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Psychometric Analysis Scale of Attitude toward Plagiarism Based on the Theory of Planned Behavior in the Students of Iran University of Medical Sciences

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Abstract

Background & Objective: Plagiarism is a growing phenomenon that could damage the reputation of educational institutions and the relationship between professors and students, thereby causing barriers to learning. The present study aimed to psychometrically evaluate the scale of attitude toward plagiarism.

Materials and Methods: This study was conducted on 200 students at Iran University of Medical Sciences in Tehran, Iran in 2016. Research tool was a 29-item scale adapted from previous studies, which was translated to Persian after the permission of the author. Item impact score, content validity index, construct validity, and content validity ratio were confirmed by 10 experts using exploratory factor analysis. In addition, the reliability and stability of the research tool (internal consistency) were assessed using the Cronbach's alpha and test-retest method, respectively.

Results: In total, 22 items were maintained in the research instrument based on the coefficient of the impact index (>1.5), content validity index (>0.62), and validity ratio (>0.7). Moreover, all the items remained in the research tool based on the exploratory factor analysis. The four factors of 'positive attitude toward plagiarism', 'negative attitude toward plagiarism', 'subjective norms', and 'perceived behavioral control' were extracted considering the special value of more than one. The instrumentcould predict 55.847% of the total changes in the scale.

Conclusion: According to the results, the strength in the factor structure and reliability of the attitude toward plagiarism could be used to evaluate the attitudes of university students and other educational institutions toward plagiarism.

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Introduction

As a growing phenomenon, plagiarism impairs the relationship between professors and students and damages the reputation of educational institutions, thereby causing significant barriers to learning (1). Plagiarism refers to the use of words and phrases without the proper mentions of the sources, the scope of which extends to the stealing of the ideas and thoughts of others. As a scientific malfunction, plagiarism violates scientific norms. Moreover, plagiarism disturbs the recognition and encouragement of individuals, overlooking the actual authors and initiators of original ideas (2).

According to a research by Kokkinaki, 70.8% of students needed training on the instances of plagiarism (3). According to Power, plagiarism could occur due to motivational or non-motivational reasons. Some of the motivational causes of plagiarism include easiness, attracting the attention of teachers, cultural background of acceptance, access to better opportunities, lack of knowledge and understanding of the methods to avoid plagiarism, ambiguous standards of scientific misconduct, and the formal application of the consequences of violating proper scientific decorum (4). In this regard, Billinges and Halsteal have emphasized on the pivotal role of faculty members in fostering positive learning environments, stating that the encouragement of students toward accepting academic honesty is essential to the formation of responsible learning environments (5).

According to the theory of planned behavior by Ajzen (6), the attitudes of individuals have a direct impact on their behavior. The theory of planned behavior was proposed by Ajzen in 1988 as an extension of the theory of rational action. According to this theory, the most significant influential factors in the intention to show a specific behavior include attitude, abstract norms, and control of perceived behavior (7).

To date, several studies have focused on plagiarism applying the theory of planned behavior (8-10), and various tools have been used to evaluate the attitudes toward this phenomenon (11-13). However, most of these tools have proven unreliable due to subject disproportion (14). For instance, in a researcher-made questionnaire, Jorge Lopez Puga used the factors associated with positive and negative attitudes, as well as control and norm factors, in the form of 10 items in order to assess plagiarism in students (15). In addition, Renni et al. developed a tool with 14 scenarios to evaluate the attitude of medical students toward scientific misconduct. In this

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method, an individual named Jones performed specific actions, and following that, the true and false nature of the actions were surveyed in the presence of students with the aim of determining the attitudes of students based on their responses. However, the tool had to be employed with caution due to the lack of confirmed reliability (16).

Ryan et al. developed an instrument consisting of two scenario and combined items (multiple choice, true/false, essay) so as to evaluate the perceptions of pharmaceutical students toward plagiarism. However, the instrument was not well-received due to the lack of proper reliability (17). On the other hand, Harris designed a simple questionnaire entitled the "Scale of Attitude toward Plagiarism', which contained 12 statements. This short scale was designed for school and BSc students and had no proof of credibility (18). In Iran, Pourjalal et al. proposed a questionnaire to evaluate the attitudes of medical students toward plagiarism, which consisted of nine items scored based on a Likert scale (19), and the test-retest method was used to assess the content validity of the tool only (19).

