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Psychometric Properties of Metacognitive Beliefs about Procrastination Questionnaire in Students of Zanjan University of Medical Sciences, Zanjan, Iran

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Abstract

Background & Objective: Considering the role of metacognitive beliefs associated with procrastination in the persistence and intensification of procrastination, application of a valid and reliable tool, either in the area of evaluation or assessment of the outcomes of therapeutic interventions, is of paramount importance. This study aimed to determine the psychometric properties of the metacognitive beliefs about procrastination questionnaire (MBPQ) in students of Zanjan University of Medical Sciences, Zanjan, Iran.

Materials and Methods: In total, 210 students were selected through convenience sampling. In order to assess the validity of MBPQ, three construct validity methods (exploratory and confirmatory factor analyses), convergent validity, and cross-correlation assessment of subscales were used. In addition, Cronbach's alpha coefficient was applied to estimate the reliability of MBPQ.

Results: The two-factor structure (positive and negative metacognitive beliefs) with 14 items explained 49% of the total test variances. This factor structure was selected as the best model obtained from exploratory factor analysis and was approved as the final model of MBPQ using the confirmatory factor analysis. According to the results, there was a direct and significant relationship between positive and negative metacognitive beliefs and total and academic procrastination, respectively. In addition, the components of MBPQ had an acceptable reliability.

Conclusion: According to the results of the study, MBPQ had favorable psychometric properties and proper fit in the two-factor structure. This questionnaire can be applied as a proper research tool in clinical assessment, formulation of reference problems, and provision of a step toward the development of conceptualization of metacognition of procrastination.

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Introduction

Procrastination is defined as intentional delay of starting or finishing a task despite expecting to be worse off for the delay (1, 2). This issue is a common behavior among adolescents and adults, and about half of the population of students and 15-20% of adults face fundamental problems in everyday life due to chronic and recurrent procrastination (3). Researchers have estimated that more than 60% of Iranian students deal with a form of procrastination behaviors (4). One of the common explanations for procrastination is presented by the theory of learning and research on motivation and targeting. Based on this theory, procrastination is the result of a complicated equation between four variables of expectancy, value, impulsivity, and time (1). In this regard, studies have significantly pointed out the negative outcomes of procrastination in students, including academic failure (5), persistent stresses and negative emotions (e.g., anxiety, depression, disturbance, and hopelessness) (6), and mental disorders (7). It is noteworthy that recently, results of a research demonstrated that procrastinators (students) are more exposed to depression and social anxiety (8).

Cognitive behavior therapy (CBT) is often considered the treatment of choice for procrastination, effectiveness of which has been shown in previous studies (9). According to the conceptualization of CBT, a large part of procrastination is due to irrational and negative beliefs and intellectual rules that direct people to procrastination. In other words, the system of beliefs in the minds of individuals (i.e., thoughts, attitudes, and values) causes the emergence of feelings, excitements, and eventually, various actions and behaviors (10). This approach emphasizes the underlying processes of procrastination, including ineffective rules and hypotheses, justifications, and their modifications and alternations along with using practical techniques (11). In classical CBT, no attention has been paid to the possible role of beliefs that affect the control and maintenance of cognitive process of procrastination (12). Some theorists have emphasized the content-based restrictions in traditional CBT. These individuals have suggested revised frameworks to conceptualize cognition in psychological problems, emphasizing the levels of meaning and metacognition (13-16).

Metacognition is an aspect of cognitive processing and is responsible for planning, assessing, analyzing, and monitoring cognitive contents (17). In addition, metacognition plays a role in determining the viewpoint of individuals about cognitive duties, especially in challenging responsibilities (18) and in forming our affections in strategies used to control emotions and thoughts (17). Theory and research in metacognition have evolved in the fields of psychology of growth and cognition (19, 20). In addition, metacognition has been recently suggested as the basis for the understanding and treatment of psychological dysfunction (15). Generally, metacognition plays a central role in the self-regulatory executive functioning (S-REF). This model presents a framework, in which it is assumed that some aspects of executive performance are under vigilant control. In addition, S-REF describes a multilevel cognitive architecture, which combines a set of cognitive processes and attention strategies and can be used to develop psychological pathology models based on successfully designed therapeutic protocols (21).

