

Validity and Reliability of Persian Version of Volition in Exercise Questionnaire among Students of Kashan University of Medical Sciences

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ABSTRACT

Background: The present study was conducted to develop and validate the Persian version of the Volition in Exercise Questionnaire (VEQ).

Methods: The statistical population of the analytical cross-sectional research was the students of Kashan University of Medical Sciences in 2022, selected using two-stage cluster random sampling. Confirmatory factor analysis was used to fit the measurement model and factors obtained from exploratory factor analysis. The reliability of the questionnaire was assessed using Cronbach's alpha coefficient and intraclass correlation coefficient (ICC) and its validity was evaluated using face validity, content validity, and construct validity. The SPSS software version 24 and AMOS software version 24 were used for data analysis.

Results: Descriptive findings showed that 310 questionnaires were completed (mean age: 21.94 ± 3.03 years). CVR, CVI, and impact score were calculated for each question. After calculating the CVR coefficients, all questions had a CVR above 0.99. All questions had a CVI above 0.79. In quantitative face validity, all questions had an impact score of ≥ 1.5 and therefore remained in the questionnaire. Exploratory and confirmatory factor analysis led to the extraction of five factors and the model had a good fit and the values and parameters of the model were statistically significant (χ^2/df : 2.15, CFI: 0.915, TLI: 0.884, RMSEA: 0.07). The results showed that the overall Cronbach's alpha coefficient calculated for the tool and its factors were acceptable (0.894). Also, the stability of the questionnaire with a 2-week interval showed satisfactory results (overall ICC: 0.576).

Conclusion: The results confirmed the measurement model and showed that the obtained factors had a favorable fit as the original version.

Keywords: Validity, Reliability, Volition, Exercise, Questionnaire

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Introduction

Health is one of the most important aspects of human life and is crucial for social agents to play their roles correctly in the society. According to several studies, exercise is considered a biological, physical, and psychological phenomenon that has many consequences. A review of the literature indicates the positive effects of exercise on health (1, 2, 3).

Exercise is a type of organized physical activity with the purpose of having fun and pleasure, gaining more ability, and improving health or physical fitness that is done in the form of planned, structured, and repetitive movements. Today, exercise and physical activity has gained a prominent place in the society as a social phenomenon (4).

Many people wish to have a healthy, happy, and long life; however, due to mechanization and technological advances, they have limited regular physical activity and gradually adopt a sedentary lifestyle (5). Mechanical life has taken the initiative from humans and has reduced their mobility, resulting in physical, psychological, and social problems (6).

One of the important indicators of human and cultural development is to have a healthy workforce and a society where most people enjoy a long healthy life. In developed and industrialized countries, special attention is paid to the expansion of exercise and physical activity in the society in order to accomplish the development goals using health, social and economic achievements associated with exercise. Participation in exercise activities is considered as one of the characteristics of a healthy lifestyle (7).

According to the World Health Organization (WHO), physical activity has an effective role in reducing health care costs. Estimates made in high, low, and middle-income countries suggest that 1-3% of the national health care costs is spent on inactivity (8).

The benefits of participating in physical activities can be listed in three areas, including physical, psychological, and social benefits. The physical advantages of physical activity include improved

health and physical fitness, weight loss, and enhanced physical strength.

The psychological or individual benefits of physical activity include improved psychological well-being, happiness, pleasure, and fun (9), reduced stress, anxiety, and increased self-confidence (10). The social benefits include the expansion of the social network and gaining social rewards (9). In addition, physical activity significantly reduces the risk of cardiovascular disease, obesity, type 2 diabetes, osteoporosis, depression, mental disorders and improves the mental and physical health of the individuals and society (11).

Insufficient physical activity is the fourth leading risk factor for mortality worldwide, so that about 2.3 million people die due to lack of sufficient physical activity every year (12). According to the WHO, more than 2.3% of annual deaths are due to inactivity (13). Despite the importance of regular physical activity, insufficient physical activity among children and adolescents is a major public health concern worldwide (14). One in every four adults (15) and three in every four adolescents (11-17 years) lack sufficient physical activity according to the WHO global recommendations.

According to the results of the STEPS survey conducted in Iran in 2016, the prevalence of insufficient physical activity in all age groups and in both genders was 56%, and Yazd province ranked second with a prevalence of 65.7%. The estimated prevalence of inactivity was 57.4% in Isfahan province. During the last three decades (from 1990 to 2017), the percentage of disability-adjusted life years (DALY) attributable to low physical activity increased by 1.5 times globally and by 2-fold in Iran (16).

Psychology and exercise have been intertwined in research studies since 1920. Exercise psychology has various branches, the most important of which include motivation and volition.

Many studies have shown that motivational and psychological factors play an important role in regular physical activity. Volition is one of the most important determinants and an essential component

of exercise and physical activity. Volition refers to a person's self-regulating mental processes and plays an important role in creating and maintaining a desired action (for example, regular exercise) (15).

A number of experimental studies have shown that volition and motivation are significantly different. One of the most accepted models of behavior change is the transtheoretical model, which is a comprehensive and integrated physical-psychological model that conceptualizes the process of changing people's voluntary behavior and includes 5 stages (17).

This theoretical framework emphasizes autonomous and voluntary motivations instead of motivations that are controlled or under pressure and shows that motivation alone is not enough to move from one stage to another (7).

To make a distinction between motivation and volition and for a more complete understanding of an individual's cognitive processes, researchers have argued that theoretical frameworks that deal solely with the construct of motivation provide knowledge about goal selection, which is not enough if it is not clear how to achieve these goals.

