Psychological Flexibility Questionnaire (PFQ): Reliability, Validity and Factor Structure in Iranian Society

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ABSTRACT

This article was conducted to indicate the reliability, validity, and factor structure of the Psychological Flexibility Questionnaire (PFQ) in the Iranian population. Methods: All students of the Faculty of Humanities of Tehran University of Science and Culture were the research population in this standardization study. In this study, 250 students of the faculty participated voluntarily by a convenience sampling method. In addition, they were evaluated at one stage of the test. Then, the PFQ-20¬ questionnaire completed Scherrer self-efficacy and NEO test openness subscale. One hundred ninety-five subjects were finally entered into the data analysis. Results: The internal stability validity was estimated to calculate the simultaneous validity by using Cronbach's alpha coefficient (0.713) and split-half coefficients as modified correlation (0.748). The mentioned data generally indicated high internal stability. The correlation between the two Scherer general self-efficacy questionnaires and the NEO test openness subscale was calculated to assess the validity of the PFQ-20 questionnaire. It was respectively 0.505 and 0.667 which was significant. The factor analysis method was used to evaluate the construct validity of the questionnaire. The PFQ-20 questionnaire was saturated with five factors that have a high correlation with each other based on characteristics obtained through the ML method. The high correlation of these five factors shows the convergence of these factors that meet the objectives of the PFQ-20 questionnaire. Discussion and Conclusion: According to this study result, to measure the degree of psychological resilience in this population, the PFQ-20 questionnaire can be generally used as a valid test.

Introduction

The ability to open up, concentrate on the moment, and change or continue behaviors according to changes in internal and external conditions are called Psychological flexibility. Psychological flexibility is a complex structure of psychology that includes emotional, cognitive, and behavioral dimensions. In addition, it is more correlated with mental health and resilience at the same time, the lack of psychological flexibility is concerning mental disorders. Psychological flexibility is both intrapersonal and interpersonal. It enables the individual to adapt to circumstances that are always changing. To experience a variety of situations in the real world, psychological flexibility is a way to express individual desire. At the same time, the individual is accompanied to hear all kinds of inner voices. The search for divergence and change is an active search for someone with a higher level of psychological flexibility. It is also perceived as a positive experience.

According to the importance of this concept on mental health, there has been a scientific movement in the investigation of the correlation between psychological flexibility, the characteristics, and the results of other psychological issues. Available evaluation tools for psychological flexibility measure the traits that relatively overlap with psychological flexibility. For example, they are both in common and have differences with psychological flexibility in many aspects. Therefore, they measure factors that are not directly related to flexibility. They also measure psychological flexibility to a limited extent so that the important aspects of this adjective are ignored.

Furthermore, it is difficult to relate the results of different studies of psychological flexibility and to combine theoretical and empirical studies in the field of flexibility

with each other due to the lack of a firm standard for measuring psychological flexibility. Therefore, it is necessary to have a measurement tool to measure psychological flexibility directly and completely. This study shows the validity and reliability of the Psychological Flexibility Questionnaire (PFQ) in Iran. Maya Maun et al. (2014) developed the main format.

Kashdan and Rothenberg (2010) describe psychological flexibility as the ability to "identify and adapt to different needs of the situation; A change in mental disposition or behavioral treasury when personal or social performance is compromised; Maintaining balance in important areas of life; They describe being aware, open, and committed to behaviors that are deeply connected to values. Their definition includes two notable points about psychological resilience: that it is a multifaceted trait that manifests itself in many areas of life, and that it is a variable that manifests itself in "repetitive interactions between individuals and their environment."

Kashdan and Rothenberg (2010) believe that psychological flexibility is the ability to identify and adapt to different needs of the situation, to change mental disposition or behavioral treasury when personal or social performance is in danger, to maintain balance in important areas of life, and to be aware, openness, and committed to behaviors that are deeply connected to values. This definition has two remarkable points about psychological flexibility. The first point is that it is a multifaceted trait that manifests itself in many areas of life and the second point is that it is a variable that manifests itself in repetitive interactions between people and their environment.

