

Academic procrastination is an important factor associated with the academic performance of learners in educational systems (1). It is a common phenomenon that affects many academic and daily activities (2). Academic procrastination is often deemed irrational and harmful (3), and it is progressively growing among students. In this regard, some research has shown that 80-90% of students suffer from various forms of procrastination (4). Some studies have reported its prevalence as 52% (5). Although the results of previous studies have reported varying prevalence rates of procrastination among different societies (6, 7), its prevalence is higher among students than others (8).

Further, its serious and unfavorable consequences have sparked greater attention to its examination. Academic procrastination can lead to various physical problems, including digestive disorders and insomnia (9), psychological issues such as diminished self-esteem (3), anxiety (3, 8), stress (10), and depression (11), along with academic problems such as inability in organizing and achieving academic goals (12), low scores (3), and poor learning (13). Accordingly, procrastination is a maladaptive behavior with harmful consequences. Thus, addressing procrastination and gaining awareness of its negative impacts are crucial (14). These can help prevent and mitigate this phenomenon, especially among students. As mentioned above, one of the negative

consequences of academic procrastination is anxiety (7). In this regard, it has been shown that in recent years, due to sudden prolonged isolation, decreased social interactions, and changes in learning style, they have found anxiety and other negative emotions (15). Some studies have indicated that in comparison with typical college students, medical sciences students had higher levels of anxiety (16, 17). In this regard, a meta-analysis by Ven Eerde (2003) revealed that there is a positive association between test anxiety and procrastination. The higher the level of test anxiety, the greater the procrastination level reported by students (18). According to Rothblum et al. (1984, 1986), academic procrastination is positively associated with different general anxieties and specifically with test anxiety and social anxiety (19).

The results of some studies showed that high levels of procrastination make students unable to organize their academic goals and achieve them. Academic performance is more at risk among procrastinating students than their peers. The consequences of procrastination often include negative emotional, mental, psychological, and behavioral aspects such as unstable health, poor self-image, poor social perception, increased stress, and professional incompatibility. More precisely, for many students, academic procrastination is strongly related to ineffective learning outcomes such as low academic performance, low quality of academic work, lack of knowledge, time pressure, dropping out, and prolonging the academic period (18-20). Although the negative consequences of academic procrastination may not be noticeable in everyday life, the implications of its prevalence among medical students who will assume important responsibilities in the future can be irreparable (21). A study examining the relationship between academic achievement and procrastination in medical school students by Hayat et al. reported that 29.25% of medical students stated that they always or almost always procrastinated their academic tasks (22). Therefore, procrastination is not an issue that can be easily passed over. Rather, it should be given serious attention because its prevalence in society, especially among students, is very high and is increasing (23, 24).

Academic procrastination is one of the more common problems at different levels of education. It is a set of behavioral problems that several factors effectively reduce.

Accordingly, the present research deals with the mediating role of anxiety in the relationship between academic procrastination and self-handicapping among students.

Objectives

This research aims to examine the mediating role of test anxiety in the relationship between procrastination and self-handicapping of students in a structural equation modeling approach.

Methods

Design and setting: The present research was a cross-sectional study of the descriptive-correlational type performed in 2022.

Participants and sampling: A sample of 200 students majoring in laboratory sciences, anesthesia, and operation room at the faculty of paramedicine of Istahban. The census method was used for sample selection because of the limited sample size.

Inclusion criteria: The inclusion criteria included students at the faculty of paramedicine of Istahban who were willing to participate in the study.

Exclusion criteria: The exclusion criteria included incomplete questionnaire responses and refusal to participate. For data collection, after obtaining the ethics code and with the necessary coordination, the research questionnaires were distributed and collected.

Tools and Instruments: Three valid questionnaires were used for data collection.