Considering the S-REF model, there is a relationship between psychological dysfunctions and a thinking style known as cognitive attentional syndrome (CAS), which encompasses heightened self-focused attention, repetitive thinking patterns (rumination and worry), thought suppression, and threat monitoring. CAS consists of a unique set of metacognitive beliefs that are activated in troubling situations (22). Metacognition theories broadly identify two categories of metacognitive beliefs which contribute to the persistence of psychological ineffectiveness, including positive and negative metacognitive beliefs. In general, positive metacognitive beliefs refer to the information of individuals about coping strategies that affect cognition and inner states. Positive metacognitive beliefs may include beliefs such as “anxiety helps me categorize things in my mind” (23). On the other hand, negative metacognitive beliefs are correlated with the meaning and consequences of performing certain types of coping strategies and associated feelings, including “my concern is uncontrollable” or “rumination will damage my brain” (24).

In this research, the 30-item metacognition questionnaire (MCQ), Cartwright-Hatton & Wells, 1997) was exploited to evaluate metacognition. This questionnaire evaluates metacognition in its general sense by five subscales of: (1) positive beliefs about

worry, (2) negative beliefs about thoughts concerning uncontrollability and danger, (3) cognitive confidence (assessing confidence in attention and memory), (4) negative beliefs concerning the consequences of not controlling thoughts, and (5) cognitive self-consciousness (the tendency to focus on thought processes) (25). Considering the role of cognitive beliefs in procrastination reported by previous studies (26-28), application of a tool that is able to specifically evaluate metacognitive beliefs related to procrastination seems necessary. In this respect, Fernie and Spada designed and developed the metacognitive beliefs about procrastination questionnaire (MBPQ) through recognizing the positive and negative metacognitive beliefs about procrastination in chronic procrastination cases. It should be noted that the items of this questionnaire were extracted from the responses of participants in a research by Fernie and Spada, as well as the clinical experience of the mentioned authors and based on the deduction theory.

In general, the MBPQ has two components, including positive and negative metacognitive beliefs. Positive metacognitive beliefs (for instance, "the opportunity provided by procrastination leads to natural emergence of creativity") are first associated with the usefulness of procrastination in cognitive function. From the metacognition point of view, these beliefs may play a role in delaying assignments and forming a type of coping. On the other hand, negative metacognitive beliefs (for instance, "I cannot control my procrastination") are associated with uncontrollable procrastination. From the metacognition perspective, these beliefs may play a role in persistence of procrastination. By establishing verbal activities, these beliefs turn the attention to the procrastination itself. In addition, these beliefs simultaneously waste the necessary executive resources to increase flexible control (29).

Given the limitations of classical CBT and possible role of metacognitive beliefs in procrastination, it seems that using interventions independently based on or as a supplement to CBT can be beneficial in the reduction of procrastination. Previous studies have evaluated the role of metacognitive beliefs about procrastination in Iranian populations (4, 27, 28). Nonetheless, no valid and reliable tool has been developed to specifically assess the metacognitive beliefs about procrastination in Iran. Therefore, in order to properly evaluate the metacognitive beliefs about

procrastination, an accurate tool is required to control intercultural differences in addition to assessing the metacognitive beliefs about procrastination. With this background in mind, this study aimed to evaluate the psychometric properties of MBPQ in students of Zanjan University of Medical Sciences, Zanjan, Iran.

Materials and Methods

This descriptive and cross-sectional research was first approved by the ethics committee of Zanjan University of Medical Sciences with the code of ZUMS.REC.1395.66. Research population included all students in Zanjan University of Medical Sciences (N=3500) in the academic year 2015-2016. Since sample size is generally estimated at 10 per each item of questionnaire in psychometric studies (30), a minimum sample size of 160 was required in the current research considering the number of items (N=16) in the MBPQ. In addition, with regard to the mentioned explanations and the sample size of previous studies in this field (26), a total number of 283 individuals were selected via convenience sampling after receiving approvals from the research council of the university and obtaining a written informed consent from the participants. In the first stage, a forward translation of the 16-item version of MBPQ in Farsi was provided by two clinical psychologists. To ensure the accuracy of translation and matching of the two Farsi and English versions, the Farsi version was back-translated into English by an English language expert. Following that, the questionnaire was distributed among 20% of the sample population to evaluate the face validity of the scale in terms of the clarity and shortness of the items. After several evaluation stages, the revised version of MBPQ was prepared and distributed among the selected participants.