The concept of psychological flexibility is a movement from simple and general ideas and theories of positive versus

negative emotions to a more specific evaluation of the function of a particular emotion or coping style. This concept shows that no experience, feeling, or coping style is optimal by itself. Therefore, its effectiveness is related to other experiences, feelings, or coping styles so that the person is placed and evaluated according to the same circumstances. For example, anger and confrontational styles are more effective than feelings and coping styles when we are faced with someone who is constantly denying a stressful issue. Whereas these items are more important in the normal state of evaluation.

An individual's adaptive potential is inseparably linked to the use of emotion regulation techniques. For example, based on situational changes and improving flexible emotional patterns, increasing, maintaining, or decreasing positive and negative emotions increases the potential for the adjustment that can lead to better health.

Psychological resilience makes it possible to access a wide range of styles related to internal and external desires that increase adaptability to changing reality. In other words, it is assumed that psychological flexibility is positively correlated with mental health and well-being. Based on many studies, psychological flexibility improves mental health by improving the ability to distinguish, recognize emotions, thoughts, and improving the ability to transfer attention and focus in response to changing circumstances. On the other hand, lack of flexibility causes depression, anxiety, rumination, anxiety, and inability to plan for long-term goals. Psychological resilience is related to mental health. Therefore, it is important to plan for clinical interventions in improving psychological flexibility.

Reliable and credible estimation tools are required to search for psychological flexibility. The development of clear guidelines is needed to describe the optimal transfer of theoretical concepts to measurable units. In this field, tools are an essential link between theory and empirical studies to the storage of knowledge.

The literature indicates that most studies that measure psychological flexibility use one of two categories of measurement tools:

The first classification is for the tools that partially measure psychological flexibility such as the Openness Scale, the Communication flexibility measure, the Communicative adaptive scale, the Rhetoric sensibility scale, Coping flexibility, and the Cognitive Flexibility Scale. The disadvantage of this type of measurement tool is that they ignore important aspects of this feature.

The second classification is for the tools that measure traits or concepts, some of which overlap with psychological flexibility. This group also has aspects unrelated to psychological flexibility. For example, decentering and the acceptance and action questionnaire II. Moreover, Kashdan and Rothenberg (2010) have listed the various concepts used in the definition of psychological flexibility. Psychological flexibility has been known over the past five decades under various names such as ego-resiliency, executive control, response modulation, and self-regulation. The disadvantage of this type of measurement tool is that they measure concepts that are similar to flexibility. On the other hand,

they include topics that are not related to psychological flexibility.

This research is an effort for the Validity and the reliability of a measurement tool to measure completely and exclusively psychological flexibility in Iranian society.

Method:

To design the PFQ of the Persian version, three phases have been conducted: 1-translating the original text of the questionnaire into Persian. 2- Translating the translation into English by English language experts and checking with the original questionnaire 3- determining the validity, reliability, and factor structure.

All participants consisted of undergraduate students in the Faculty of Humanities of the University of Science and Culture who announced their consent to participate in the studies. This study was conducted based on observing ethical points in the assessment, such as voluntary participation, the confidentiality of their information, and observance of the subjects' rights.

The reliability and Validity of ehtPFQ questionnaire:

Structural reliability: 250 undergraduate students of the Faculty of Humanities were given the translated questionnaire. They were asked to determine how much each sentence described them on a Likert scale of 1 to 5. Number 1 means strongly disagree and five means strongly agree.

Due to defects, 55 questionnaires were removed from the total number of questionnaires after statistical analysis of the questionnaire. In this questionnaire, Cronbach's alpha method was used and the validity coefficient of the questionnaire was 0.713 after statistical analysis. To recognize the accuracy of the instrument, these students completed two other similar questionnaires (described below).