In this regard, Mavrinac et al. have claimed that despite the number of the questionnaires designed in this regard, these tools cannot be easily used for extensive scientific and academic studies (20). This highlights the need for a valid and reliable tool in this area; therefore, Marvinac et al. designed a 29-item questionnaire after the comprehensive review of the literature. To evaluate plagiarism, the proposed questionnaire involves focused group discussions in accordance with the structures of the theory of planned behavior (20).

The present study aimed to perform a psychometric evaluation on the questionnaire developed by Mavrinac et al. given its comprehensiveness and theory-based design.

Materials and Methods

This psychometric study was conducted on 200 medical students at Iran University of Medical Sciences in Tehran, Iran in 2016 to evaluate the scale of attitude toward plagiarism. In this research, the 29-item questionnaire by Marvic et al. was applied to psychometrically assess as the tool of attitude toward plagiarism (20).

The items in the questionnaire were scored based on a five-point Likert scale (Totally Disagree= 1, Totally Agree=5). After the psychometric analysis, the components in the questionnaire were classified into three categories of 'positive attitude toward

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plagiarism', 'negative attitude toward plagiarism', and 'abstract norms'. After obtaining the permission of the author, the tool was translated into Persian by two professional Persian and English translators using the forward-backward method. Following that, two other translators translated the questionnaire separately from Persian to English, and the result was compared to the original version in order to eliminate errors.

Study population consisted of 200 medical students at Iran University of Medical Sciences, who were in the process of their thesis. Sample size was estimated at 200 individuals based on the recommended minimum sample size by Guilford (21).

Data collection was carried out via convenience sampling. Content validity of the questionnaire was assessed and modified based on the comments of 10 experts, who were familiar with the concept of plagiarism (medical and health education experts), and the face validity was confirmed by 10 students. Moreover, the questionnaire was randomly distributed among 15 students in order to assess its reliability. Following that, the research tool was distributed among the sample population to evaluate the construct validity, reliability, and internal consistency.

Qualitative correction was used to determine the qualitative face validity of the questionnaire (four items). Also, quantitative face validity was determined in order to estimate the item impact index by providing a complete list of the questionnaire items to 10 individuals of the target group separately. After the estimation of the impact scores, the scores above 1.5 were accepted, followed by the retaining of the items for the next stages of the study.

In the qualitative evaluation of the content validity, factors such as compliance with the Persian grammar, proper diction, proper placement of the items, appropriate scoring, required time to complete the questionnaire and the appropriateness of the selected range were repeatedly modified and corrected.

Content validity ratio (CVR) and content validity index (CVI) were used to determine the content validity of the data collection tools. The items were accepted based on the CVR score of more than 0.62 (22) and CVI score of more than 0.70 (23). Furthermore, exploratory factor analysis was carried out using the Kaiser-Meyer-Olkin (KMO) test, Bartlett's test of sphericity, scree plot, special value, VARIMAX rotation, and confirmatory factor analysis. To simplify the extracted

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factor structure, the VARIMAX method was used, which is a proper approach for the placement of the items with high correlation in a one factor.

The modified questionnaire was completed by the participants to assess its reliability. After the extraction and collection of data, Cronbach's alpha was estimated for the entire questionnaire, as well as for each of the factors independently.

Results

Mean age of the students was 29.26±4.13 years, and 54.5% of the participants were female. Other demographic characteristics of the subjects are presented in Table 1.

Table 1: Demographic Characteristics of sample

Variables	**N (%)**	**Total**
Age (y)		200(100%)
20-24	1(5%)	
25-29	139(69.5%)	
30-34	36(18%)	
35-39	16(11%)	
≤40	8(8%)	
Sex		200(100%)
Male	109(54.5%)	
Female	91(45.5%)	
Marital status		200(100%)
Single	151(75.5%)	
Married	49(24.5%)	
Term of writing thesis		200(100%)
First	165(82.5%)	
Second	35(17.5%)	

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Evaluation of Face Validity

A) Qualitative evaluation: Four items required modification, and the proposed issues by the professors were considered in altering the questionnaire.

B) Quantitative evaluation: All the items were retained.

Evaluation of Content Validity

At this stage, CVI and CVR were determined.