In addition to MBPQ, two scales of the procrastination assessment scale for students (PASS; Solomon & Rothblum, 1984) and Tuckman procrastination scale (TPS; Tuchman, 1991) were used to evaluate the convergent validity or correlation with MBPQ while observing ethical principles (e.g., confidentiality of information of examinees, no use of name and personal information of the examinees in analysis of the data, and receiving an ethical code from the research committee of university). However, 73 questionnaires were eliminated from the research due to incomplete filling, similarity of responses, and lack of return. In the end, 210 subjects, including 103 males and 107 females, were enrolled in the

research. It is notable that the age range of the subjects was 18-35 years with mean and standard deviation of 23.35 (±5.35) years, specifically the mean of 23.83 (5.58) and 22.88 (5.11) years in male and female participants, respectively.

Research Tools

Metacognitive Beliefs about Procrastination Questionnaire (MBPQ)

The items of MBPQ about procrastination were extracted from the responses of participants in the research by Fernie and Spada, clinical experiences of the authors, and based on the deduction theory. The original version of the questionnaire had 22 items, which were scored based on the four-point Likert scale from completely disagree (score: 1) to completely agree (score: 4) to determine the level of agreement of the participants. In the end, the final number of items was reduced to 16 using factor analysis. In total, MBPQ has two components, including positive (items 1-8) and negative (items 9-16) metacognitive beliefs. The internal consistency of this questionnaire has been previously confirmed by Fernie and Spada in two studies. In the first study and on a sample size of 230 encompassing the students of University of London, internal consistency of positive and negative metacognitive beliefs was determined at the Cronbach's alphas of 0.87 and 0.84, respectively. In the second research and on a sample size of 281, the internal consistency of the tool for positive and negative metacognitive beliefs was reported at 0.81 and 0.85, respectively (26).

Procrastination Assessment Scale-Students (PASS)

This scale was originally developed by Solomon and Rothblum and consists of three components, including: 1) procrastination in preparing for test (items 1-6), 2) procrastination in preparing for homework (items 9-17) and 3) procrastination in preparing term papers (items 20-25). In total, there were 27 items in the questionnaire scored based on a four-point scale from rarely (score: 1) to almost always (score: 4). In addition to the mentioned 21 items, six items (7, 8, 18, 19, 26, 27) were considered for assessing two properties of feeling bad about procrastination and having the tendencytochangethehabit of procrastination. In this scale, items 2, 4, 6, 11, 13, 15, 16, 21, 23, and 25 were scored reversely, and minimum and maximum scores of the scale were 27 and 108, respectively.

In order to determine the score of academic procrastination, 21 items related to the main three components were scored, where the scores within the range of 21-42 were

indicative of lower academic procrastination, whereas the score ranges of 43-64 and 65-84 demonstrated moderate and high academic procrastination. It is notable that the reliability of the PASS was estimated at the Cronbach's alpha of 0.84 (31). In the Iranian population, validity of the scale was confirmed by factor analysis method, and its reliability was reported at 0.73 and 0.69 using the Cronbach's alpha and split-half, respectively, indicating the proper reliability of the tool (32).

Tuckman Procrastination Scale (TPS)

This scale was developed by Tuckman and contains 16 items and 1 component. The TPS was first implemented and standardized in 2001 in the University of Toronto, Canada to assess the level of procrastination in design students. Possible responses range from 1: "That's me for sure," to 4: "That's not me for sure". In total, 12 items are scored directly, whereas four items (7, 12, 14, and 16) are scored reversely. The final interpretation of the total scores is as follows: scores in the range of 16-32 are indicative of low procrastination, whereas the score ranges of 32-48 and ≥48 indicate moderate and high procrastination level, respectively. Tuckman has reported the reliability of the questionnaire at 0.86 (33). In the Iranian population, internal consistency of the scale has been determined at 0.74, and its validity has been reported at 0.56 by correlating it with the test by Schwarzer et al. (34).