Psychological Flexibility Questionnaire (PFQ): Maya Maur (2014) developed this questionnaire which has 20 questions. This questionnaire evaluates the dimensions of psychological flexibility in healthy individuals. Respondents are demanded to show their agreement or disagreement with each of the options on a scale of 1 to 5. This scale is rated from one to five, which respectively means strongly disagree and strongly agree. The test has five subscales, which are the key domains of the field of psychological flexibility. These 5 subscales include 1- Positive perception of change 2- Describing the personality as flexible 3- Describing the personality as an open and innovative mindset 4- Understanding reality as a changing and dynamic subject 5- Multidimensional perception of truth.

Scherer General Self-Efficacy Questionnaire: Scherer et al. (1984) developed this questionnaire as a tool to determine different levels of general efficiency. This questionnaire focuses on performance expectations in some cases such as social skills with professional competencies. These cases are dedicated to the following topics: 1- Tendency to start the behavior 2- Tendency to complete the behavior 3- Insistence in case of failure. This questionnaire has 17 questions.

Openness Scale for the Big 5 Personality Factors Questionnaire: The improved version of the NEO-PI-R Personality Questionnaire is a type of personality traits self-assessment questionnaire based on a popular personality pattern called the Five-Factor Model. This questionnaire has 240 questions. Its opening scale has 48 questions, which consist of 6 styles that include imagination, aesthetics, emotions, actions, ideas, and values.

Openness scales are devoted to those experimental aspects or ranges, which are open against the individual. Experiential people are curious about the fertility of their inner experiences and the world around them. Therefore, their lives are full of experience. Compared to closed people, these people benefit from new theories and unconventional values and have many positive and negative emotions. People with higher education score higher on this index because it is positively concerned with intelligence. Men and women who behave in a normal and conservative manner score lower on this index. They prefer common topics to rare ones, and their emotional responses are relatively calm and latent. People with high experience scores are those who are unconventional people, are interested in freedom in moral and social affairs and political views, and tend to question the source of power.

Execution method:

A sampling method was available. The professors managed to select several classes from the Faculty of Humanities. Then, students were explained about the purpose of the study, time, and stages at the beginning of each class. In addition, they were invited to participate in the research after answering the questions. The total of the tests was given to the participants as a notebook. The test was finally performed in groups after re-explaining the total scheme.

Statistical analyzes of this study were performed during the following steps:

First, Cronbach's alpha coefficient was calculated to detect heterogeneous questions by removing the material individually. Second, the correlation of each question was calculated with the total score without calculating the score of that question to evaluate the clean coefficient of PFQ-20 Persian form materials. It is also called total material-modified correlation. Third, by calculating Cronbach's alpha for the whole scale and its subscales, the internal consistency of the Persian form PFQ-20 was evaluated. Fourth: The scores of the questionnaire with the Scherer self-efficacy test and the NEO test openness subscale were compared from which the validity of the PFQ-20 Persian form criterion was obtained. Finally, exploratory factor analysis was used to investigate the cognitive domains and validity of the PFQ-20¬ structure. For this purpose, two methods of PC and MI with orthogonal rotation were used. SPSS software was used in all stages of data analysis.

110 women and 85 men with a mean age of 20.5 years were the samples with a deviation standard of 2.39. Among them, 150 were single and 45 were married. For all subjects, the total score of the Persian version of PFQ-20 was 66.86 (deviation from the standard of 8.57). The total score of subscales was obtained as follows: positive perception of change 15.08 (51 2.51), describing the self-personality as flexible 14.24 (59 2.59), describing the self-personality as open-minded and innovative 11/118 (66 1.66), perception of

reality as a changing and dynamic subject 11.62 (54 2.54) and multifaceted perception of truth 8.13 (39 1.39). There was no significant difference between the total score and subscales in the two gender groups of students. Cronbach's alpha coefficient was used to remove the material to detect heterogeneous test questions. In addition, this analysis indicated that Cronbach's alpha coefficient does not change significantly by removing each question. The correlation of each question with the total score was calculated without considering the score of that question to evaluate the distinguishing coefficient of PFQ-20 Persian form materials. Based on Total correlation - Modified material, those questions that are not significantly correlated with the whole test are not available in this questionnaire.