A) Solomon and Rothblum procrastination questionnaire

This questionnaire measures students' procrastination in six areas: writing an assignment (writing papers, translation, preparation class project, thesis, etc.), studying for exams, keeping up with weekly reading assignments, performing administrative tasks (completing forms, registration for classes, obtaining an ID card, etc.), attending meetings (meeting with the advisor professor, meeting with a professor, etc.), and performing academic tasks in general. Each domain is assessed with three questions in a 5-point Likert scale. In general, the range of scores is between 18 and 90. Higher scores mean higher procrastination. Solomon and Rothblum in their study, reported the validity and reliability (0.84) of this questionnaire at a favorable level (25). This questionnaire has already been translated and used in many studies in Iran, and its psychometric properties have been confirmed in various studies (26, 27). We used the translated and validated version. However, we also used confirmatory factor analysis to assess the construct validity. In the present study, the Cronbach´s alpha coefficient was used and obtained as 0.85.

B) Sarason's test anxiety standard scale

One of the valid instruments for measuring test anxiety is the Sarason questionnaire, which contains 37 two-option items (28). This instrument captures the person's psychological states and physiological experiences during the test and before and after it based on a self-report method. The higher the person's score, the greater the anxiety. On this scale, the scores range from 0 to 37. The cutoff points of this questionnaire have been determined as follows: mild anxiety (score 12 and lower), moderate anxiety (scores 13-20), and severe anxiety (score of 20). The reliability of this questionnaire has been confirmed in different studies. The studies performed in Iran have confirmed its desired validity (77). We used the translated and validated version. However, we also used confirmatory factor analysis to assess the construct validity. In the present study, the test-retest reliability coefficient was 0.85.

C) Johns and Rodwelt self-handicapping standard questionnaire

To measure self-handicapping, the Jones and Rodwelt questionnaire was used (29). This questionnaire contains 25 items, and has been designed based on a Likert scale, ranging from absolutely disagree (0) to absolutely agree (5). The total score of the questionnaire indicates the level of self-handicapping. Specifically, higher scores indicate high levels of self-handicapping, while low scores represent low levels. The maximum score is 125, and the minimum is 25. The reliability of this questionnaire has been confirmed in different studies. Studies in Iran also suggest its desirable validity (30). We used the translated and validated version. However, we also used confirmatory factor analysis to assess the construct validity. To determine the reliability of the mentioned questionnaire, the Cronbach alpha coefficient, whose value was obtained was 0.83, was used, suggesting the desirable reliability of this instrument.

Data analysis: Pearson correlation coefficient and Structural Equations Modeling (SEM) were used for data analysis through SPSS 23 and AMOS 22.

Ethical considerations: The ethics committee of Shiraz University of Medical Sciences (IR.SUMS.REC.1400.480) received permission to conduct the research to observe the ethical considerations. Before distributing the questionnaire, the researcher explained the research objectives to the participants and informed them that their participation was absolutely voluntary. In addition, the participants were assured that the questionnaire would be anonymous, with no mention of their names or personal information.

Results

The descriptive findings indicated that most subjects (n = 124 and 62%) were female students. Also, 139 subjects (69.5%) were single. Regarding the academic major, the results are presented in Table 1.

Table 1. Frequency of academic major variable

Academic major	Frequency	Percent
Anesthesiology	28	14
Laboratory sciences	36	18
Operation room	32	16
Nursing	67	33.5
Management	20	10
Medical emergencies	11	5.5
Health information technology	6	3
Total	200	100

Confirmatory factor analysis for the research questionnaires: First, the research instruments should undergo confirmatory factor analysis to initiate structural equation modeling and determine construct validity. Confirmatory factor analysis was used to confirm each of the variables and the items related to each of them. The goodness of fit indices of the final analysis are presented in Table 2.