Data Analysis

In this research, three construct validity methods(exploratory and confirmatory factor analysis[EFAand CFA]), convergent validity or correlation with other assessment tools, andcross-correlation assessment of subscales were applied to evaluate the validity of MBPQ. In addition, reliability of the mentioned tool was estimated through the internal consistency method (Cronbach's alpha). In EFA, first the sampling quality indicators and the Bartlett coefficient were estimated for the data. After ensuring the ability to perform EFA, the process was carried out. Moreover, EFA was performed by main components analysis method and by the application of Varimax rotation in SPSS version 20.

On the other hand, CFA was carried out in AMOS version 20. In this analysis, first the possible models were determined based on the theoretical basis of the questionnaire. In addition, results obtained from CFA were determined, and the models were compared to each other considering the achieved fit indexes. In this regard, the most important indexes are presented below:

1- Chi-square to degree of freedom radio (X^2/df): lower values (<3) are indicative of higher fit. Chi-square significantly depends on sample size, and large sample size increases the Chi-square more than anything that can be attributed to the inaccuracy of the model (34).

2- Goodness-of-fit Index (GFI) and adjusted goodness-of-fit index (AGFI): both criteria vary between zero and one, where the more the value is near to one, the better the fit of the model to the data (36).

3- Root mean of residuals (RMR): in this regard, values below 0.05 are indicative of a significantly high level of fit of the models. However, values in the range of 0.05-0.08 demonstrated good fit of the model (35).

4- Root mean square error of approximation (RMSEA):

in this respect, values ≤0.05 were indicative of a good model. However, values of ≥0.10 demonstrated an inappropriate fit (37).

Results

Results Related to MBPQ Validity

In order to evaluate the validity of MBPQ, three construct validity methods (EFA and CFA), convergent validity or correlation with other assessment tools and cross-correlation assessment of subscales were exploited.

In the first method, exploratory and confirmatory factor analyses were used to evaluate the construct validity of MBPQ.

A) Exploratory Factor Analysis of MBPQ

In order to assess the factor structure applying the exploratory factor analysis, the principal component analysis with Varimax rotation was exploited. First, the Kaiser-Meyer-Olkin (KMO) test was performed to ensure the adequacy of sample size. Then, since the correlation between the test items is the basis of the factor analysis, the Bartlett's test of sphericity was applied to determine that the correlation between the variables is not equal to zero, results of which are presented in Table 1.

Table1: KMO and Bartlett's Test

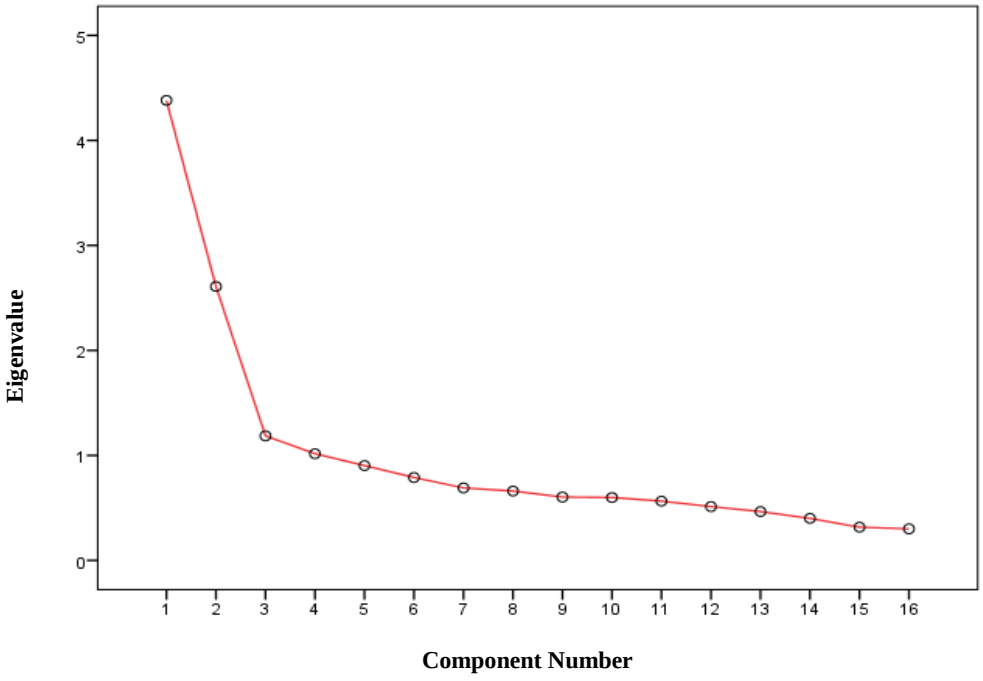
Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		0.818
Bartlett's Test of Sphericity	Approx. Chi-Square	971.33
	df	120
	P.value	0.001