A) Results of CVR Evaluation

The obtained results were compared to the criteria of the Lawshe's table based on the comments of 10 experts. Considering the number of the participants (n=10) and the minimum CVR value (0.62), the items greater than 0.62 with the mean judgment score of more than 1.1 were retained, while two items were eliminated, and five items were modified.

B) Results of CVI Evaluation

At this stage, the items greater than 0.79 were retained, while the items within the range of 0.7-0.79 were modified. In total, five items were eliminated.

Table 2: Item Impact Score, CVI, CVR

Items	Item impact score	CVR	CVI		
			Relevancy	Simplicity	Clarity
1. Sometimes one cannot avoid using other people's words without citing the source, because there are only so many ways to describe something.	1.58	0.6	0.7	0.7	0.9
2. It is justified to use previous descriptions of a method, because the method itself remains the same.	2.25	0.6	0.9	0.9	0.9
3. Self-plagiarism is not punishable because it is not harmful (one cannot steal from oneself).	1.5	0.2	0.6	0.9	0.5
4. Plagiarized parts of a paper may be ignored if the paper is of great scientific value.	1.52	0.2	0.6	0.7	0.9
5. Self-plagiarism should not be punishable in the same way as plagiarism is.	1.59	0.6	0.6	0.8	1
6. Young researchers who are just learning the	1.57	0.4	0.8	0.9	1

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ropes should receive milder punishment for plagiarism.					
7. If one cannot write well in a foreign language (eg, English), it is justified to copy parts of a similar paper already published in that language.	1.58	0.6	1	0.8	1
8. I could not write a scientific paper without plagiarizing.	1.57	0.6	0.9	1	0.8
9. Short deadlines give me the right to plagiarize a bit.	1.5	0.4	0.8	0.7	0.7
10. When I do not know what to write, I translate a part of a paper from a foreign language.	1.57	0.4	0.5	0.6	0.8
11. It is justified to use one's own previously published work without providing citation in order to complete the current work.	1.9	0.8	0.7	0.6	0.8
12. If a colleague of mine allows me to copy from her/his paper, I'm NOT doing anything bad, because I have his/her permission.	1.58	1	0.7	0.6	0.9
13. Plagiarists do not belong in the scientific community.	1.55	0.8	0.7	0.7	0.9
14. The names of the authors who plagiarize should be disclosed to the scientific community.	1.51	0.4	0.8	0.9	0.9
15. In times of moral and ethical decline, it is important to discuss issues like plagiarism and self-plagiarism.	1.66	0.6	0.8	0.8	0.9
16. Plagiarizing is as bad as stealing an exam	1.52	1	0.6	0.9	0.9
17. Plagiarism impoverishes the investigative spirit.	2	0.4	0.8	0.9	0.9
18. A plagiarized paper does no harm science.	1.51	0.4	0.8	0.9	0.9
19. Since plagiarism is taking other people's words rather than tangible assets; it should NOT	2.27	1	0.8	0.7	1

be considered as a serious offense.					
20. Authors say they do NOT plagiarize, when in fact they do	2.2	0.8	0.6	0.7	0.9
21. Those who say they have never plagiarized are lying.	1.51	0.6	0.7	0.8	0.7
22. Sometimes I'm tempted to plagiarize, because everyone else is doing it (students, researchers, physicians).	1.84	0.6	0.5	0.6	0.6
23. I keep plagiarizing because I haven't been caught yet.	1.51	0.6	0.8	0.6	0.8
24. I work (study) in a plagiarism-free environment.	2.1	0.4	0.9	0.8	0.8
25. Plagiarism is not a big deal.	2	0.8	0.9	0.8	0.9
26. Sometimes I copy a sentence or two just to become inspired for further writing.	1.9	0.8	0.8	0.9	0.9
27. I don't feel guilty for copying verbatim a sentence or two from my previous papers.	2.1	0	0.7	0.9	0.7
28. Plagiarism is justified if I currently have more important obligations or tasks to do.	1.57	0.8	0.9	0.9	1
29. Sometimes, it is necessary to plagiarize.	1.95	1	0.8	0.9	0.8

Construct Validity

Initially, sampling adequacy was tested for factor analysis, which was estimated at 0.736 according to the results of the KMO test. In addition, the Bartlett's test of sphericity was calculated to be 2139.223 at the significance level of $P<0.001$. Therefore, the minimum condition for performing exploratory factor analysis was available.