Table 2. Fitting indices of the procrastination and self-handicapping questionnaires

Index	Procrastination	Self-handicapping
	Estimation	
χ^2/df	2/41	2/32
RMSEA	0.06	0.07
GFI	0.93	0.96
AGFI	0.90	0.91
CFI	0.95	0.96
NFI	0.91	0.96
RMR	0.02	0.02

χ^2/df: Chi-square to the degree of freedom ratio; RMSEA: Root mean square error of approximation; GFI: Goodness of fit index; AGFI: Adjusted Goodness of fit index; CFI: Comparative fit index; NFI: Normed fit index; RMR: Root mean square of residuals

Based on Table 2, the calculated χ^2/df values were 2.41 and 2/31; χ^2/df smaller than 3 suggests good model fitness. Furthermore, the root mean square error of approximation (RMSEA) should be lower than 0.08; in the model presented here, these values were 0.06 and 0.07. The GFI, AGFI, CFI, and NFI values should be greater than 0.9; in the model examined here, the values were larger than this determined number.

Table 3. Factor loads and common variance estimated for the questionnaire items

Procrastination questionnaire			Self-handicapping questionnaire		
Item	Factor load	R²	Item	Factor load	R²
1	0/79	0/62	1	0/23	0/05
2	0/89	0/79	2	0/23	0/05
3	0/68	0/46	3	0/32	0/10
4	0/59	0/35	4	0/35	0/12
5	0/71	0/51	5	0/43	0/18
6	0/73	0/53	6	0/29	0/09
7	0/67	0/45	7	0/22	0/05
8	0/81	0/66	8	0/33	0/11
9	0/83	0/69	9	0/22	0/05
10	0/80	0/65	10	0/43	0/19
11	0/83	0/69	11	0/29	0/09
12	0/78	0/61	12	0/81	0/65
13	0/59	0/35	13	0/38	0/14
14	0/84	0/71	14	0/72	0/52
15	0/74	0/55	15	0/68	0/46
16	0/85	0.72	16	0/70	0/49
17	0/91	0.82	17	0/76	0/58
18	0/73	0.54	18	0/74	0/55
			19	0/88	0/77
			20	0/77	0/59
			21	0/71	0/51
			22	0/71	0/50
			23	0/58	0/34

Thus, this research's data had a good fit with the structural analysis of the questionnaires, suggesting congruence between the items and the constructs. Note that items 24 and 25 in the self-handicapping questionnaire were eliminated from the analysis since they did not have a significant factor load.

Table 3 reports the factor loads of the items related to the questionnaires (procrastination and self-handicapping) and their explained variance.

In Table 4, descriptive indices of the research variables are presented, indicating that the data enjoys the necessary distribution for conducting structural equation modeling.

Table 4. Descriptive indices of the research variables

Variable	Min	Max	Mean	SD
Procrastination	20	83	56.17	13.02
Text anxiety	7	34	20.40	7.47
Self-handicapping	43	105	79.79	15.14

Before testing the theoretical model of the research, there should be a significant correlation between variables of the theoretical model. Accordingly, Table 5 reports the correlation matrix of the research variables.

According to the above table, the relationship between procrastination (0.51) plus test anxiety (0.62) and self-handicapping was positive and significant at 0.01. Also, the relationship between procrastination and test anxiety (0.46) has been positive and significant at 0.01 level.

Table 5. Correlation matrix of the research variables

No.	Variable	1	2	3
1	Procrastination	1		
2	Text anxiety	0.46**	1	
3	Self-handicapping	0.51**	0.62**	1

Next, to predict the self-handicapping of students, the proposed conceptual model was investigated through structural equation modeling based on the maximum likelihood method. Figure 1 demonstrates the model tested in the research. Table 8 also outlines the results related to the direct coefficients of effects.

Based on Table 6 and Fig, the direct effect of procrastination (0.32) and test anxiety (0.49) has been positive on self-handicapping and significant at 0.001 level. The direct impact of procrastination on test anxiety (0.46) was positive and significant at 0.001 level. Procrastination and test anxiety overall accounted for

48% of the variance of self-handicapping of students. Procrastination alone also explains 21% of the variance of test anxiety. Based on the above table, the indirect effect of procrastination on the self-handicapping of students was through test anxiety (0.22), which was positive and significant at 0.01 level based on the bootstrap method.