The latent factors in MBPQ were extracted by principal component analysis with Varimax rotation. In this model, four factors were obtained based on the number of special values above one (Table 1) and the Scree Plot (Diagram 1). According to the results shown in Table 2 and Diagram 1, four factors were extracted for the

questionnaire. However, due to the low explanatory power of the two last factors and considering the footslope (Diagram 1), the factor analysis was calculated by the order of extraction of two factors. EFA was re-implemented after limiting factor extraction to two factors, using the Varimax rotation, and determining the correlation coefficient of ≥0.40 for factor loading of each item. By the order of extracting two factors, the total percentage of the variance explained reached 43.69. The first and second factors explained 23.1% and 20.6% of the total percentage of variances of the test with special values of 3.66 and 3.26, respectively. In this regard, the obtained factor loadings are reported in Table 3.

Table 2: Total Variance Explained

Extraction Sums of Squared Loadings			
Component	**Total**	**% of Variance**	**Cumulative %**
1	4.38	27.38	27.38
2	2.61	16.30	43.69
3	1.19	7.41	51.10
4	1.02	6.35	57.46



Graph 1: Scree Plot

Table 3: Factor loadings of the MBPQ

	Factor 1	Factor 2
3. When I procrastinate, I am focusing on other tasks so learning something new	0.776	
1. Procrastination allows creativity to occur more naturally	0.694	
7. When I procrastinate, I am unconsciously mulling over difficult decisions	0.678	
6. Procrastination helps me cope	0.658	
2. Procrastination stops me from being bored	0.632	
5. Procrastination ensures that I do not forget stuff	0.614	
Procrastination stops me from making poor decisions when I am feeling anxious	0.472	
4. Procrastination stops me from doing things when I am not ready	0.381	
10. Procrastination is stressful		0.772
16. Procrastination increases my worry		0.765
11. When I procrastinate, I find it difficult to concentrate on other tasks		0.722
12. Procrastination is mentally tiring		0.721
13. When I procrastinate, I waste a lot of time thinking about what I am avoiding		0.700
9. Procrastination makes me feel down		0.670
14. Procrastination can be harmful		0.583
15. My procrastination is uncontrollable		0.264

As observed in the mentioned table, the result of exploratory analysis was extraction of two factors, where the items 4 "procrastination stops me from doing things when I am not ready" and 15 "my procrastination is out of control" had factor loadings below 0.4, which led to their elimination. Following that, the percentage of variances explained for each factor was calculated after another replication of rotation. After removing the items 4 and 15 that had low factor loadings, the total percentage of the variance explained reached 48.57%. This time, the first and second factors explained the total percentage of test variances at 26.04% and 22.53% with special values of 3.65 and 3.15, respectively. Therefore, by eliminating the items 4 and 15, which had factor loadings below 0.4, the third model had the highest total percentages of the variance explained and was accepted as the best model of EFA.

B) Confirmatory Factor Analysis of MBPQ

In this section, three models for placement of test items were evaluated and compared based on previous studies and results of the exploratory factor analysis in the current research. Comparison of the models was carried out based on GFI.