In the present study, analysis of the main components and special value were applied to extract the factors and determine the number of the factors, respectively. With regard to the special values of one factor (total square of the coefficients of the loads per each factor), four factors with 55.84% of the total variance of the scores were placed above a specific issue in order to verify the variance of attitude toward plagiarism.

In the current research, VARIMAX and oblimin rotations were applied to simplify the data, where the VARIMAX rotation complied

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with the main tool. Therefore, four areas were extracted. However, the items relating to each factor were recognized based on the rotated factor matrix among the factors of the scale of attitude toward plagiarism (Table 2).

Table 3: Eigen value and total variance explained

Component	Initial eigenvalue			Extraction Sums of Squared Loading			Rotation Sums of Squared Loading		
	Total	% of variance	Cumulative %	Total	% of variance	Cumulative %	Total	% of variance	Cumulative%
1	6.262	28.466	28.466	6.262	28.466	28.466	4.346	19.756	19.756
2	2.648	12.035	4.500	2.648	13.035	40.500	3.678	16.719	36.475
3	1.760	8.000	48.500	1.760	8.000	48.500	2.501	11.370	47.845
4	1.616	7.347	55.847	1.616	7.347	55.847	1.760	8.002	55.847

The items relating to each factor were recognized and titled based on the rotated factor matrix from among the items of the scale of attitude toward plagiarism. On the other hand, the components were compared to the titles selected by the developers of the scale with in terms of the rotated factor matrix, and the titling of the components was performed for the comprehension and compliance of factors with the theorists.

At this stage, the variables with high correlations were classified inside one factor, including the 'positive attitude toward plagiarism', 'perceived control', 'subjective norms', and 'negative attitude toward plagiarism'.

Table 4: Final Extracted Factors, items for each Factors and its labeling

Factors	Factor Names	Items for each factor
1	Positive attitude to plagiarism	21, 3, 8,9,12, 13,14,7,18
2	Perceived Control	17, 11,10,5,22,20
3	Subjective norms	6, 4, 1,15
4	Negative attitude to plagiarism	19,2,16

In the present research, the reliability of the scale of attitude toward plagiarism was determined using the Spearman's correlation-coefficient (P=0.936), and the internal consistency of the entire questionnaire was confirmed using the Cronbach's alpha

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(α=0.79), which was estimated at 0.794, 0.748, 0.733, and 0.692 for the first, second, third, and fourth factor, respectively.

The constructive assessment was performed using the LISREL software, which indicated the root mean square error of exploration of 0.82, X_2/df of <3, while the goodness of fit index, confirmatory fit index, normal fit index, and non-normal fit index values were higher than 90%, confirming the construct validity in the present study.

Discussion

Considering the lack of a valid and reliable instrument for the attitude toward plagiarism, the current research aimed to evaluate the attitudes of students toward plagiarism based on the theory of planned behavior. Exploratory factor analysis was performed to determine the construct validity of the tool, and VARIMAX rotation was applied to simplify the data. In total, four components of 'positive attitude toward plagiarism', 'negative attitude toward plagiarism', 'subjective norms', and 'perceived behavior control' were extracted based on the patterns of planned behavior, which were consistent with the extracted factors of the original questionnaire (24).

Mavrinac et al. employed the theory of planned behavior in titling the extracted components of their questionnaire. However, the main strength of the current research is the use of all the constructs of planned behavior (20). According to our findings, attitude is one of the foremost influential factors in plagiarism, which is in congruence with the results of the previous studies in this regard (23-27).

In another study, Zamani et al. claimed that positive and negative attitudes play a key role in plagiarism since cheating might be considered the best alternative to hard work (28). Given the predominant attitudes pervading the Iranian community, theft only involves tangible objects, while it is not defined for thoughts, ideas, and extensive scientific endeavors; consequently, many individuals are able to achieve high academic status through plagiarism (29).

In addition to attitude, 'abstract norms' and 'perceived control' were among the extracted factors in the present study. In this regard, Ajzen believes that attitude, abstract norms, and perceived control significantly affect behavioral intentions (7).

Subjective norms refer to the perceived social pressure for adhering to or avoiding a specific behavior. Individuals often act in accordance with their perceptions toward others'

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thoughts, and their intention to accept a certain behavior is potentially influenced by their close interactions with other individuals (30). Evidently, such factors are essentially involved in the intention of individuals to resort to plagiarism.