This means that procrastination through test anxiety had a positive and significant indirect effect on the self-

handicapping of students. In other words, procrastination has resulted in increased test anxiety in students, and this increase in test anxiety itself leads to their self-handicapping. Also, to investigate the fitness of the tested model, three groups of fitness indices, including absolute, comparative, and parsimonious, were used, with their results presented in Table 7.
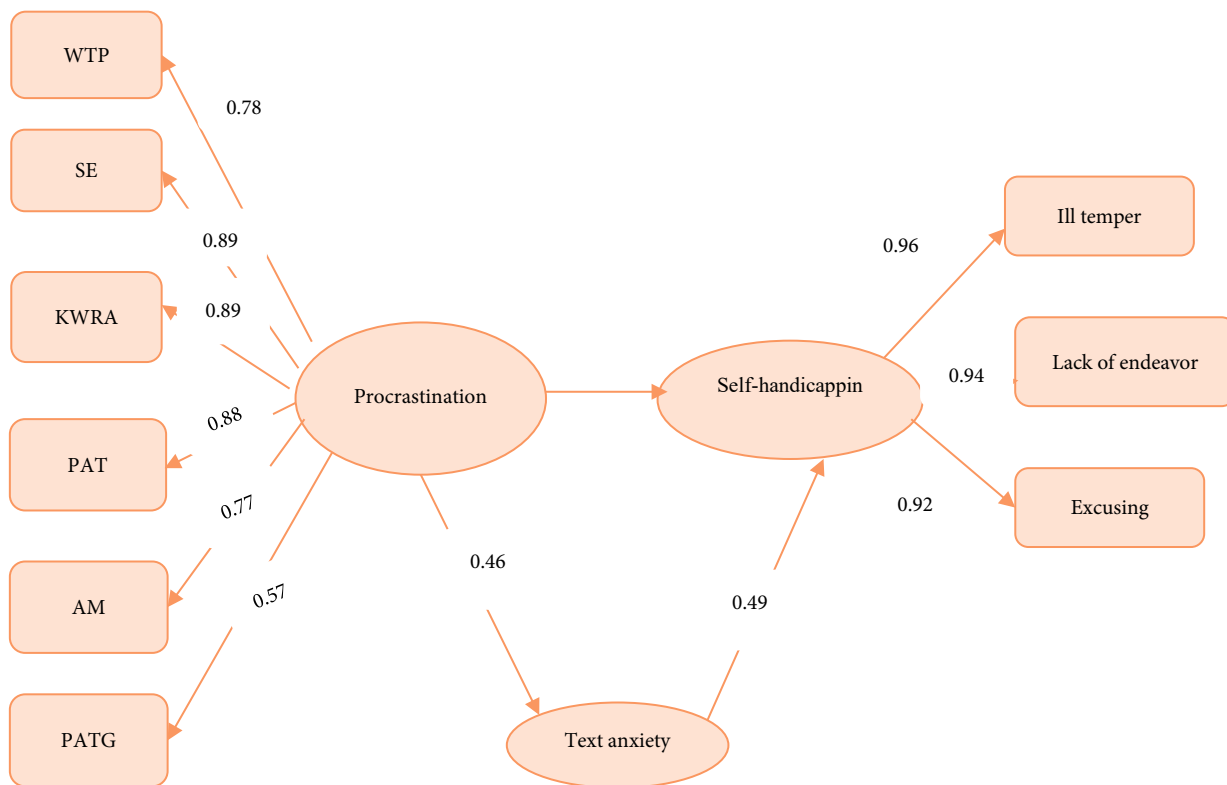
Figure 1. The tested model of self-handicapping of students

Based on the above table, the goodness of fit index (GFI) was 0.96 for the tested model, which is larger than 0.90. The adjusted goodness of fit index (AGFI) was 0.93, larger than 0.80. Also, the standardized root mean square error (SRMR) was 0.01, lower than 0.05. The comparative fitness index (CFI) was 0.99, larger than 0.99. The normalized fitness index (NFI) was 0.97, larger

than 0.90. The non-normalized fitness index (NNFI) was 0.99, larger than 0.90. The chi-square of the degree of freedom (X^2/df) is 1.46, which is lower than 3. The parsimony-normed fit index (PNFI) is 0.69, larger than 0.60, and the root means square error of approximation (RMSEA) is 0.05.