In the present study, three models were assessed, as presented below:

1) "The first model" was performed based on the scoring pattern of original questioner, meaning the two factors of positive and negative metacognitive beliefs, where all major 16 items were placed in one of the factors. The indexes obtained for this model included (X^2=175.25, df=103, X^2/df=1.702, RMR=0.043, RMSEA=0.058, GFI=0.912,

AGFI=0.884). As observed, the indexes showed the lack of good fit of the model.

2) "The second model" was proposed based on the results of EFA. As observed in the section of EFA (Table 4), items 4 and 15 had factor loadings below 0.4. Therefore, these two items were removed from the model. In the end, fit of the model with two factors and 14 items was evaluated (X^2=136.83, df=76, X^2=df=1.8, RMR=0.04, RMSEA=0.062, GFI=0.922, AGFI=0.892). As observed, there was an improvement in the GFI of the model, compared to the previous model, in a way that the Chi-square was reduced to 136.83. However, it was possible to obtain suitable models. Therefore, the outputs of the AMOS were evaluated, revealing that the GFI could be significantly improved by releasing a number of covariance errors between items (especially reducing the value of Chi-square), as presented in model 3.

3) "The third model" was a two-factor model with 14 items and releasing of the covariance errors. Bentler and Chou and Bentler mentioned that the features of being uncorrelated in all errors of the models of confirmatory factor analysis not only cause no harm to the factor validity of the questionnaire, but also provide a more realistic representation of the data (38, 39). Therefore, it was decided to use this technique for the CFA model to have a more appropriate fit in the questionnaire. In the third model, fit indexes were significantly improved in the third two-factor model with 14 items and releasing of two covariance errors between the items "3 and 6" and "2 and 7" (X^2=115.34, df=74, X^2=df=1.56, RMR=0.039, RMSEA=0.05, DFI=0.931, AGFI=0.902). In the end, the third model was accepted as the most efficient model, compared to the previous models (Diagram 2).

In the second method, the convergent validity of MBPQ was evaluated using Pearson's correlation coefficient between MBPQ and scales of PASS and TPS. Results demonstrated a direct relationship between positive metacognitive beliefs and total procrastination. On the other hand, there was a significantly reversed association between positive metacognitive beliefs and feeling bad about procrastination and the tendency to change the habit of procrastination ($P<0.01$). Results were also indicative of a significantly direct relationship between negative metacognitive beliefs and academic procrastination and its components (with the exception of the component of procrastination in preparing tasks) ($P<0.05$). In general, the correlation coefficient below moderate level indicated independence of

MBPQ from PASS and TAP and, at the same time, a significant but partial association between them (Table 4).

Table 4: Means, standard deviations and intercorrelations of variables

		M	SD	2	3	4	5	6	7	8	9
MBPQ	**1. Positive Metacognition**	12.28	3.74	-0.217**	0.119	0.125	0.109	0.083	-0.195**	-0.184**	0.216**
	2. Negative Metacognition	21.28	4.62	1	0.153*	0.173*	0.029	0.243**	0.250**	0.300**	0.134
PASS	**3. Total score of Academic Procrastination**	46.19	10.4	-	1	0.851**	0.916**	0.864*	-0.304**	0.121	0.694**
	4. Procrastination in exam preparation	13.88	3.14	-	-	1	0.678**	0.635**	-0.189**	0.201**	0.578**
	5. Procrastination in assignments preparation	19.3	4.9	-	-	-	1	0.665**	-0.384**	0.041	0.621**
	6. Procrastination in final paper preparation	13	3.7	-	-	-	-	1	-0.181**	0.113	0.629**
	7. Discomfort of Procrastination	9.15	2.37	-	-	-	-	-	1	0.309**	0.227**
	8. The desire to change the habit of procrastination	9.45	2.36	-	-	-	-	-	-	1	0.184**
TPS	**9.Tuckman Procrastination Scale**	35.98	8.76	-	-	-	-	-	-	-	1

****P<0.01, *P<0.05.**

The final method was evaluation of validity of MBPQ and assessment of cross-correlation between the components of metacognition. Results demonstrated a significantly reversed correlation between negative and positive metacognitive beliefs (P<0.01) (Table 4).