In the current research, subjective norms were found to influence plagiarism among students. Similarly, the findings of Park also confirm the effect of social pressure on plagiarism (30). The effect of subject norms on this phenomenon has been investigated by the other studies in this regard (31). For instance, Denis has stated that sociocultural factors are among the influential factors in plagiarism (32). In line with the results obtained by Zamani et al., findings of the current research demonstrated that the perceptions of individuals regarding their abilities and control of behaviors are influential in the realization of a behavior (28), which is a unique results yielded by our study. Perceived control encompasses the feelings of individuals regarding adhering to or avoiding a certain behavior, and several studies have denoted the overlap of this factor with self-efficiency in predicting behaviors (33). Ajzen considers these factors to be identical (34).

In an attempt to identify the influential factors in plagiarism, Zamani et al. developed a questionnaire with 48 items and 11 factors, which could predict the variance, as follows: 1) lack of self-efficiency in conducting research and report writing (5.57%); 2) lack of proper mechanisms to detect plagiarism and punish plagiarists (3.73%); 3) attitude (3.06%); 4) sociocultural factors (2.9%); 5) degree orientation and prioritization of grades (2.62%); 6) lack of prior training on documentation and unfamiliarity with the method to prevent plagiarism in high school or informal education (2.22%); 7) not detecting plagiarism on behalf of professors/lack of response to plagiarism (2.04%); 8) lack of fear of punishment and reprimand (1.8%); 9) electronic and virtual learning environments (1.78%); 10) pressure (1.75%) and 11) inadequate training on the detection and prevention of plagiarism at university (1.69%) (28).

Comparison of the items relating to the mentioned factors with the factors of the valid questionnaire in the present study indicated that the first, second, fourth, fifth, sixth, eighth, ninth, and 11th factor were balanced with ‘perceived control’, while the third factor was consistent with the ‘positive and negative attitudes toward plagiarism’, and the seventh and 10th factor were balanced with ‘subjects norms’.

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In the study by Zamani et al., a panel of experts decided the first factor to be the most significant influential factor in plagiarism. Therefore, it could be inferred that perceived control is of paramount importance in the prediction of plagiarism (28). Furthermore, the researchers stated that many students believed that they lacked the essential skills in conducting research and had difficulty performing a scientific project; one of the main reasons in this regard was poor practice in carrying out research independently (28). Evidently, skills cannot be improved unless persistency is achieved in practicing. Lack of skills in self-efficiency and perceived control are among the most significant factors in this regard.

In total, the four extracted factors in the present study could predict 56% of the variance of attitude toward plagiarism. In the study by Zayim (14), the three extracted factors of 'attitude toward the function of plagiarism', 'emotional attitude toward plagiarism', and attitude of minimum estimation toward plagiarism' could explain 47% of the variance at the Cronbach's alpha of 0.82, 0.82, and 0.60, respectively. In the current research, the Cronbach's alpha for the extracted factors was 0.794, 0.748, 0.733, and 0.692, while it was estimated at 0.79 for the entire questionnaire; these findings are consistent with the results of the aforementioned studies.

In the researcher-made questionnaire of plagiarism by Jorge Lopez Puga for Spanish students (15), the researchers extracted several factors associated with attitude, including negative attitude (*Plagiarism is inappropriate.*), positive attitude (*Since everybody uses plagiarism, it is not a problem.*), perceived control (*Those who use plagiarism will eventually be recognized by the community.*), and subjects norms (*Since professors use plagiarism, it is not a problem.*); these findings are in congruence with the results of the present study.

Conclusion

Given the importance of plagiarism and the associated attitudes and beliefs, the instrument that was psychometrically analyzed in the present study is recommended as a valid tool for the evaluation of this phenomenon. By recognizing the attitudes of students, education professionals could predict their performance and behaviors in this regard, thereby reducing and eliminating this issue in scientific circles.

According to the results, the psychometric evaluation of the instrument based on the theory of planned behavior, which was carried

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out for the first time in Iran, is a reliable approach to assessing the attitudes of students toward plagiarism since it is comprehensive and theory-oriented. The slight difference between the number of the factors in our questionnaire and the original version could be attributed to the diversities in the cultural background and cognitive patterns pervading the Iranian universities.

One of the limitations of the current research was the lack of proper cooperation by the students in completing the questionnaire, which was partly overcome by justifying the participants and elucidating the objectives of the study.

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