Reliability:

Cronbach's alpha coefficient method and split-half methods were used to determine the validity of the questionnaire. In this study, the value of Cronbach's alpha coefficient for the whole questionnaire and 5 subscales of positive perception of change, describing the self-personality as flexible, describing the self-personality as an open-minded and innovative person, understanding reality as a subject dynamic change and multifaceted perception of truth were respectively 0.713, 0.649, 0.619, 0.726, 0.628, 0.837. It shows a high alpha coefficient. The method of calculating the correlation coefficient of the scores of even questions with the scores of odd questions was used to calculate the split-half coefficient. As the modified correlation, the split-half coefficient for the whole test was 0.748.

Validity:

Two methods were used to evaluate the validity of the PFQ-20 structure: 1- Convergent validity: The correlation of this test with the NEO test (only O subscale) and Scherer self-efficacy was calculated to estimate the convergence of PFQ-20. The correlation between the PFQ-20 test with Scherer self-efficacy and the O subscale of the NEO test was respectively 0.505 and 0.667, which seems significant ($P < 0.01$).2. Internal Coordination: The exploratory factor analyzed all materials of the questionnaire to answer the research question of what factors saturated the entire content of the PFQ-20 questionnaire. PFQ-20 evaluates and diagnoses psychological flexibility. The test is formed of five groups of thoughts that include a total of psychological flexibility. Therefore, it is necessary to examine the validity of this test carefully to show whether this test is saturated with several general factors by examining its factor structure. The working group was based on the value of special scores for the first five factors, which were respectively 3.863, 3.003, 1.978, 1.363, and 1.198.

Principal component analysis (PC) and maximum likelihood (ML) were used for factor analysis. On the first basis (PC), in addition to the common variance and the specific variance, number one also contains the error variance in each of the diameter cells. This method searches a structure to explain all the variance of the set of variables in question (Thorndike, 1982).

The main elements of the correlation matrix diameter are substituted for estimating the amount of communality according to the second method (ML). This estimate is adjusted in a recurring manner. Varimax rotation method was used to finally solve and identify the factors that may

form the basis of certain materials and also determine their simple structure.

Factor analysis was performed based on a 20 * 20-correlation matrix because PFQ-20 has 20 questions. The correlation matrix between materials indicates that: 1-There is a correlation between 20 PFQ-20 substances. 2- Elements of the matrix are usually negative. The adequacy of sampling (KMO measurements) and Bartlett sphericity test need to be checked before performing factor analysis.

The adequacy of sampling and performing factor analysis based on the studied correlation matrix will be justified because the KMO value was 0.629 and the level of significance of Bartlett's spherical characteristic was less than 0.0001. Two main indicators were considered to determine how many significant factors saturate PFQ-20: 1-Eigenvalue 2- the ratio of variance explained by each factor. According to preliminary, statistical specifications of PFQ-20 through ML and PC methods for the whole sample, five factors have an eigenvalue greater than 1, and 59.051% of the total variance of the variables is determined by five factors together. Therefore, the factor is extracted from the response of the subjects studied. The first factor determines about 25.8% of the total variance and four other factors determine the rest.

The number of factors that should be the basis of the final characteristic has been determined according to the statistical characteristics of the factor analysis of the first stage of the correlation matrix. Both PC and ML methods were used in the initial solution of factor analysis and five factors were extracted in total.

Initial solution (no rotation):

The initial statistical characteristic was obtained using the PC method. It shows that the eigenvalue of factors one to five is greater than one. These factors together determined the amount of variance 59.051% and the share of the first factor is 28.8%. In addition, the share of variance explained by the following factors is respectively 11.428, 8.270, 7.46, and 061.6.