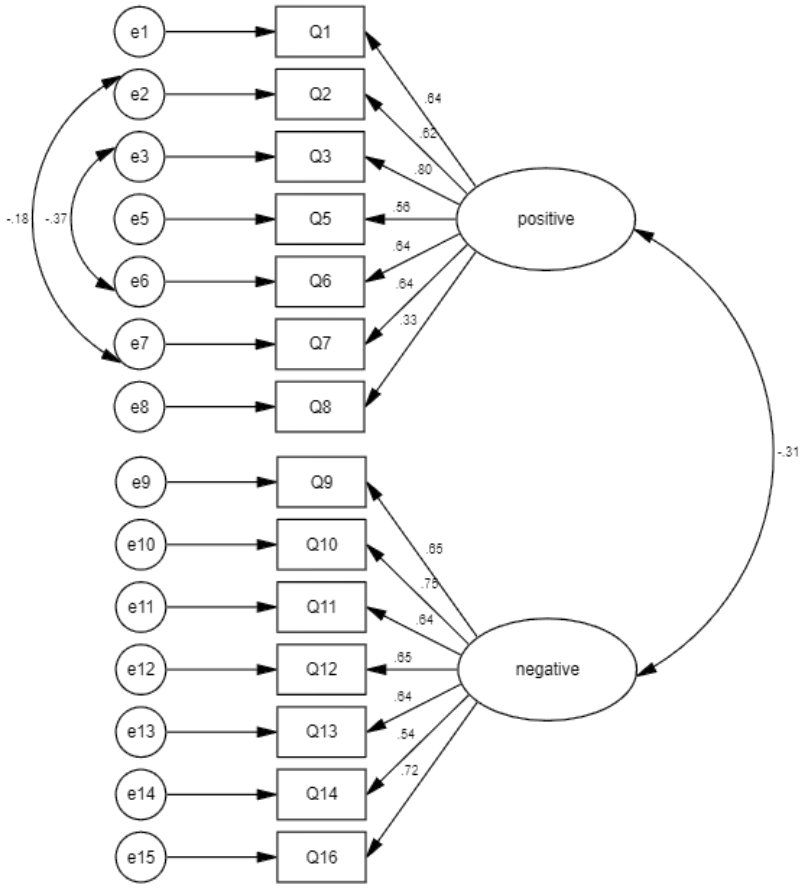
2) Results Related to Reliability of MBPQ

In the present study, reliability of MBPQ was estimated through internal consistency (Cronbach's alpha). Reliability of the original version of the questionnaire (16 items) and the Iranian version was estimated based on the final accepted model obtained from EFA and CFA and by eliminating the items 4 and 15, which had factor loadings below 0.4. According to the results, the reliability coefficients of each component of the negative and positive metacognitive beliefs in the original version of the questionnaire were estimated at 0.76 and 0.70, respectively, whereas they were

reported at 0.77 and 0.84 for the standardized version in the Iranian population, respectively. As observed, reliability was higher in the Iranian version, compared to the original version (Table 5).

Table 5: Means, standard deviations and internal consistency of the MBPQ

	Component	M	SD	Cronbach's Alpha
MBPQ - Original Version (16 Items)	Positive Metacognition	12.3	3.7	0.76
	Negative Metacognition	21.3	4.6	0.82
	Total	33.6	5.3	0.65
MBPQ - Iranian Version (14 Items)	Positive Metacognition	10.3	3.4	0.77
	Negative Metacognition	19.6	4.5	0.84
	Total	29.9	4.7	0.65



Graph 2: Model No.3 (Tow Factor with 14 Items)