Table 6. Direct, indirect, and total effects, as well as explained variance of variables

Path	Direct effect	Indirect effect	Total effect	Explained variance
On Self-handicapping through				0.48
Procrastination	0.32***	0.22**	0.54***	
Text anxiety	0.49***	-	0.49***	
On Test anxiety through				0.21
Procrastination	0.46***	-	0.46***	

Table 7. The goodness of fit indices of the tested model of the research

Absolute fitness indices				
Index	GFI	AGFI	SRMR	Index
Obtained value	0.96	0.93	0.01	Obtained value
Acceptable limit	Greater than 0.9	Greater than 0.8	Less than 0.05	Acceptable limit
Comparative fitness indices				
Index	CFI	NFI	NNFI	Index
Obtained value	0.99	0.97	0.99	Obtained value
Acceptable limit	Greater than 0.9	Greater than 0.9	Greater than 0.9	Acceptable limit
Adjusted fitness indices				
Index	X2/df	PNFI	RMSEA	Index
Obtained value	46.1	0.69	0.05	Obtained value
Acceptable limit	Less than 3	Greater than 0.6	Less than 0.08	Acceptable limit

Discussion

The present research focused on investigating the mediating role of test anxiety in the connection between procrastination and self-handicapping. The results showed that procrastination had a positive and significant effect on test anxiety, and, with the increase in academic procrastination, the test anxiety of students also increased. This is in line with the findings of previous research (14-17) as well as theoretical statements, suggesting that procrastination is always associated with negative consequences, including anxiety. In this regard, a meta-analysis performed by Van Eerde (2003) indicated that there is a positive relationship between test anxiety and procrastination. The higher the test anxiety level, the greater the procrastination level reported by students (18). According to Rothblum et al., academic procrastination is positively associated with general anxiety, specifically test anxiety and social anxiety (19). It can be assumed that students who have high levels of procrastination experience more anxiety. They are also more insecure about positive and constructive solutions to problems. They frequently delay the implementation of programs, and at the last minute, when the deadlines approach, they begin their tasks, making efforts to make up for the lost time almost futile.

Anxiety can be aggravated by high expectations from others as well as excessively high standards about the work outcomes. According to one study (28), procrastination especially emerges in situations that require evaluation and measurement of personal abilities. Thus, it can be assumed that postponing academic activities is not typical for students with low levels of procrastination. Thus, the problems resulting from late and untimely assignment fulfillment are rare.

Accordingly, it can be stated that students with low procrastination experience less anxiety.

This procrastination leads to academic failure. Thus, these students get the impression that they do not have adequate competence and qualifications, which severely damages their academic self-confidence. The relationship between anxiety and procrastination is complex, as they mutually affect each other. Procrastinators experience severe anxiety due to the sense of threat to their self-esteem. This level of anxiety makes them postpone the possibility of doing that assignment to liberate themselves from its resulting suffering. The study results showed that procrastination had a positive and significant effect on self-handicapping (0.32); with an increase in academic procrastination, the self-handicapping of students also increased. This is consistent with the results of earlier studies (16, 17, 21, 22, 26). In a meta-analysis, Van Eerde (2003) investigated the factors associated with procrastination and found that the greatest positive association existed between procrastination and self-handicapping (18). Some research has mentioned academic procrastination as a self-handicapping strategy, which has been regarded as a predictor of self-handicapping (20). For example, Aka et al. (2012), in research on undergraduate students, concluded that there was a positive and significant correlation between self-handicapping and academic procrastination. Among the research variables, academic procrastination claimed the largest share in predicting self-handicapping (29). In this respect, it can be stated that procrastinating students do not seek qualification and mastery over their courses and do not feel a sense of responsibility for gaining success. They have little perseverance and, in case of failure, do not attempt further. In addition, most of their goals are directed to external factors, including the acquisition of grades and