The factor load of all questions is positive in the first factor according to the factor matrices of the PFQ-20 test. In the other factors, some of them are positive and negative.

The final characteristic was obtained through ML. It shows that the share of variance of first to fifth factors are respectively 12.628, 19.227, 6.75, 6.59, 4.484% and generally it is 49.683%. In addition, the first to fifth factors by the PC method together explain 59.51% of the total variance. The total result is that the PFQ-20 test is saturated with 5 factors and the share of the following factors is small in terms of explaining the variance between materials.

Final solution (after rotation)

The final characteristic of the PFQ-20 test was obtained by ML and PC methods. It shows that 5 factors have an eigenvalue greater than 1 and this value explains 49.683% (ML method) of the total variance. To discover the general staff of PFQ-20 materials and to identify their structural structure, the extracted factors were transferred to new axes based on the conventional method using Varimax rotation because the factor matrix is not rotated and its factor loads do not provide a meaningful structure. The final characteristics of PFQ-20 materials were obtained by the ML method. It shows that the share of variance of first to

fifth factors are respectively 12.648, 19.227, 6.75, 6.59, 4.484% (683/49 in total). After rotation, the total variance is 12.952, 119.249, 843.9, 489.9, and 6.57% (Table 1)

Table 1 - Variance determined by 5 factors before and after rotation

Total	Predicted variance	Predicted variance after rotation
5,176	12.628	12.952
2,286	19.227	11.249
2.229	6.75	9.849
1,654	6.59	9.489
1.492	4.84	6.57

The nature of factors 1 to 5 has a high factor load after rotation. Therefore, the best terms that can be suggested to them are 1- Positive perception of change 2- Describing the self-personality as flexible 3- Describing the self-personality as an open-minded and innovative person 4- Perception Reality as a changing and dynamic subject 5- Multidimensional perceptions of truth. The factor load related to each question is divided into 5 factors in Table 2:

Table 2 - Factor load of each question by 5 factors

Question number	First factor	Second factor	Third factor	Fourth factor	Fifth factor
Question 10	731.0	102.0	183.0	148.0	09.0
Question 3	721.0	099.0	125.0	90.0	19.0
Question 2	621.0	076-0.	090.0	127.0	28.0
Question 15	629.0	358.0	238.0	278.0	01.0
Question 14	411.0	277.0	227.0	211.0	010.0
Question 18	027.-0	804.0	023.0	248.0	12.0
Question 20	112.0	780.0	239.0	040.-0	23.0
Question 17	342.0	613.0	356.0	091.0	24.0
Question 19	320.0	556.0	172.0	086.0	14.0
Question 16	217.0	436.0	344.0	198.0	28.0
Question 11	247.0	313.0	738.0	022.0	011.-0

Question 8	225.0	38.-0	768.0	125.0	026.0
Question 13	121.0	436.0	720.0	105.0	02.-0
Question 1	148.0	006.0	038.-0	856.0	14.0
Question 9	292.0	224.0	045.0	775.0	05.0
Question 7	069.0	075.0	410.0	629.0	31.0
Question 12	318.0	214.0	039.-0	158.0	740.0
Question 4	137.0	217.0	037.-0	128.0	70.0
Question 5	165.0	328.0	022.0	232.0	654.0
Question 6	205.0	024.0	543.0	008.0	658.0

Discussion and conclusion:

This study was conducted to develop a Psychological Flexibility Questionnaire (PFQ), which is short enough to access easily (but at the same time complete) and evaluate its reliability.

According to the credit analysis of this test, PFQ-20 is accurate and stable. Two credit estimates such as Cronbach's alpha (0.713), split-half (0.748) were used, and both of them had high credit ratings. In addition, two estimates of the validity of the internal stability of the whole test and subscales (0.713, 0.649, 0.619, 0.726, 0.628, and 0.837) and split-half (0.748, 0.869, 0.844, and 0.8001) were respectively used that both cases had high credibility.