Discussion

The present study aimed to evaluate the psychometric properties of MBPQ in students of Zanjan University of Medical Sciences. Results of EFA along with using the principal component analysis with Varimax rotation and determining the correlation coefficient of ≥0.40 for factor loading of each item showed that items 4 and 15 had factor loadings below 0.4. After the elimination of the mentioned items, the percentage of the variances explained for each item after each rotation was calculated again. The total percentage of variance explained improved to 49% after eliminating the items 4 and 15. In the end, a two-factor model with 14 items was accepted as the best model obtained from EFA. In order to perform the CFA of the questionnaire, three models were evaluated and compared with regard to previous findings and results of exploratory factor analysis in the current research. Eventually, the third model with 14 items, two factors, and releasing two covariance errors between items "3 and 6" and "2 and 7" was able to significantly improve the GFI, and was therefore accepted as the final model after comparison with previous model. Our findings are in line with the EFA and CFA of the main version of the questionnaire. Using EFA, Fernie et al. recognized two metacognitive factors related to procrastination and named them positive and negative metacognitive beliefs. In another research, these two factors were confirmed applying CFA (26). In the present study, two items 4 and 15 were removed due to factor loadings below 0.4, which might be due to differences in the culture or factors such as lack of proper understanding of the mentioned items, response bias and/or maintaining social desirability of the participants.

Results of convergent validity of MBPQ with PASS and TPS demonstrated a significant but partial relationship between them. In this regard, there was a positive correlation between negative metacognitive beliefs and academic procrastination, a positive correlation between positive metacognitive beliefs and total procrastination, and a negative correlation with feeling bad about procrastination and the tendency to change the habit of procrastination. In line with these findings and despite the use of different tools to assess procrastination, Fernie et al. conducted a research on a sample size of 281 consisting of students in University of London, affirming a positive relationship between negative metacognitive beliefs and behavioral and decision-making

procrastination. However, their results were indicative of a positive association between positive metacognitive beliefs and only procrastination in decision-making (26). The relatively weak correlation between metacognitive factors and the dimensions of procrastination could be explained based on the features of the participants. In factor, in the present research and the study by Fernie et al., the subjects were not specifically selected from a pathology sample and data was not collected from specific activity fields; the areas in which time pressure and harsh deadlines were more likely to activate the metacognitive beliefs associated with procrastination.

In the present study, a significantly negative association was reported between positive and negative metacognitive beliefs about procrastination. With regard to metacognition theories, positive metacognitive beliefs affect people's information about coping strategies that exert impacts on their cognition and internal states. Meanwhile, there is a relationship between negative metacognitive beliefs and meaning and consequences of performing certain types of coping strategies and disturbing thoughts and emotions (23, 24, 26). The negative correlation between two components of metacognitive beliefs about procrastination could be explained, as follows: positive metacognitive beliefs act as a way to immediately emancipate excitement associated with procrastination due to the motivational role they play in delaying assignments, through which they can be strengthened and repeated. On the other hand, negative metacognitive beliefs lead to perceptions of intrusiveness, and, conversely, maintain the activity of some unpleasant excitements. Results of Cronbach's alpha indicated that each component of negative and positive metacognitive beliefs of MBPQ had the necessary reliability for assessment, which is in congruence with the results related to the main form of the questionnaire. In two studies, Fernie et al. evaluated and confirmed the acceptable reliability and internal consistency of MBPQ in students of University of London. Changing metacognitive beliefs can be considered as a valuable supplementary intervention to reconstruct metacognitive beliefs and eliminate the limitations of classical CBT (where no attention has been paid to the possible roles of beliefs that affect the control and maintaining of cognitive process of procrastination). Obviously, performing further research to evaluate the psychometric features of MBPQ will be necessary,

specifically to determine the structure and reliability of the questionnaire over time and on other sample populations. Moreover, in case of proving the usefulness of the questionnaire as a tool for evaluating treatment, some studies will be required to assess the sensitivity of this questionnaire for therapeutic effects and improvements.

Some of the major drawbacks of the present research were bias in self-report and maintaining social desirability by participants. Nonetheless, researchers of the current research believe that MBPQ might be useful in detecting negative and positive metacognitive beliefs about procrastination in clinical assessments and formulating referral problems and moving another step closer to the development of conceptualization of metacognition in procrastination.

Conclusion

According to the results of the present study, the two-factor structure of MBPQ (negative and positive metacognitive beliefs) had acceptable psychometric properties and proper GFI in the Iranian population. Therefore, the MBPQ can be used as an appropriate tool to assess the metacognitive beliefs about procrastination in line with therapeutic and research objectives.

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