scores, becoming top students, getting approval from a professor, etc., and even avoiding the consequences of failure. This increases the active strategies of opportunities for externalizing failure (I failed in the exam because I was sick) and success for internalization (I am smart and do not study hard for exams), thereby promoting the ground for self-handicapping in the person. Procrastinators may assume that their actions have had no effect on changing their situation and hence focus on regulation and management of their emotions. This means that instead of an assignment-based coping orientation, they tend to adopt an emotion-based coping orientation. One form of this emotion-based coping, which represents a deficiency in the self-regulation function, is self-handicapping, which means the person places an obstacle to delay their desired performance. The driver of self-handicapping is maintaining self-esteem. In such a case, the person sets failure in doing the desired performance as an external factor. Self-handicapping can be regarded as a potential cause or reflective cause of procrastination. If these people succeed in assignments, they feel a sense of self-efficacy and pride; however, if they fail, they feel shame and further humiliation. Possibly, the reason why procrastinators adopt a self-handicapping strategy is that they have always received negative feedback and consider the probability of its reception in response to failure always imminent.

Other results showed that test anxiety had a positive and significant effect on self-handicapping. In addition, test anxiety plays a mediating role between procrastination and self-handicapping of students. Also, other studies (25, 35), including the research by Barutçu and Demir (2020), showed that test anxiety was a significant predictor of self-handicapping among undergraduate students (23). The self-worth theory (Covington, 1992) suggests that the students' self-worth can be affected by failure. This is because failure is regarded as a symbol of incompetence, which is considered low self-worth (30). In the current academia, emphasis on success and personal performance and perception of personal value have increased (31-36).

The relationship between academic procrastination and anxiety presents further evidence suggesting that procrastination is beyond deficiency in time management and study skills and also encompasses cognitive and emotional elements. Indeed, according to Saputri (33), procrastinators in their study behavior are not different in terms of anxiety. In another respect, it

can be stated that students who experience fear of failure as well as fear of negative assessment delay studying lessons up to the night of the exam because of their severe anxiety.

Thus, the students with higher test anxiety levels tended to adopt self-handicapping and pessimistic defensive strategies, which could protect their self-worth feelings against the expected failure by reflecting the attribution away from their perceived incompetence (34, 36). Overall, it can be concluded that procrastination not only directly leads to increased self-handicapping of students but can also indirectly affect self-handicapping by increasing test anxiety. Previous studies have shown that there is a significant correlation between procrastination, academic anxiety, and self-handicapping (25). Nevertheless, to our knowledge, no research has proven its indirect association.

Limitations: One of the limitations of this research was that the research was limited to the city of Istahban and that the present research was limited to the sample of students of the Istahban University of Medical Sciences. Therefore, it is recommended to conduct additional studies in various cities to ensure that the findings can be applied more broadly. It is also recommended that similar research be conducted in other groups with different characteristics. This research also had limitations, such as the self-report method and that questionnaires were used to measure the research variables, and there is a possibility that these values are over reported.

Conclusion

The present research spotlighted the relationship between academic procrastination and self-handicapping through the mediating effect of test anxiety. Our research demonstrated that academic procrastination affects self-handicapping and revealed that test anxiety, to some extent, mediates the effect of procrastination on self-handicapping. In line with the research results, it is suggested that workshops be held by health administrators in connection with psychological interventions to reduce students' emotional problems such as procrastination, test anxiety, etc., as well as to promote motivation and progress goals in universities and counseling centers. It is possible to take pivotal treatment towards a health-oriented approach and save on the high cost of healthcare. It is suggested to identify and reduce the sources of students' exam anxiety, including an emphasis on grades and perfectionism, so that the level

of self-disability and procrastination of students decreases. In this regard, it is suggested that interventional research be conducted on strategies to reduce exam anxiety.

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