Scherrer's general self-efficacy tests and NEO test openness subscale calculated respectively the validity of PFQ-20 criterion 0.505 and 0.667, which was significant at the level of p <0.001. According to the study of convergence validity, there has been a positive correlation between the Flexibility Questionnaire and the Openness Scale, which is consistent with the Schultz results (1997). In addition, there has been a significant positive correlation between the questionnaire and Scherer's general self-efficacy scale, which is consistent with the Leganger research (2000). The questionnaire also shows the scores of internal stability and satisfaction of the constructive structure.

However, it is crucial to remember that the ability to be flexible and change behaviors does not mean a lack of internal stability, the opposite can be true. To avoid the fear of change, a strong sense of self is needed. Pluralism does not lead to chaos, and many inner voices do not contradict a strong personal identity. The flexibility allows an individual to create resilience and build a backbone that changes circumstances and facilitates adaptation to changing reality.

Some pleasant and unpleasant events are inevitable such as getting old, becoming a parent, getting married, or getting a job, the death of a close relative, divorce, job loss.

Psychological flexibility can facilitate tolerance for events (both positive and negative) and life situations. In this way, it is a catalyst for the processes of mental growth and development. The capacity for flexibility can change over time in response to environmental interactions although it develops early in life. Therefore, one of the appropriate therapeutic goals and important issues is the development and improvement of personal flexibility.

Exploratory factor analyzed all test materials to answer this question: what factors saturated the content of all materials in Persian language samples.

Based on the Eigenvalue, it is concluded that PFQ-20 is saturated with five factors and the contribution of the following factors is small in terms of explaining the variance of the materials.

Due to the overlap of five factors with each other, the final characteristic was conducted through the ML¬ method by using Varimax rotation and with the confirmation of five factors. It also indicated that the first factor explains 12.628, 19.227, 6.75, 6.59, 4.484, and in total 683.49% of the total variance. These five factors are 1- a positive perception of change 2- recognizing oneself as flexible 3-recognizing oneself as an open-minded and innovative individual 4- the perception of truth as something changing and dynamic 5- the perception of truth as a multifaceted subject. The high correlation of these five factors indicates the convergence of these factors, which determines why the PFQ-20 test is measured.

These five factors complement each other: when an individual finds himself flexible and open-minded, he evaluates the changes positively. He also considers reality as a dynamic, changing, and multifaceted issue. Psychological flexibility includes a positive view of change, and a cognitive ability to perceive the change with an emotional ability to maintain and regulate its consequences. As a result, Psychological flexibility is entering a wide range of changing behavioral responses. Separating the concepts of flexibility into different factors theoretically allows us to have a full understanding of the concept and its components. Finally, it is concluded that the Psychological Flexibility Questionnaire (PFQ) can directly, completely, and successfully measure psychological flexibility. This measurement is relative and is performed in different environments. In the therapeutic environment, it finds the fit of different patients to different forms of psychotherapy. For example, Hatchett and Hann discovered that openness (measured by the openness scale of the Big Five Factor Theory) was positively correlated with their expectations of active participation in the healing process. The questionnaire consists of five elements. This fact enables a psychotherapist/researcher to construct an index of the patient's flexibility. This fact also helps him focus on psychotherapy to reinforce the weaker elements of his psychological flexibility. The questionnaire is also used to assess the effect of psychotherapy on improving patient flexibility. In addition, PFQ is possibly related to many areas outside of psychotherapy. Future studies can investigate psychological flexibility in human resources (investigating psychological flexibility improves the hiring process and foresee the adaptability of potential employees

for the job position, especially when job situations require adaptability) in

education (development of teaching methods, etc.), and many other areas. If further research on larger and more diverse examples examine flexibility in a wide variety of contexts, it can enrich the current understanding of flexibility as a theoretical concept and its empirical implications.

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