The Rubicon model describes 4 phases for a successful goal pursuit, in which motivation and volition each play a role in 2 phases.

Motivational mindset plays a role in the pre-decision stage where a person forms a goal and thinks about the positive consequences of achieving it. Volition is important in the pre-action phase, in which the person plans the steps to reach the goal, and in the action phase, in which the person continuously pursues the goal. Finally, motivation plays a role in the post-action stage, where the person evaluates the success in achieving the goal and its consequences (18).

Since there was no tool to measure the volition in exercise in Iran, the present study was conducted to assess the validity and reliability of the Persian version of the Volition in Exercise Questionnaire (VEQ) among the students of Kashan University of Medical Sciences.

Methods

A analytical cross-sectional study was

conducted in 2022.

The statistical population of this research comprised the students of Kashan University of Medical Sciences selected using two-stage cluster random sampling method.

According to the guidelines for validity and reliability measurement, 8-10 samples are needed for each question (19). Since the VEQ contains 18 questions, at least 300 samples were required.

Instruments: Three questionnaires were used for data collection

Demographic questionnaire: A demographic questionnaire was developed by the researcher for collecting data such as age, sex, marital status, height, weight, education level, history of exercise, etc.

Tools

The VEQ is comprised of 18 questions, each questions is a statement that one can agree with to a greater or lesser extent. The respondent must check the box that fits his/her level of agreement with the statement.

All items were answered using the following scale: (0 = Not true at all, 3 = Very true)

Sport Motivation Scale (SMS-6): In 1995, the 28-item SMS-6 was developed by Pelletier et al. based on the Deci and Ryan's self-regulation theory in order to investigate internal motivation, external motivation, and lack of motivation in the field of exercise. Then, Mallet et al. revised it in 2007 and changed the number of items from 24 to 28. The validity and reliability of this questionnaire was confirmed by Esmaeili et al. The respondents use a 7-point Likert scale (not at all = 1, totally = 7) to indicate the extent to which each statement refers to their exercise activity (20).

Data collection method

The developers of the VEQ (P. Elsborg et al.) were contacted to obtain their permission to prepare its Persian version.

Two translators translated the VEQ to Persian. Then, after ensuring the accuracy of the translation, two other translators who were fluent in English were hired for backward translation. Then, the backward translation and the original version were

sent to experts in this field to receive the comments and the necessary corrections were made in the translation to ensure its accuracy.

Content validity

To evaluate the Persian version of the questionnaire in terms of cultural expressions and concepts, it was shared with five experts in the field of exercise and exercise psychology. The experts were requested to assess the questions according to the content validity index (CVR) and provide feedback on the grammar, sentence structure, and phrasing.

The content validity ratio (CVR) was calculated using the following formula (21).

$$CVR = \frac{NE - \frac{N}{2}}{\frac{N}{2}}$$

The acceptable range according to the Lawshe table for minimum values of CVR depends on the number of experts, which was considered 0.99 in the present study according to the opinions of five experts (21). In other words, a CVR value of ≥ 0.99 calculated for each question confirmed its content validity.

Using the following formula, proposed by Waltz and Basel for calculating the CVR, the number of experts who scored an item as 3 or 4 was divided by the total number of experts (22).

$$CVI = \frac{\text{Number of experts who score the item as 3 or 4}}{\text{Total number of experts}}$$

Values less than 0.7 resulted in the rejection of the question. Values between 0.7 and 0.79 needed to be revised. Values greater than 0.79 were acceptable (22).

Face validity

The impact score of each question was calculated to quantify the face validity. First, for each of the 18 questions, a 5-point Likert scale (5: completely

important, 1: not important at all) was considered. Then, the questionnaire was shared with 15 students. After completing the questionnaire by the target group, face validity was calculated using the following formula. Face validity values above 1.5 were acceptable (23).

$$\text{Impact score} = \text{frequency \%} \times \text{importance}$$

Then an online questionnaire was developed and its link was shared with the members of the student groups through mobile phone social networks (Telegram and WhatsApp) after obtaining the necessary permissions.

Before completing the questionnaires, the objectives of the study were explained to the participants. The questionnaires were anonymous and participation was voluntary. Finally, the data of 310 subjects were analyzed.

Reliability

The Cronbach's alpha method was used to evaluate the internal consistency of the questionnaire. Cronbach's alpha equal or more than 0.7 were acceptable (24).

The external reliability of the questionnaire was measured using intraclass correlation coefficient (ICC) (test-retest) and the Pearson's correlation coefficient was calculated.

Results

Descriptive findings showed that 310 questionnaires were completed. Moreover, 65.2% of the participants were female and 34.8% were male, 90% were single and 10% were married. The mean (\pm standard deviation) age of the participants was 21.94 ± 3.03 years.

CVR, CVI, and impact score were calculated for each question. After calculating the CVR coefficients, all questions had a CVR above 0.99. All questions had a CVI above 0.79. In quantitative face validity, all questions had an impact score of ≥ 1.5 and therefore remained in the questionnaire, Table 1.

Table 1. The CVR and CVI and impact score of the questionnaire (n = 5 experts).

| N | Questions | CVR | CVI | Impact score |
|----|---|-----|-----|--------------|
| 1 | I feel that I should care about other people's opinions during my exercise activities. | 1 | 1 | 1.54 |
| 2 | I only start my exercise activity when I have to. | 1 | 1 | 1.58 |
| 3 | I often find it difficult to concentrate during my exercise activities, because I think about things that are not related to the activity itself. | 1 | 1 | 1.58 |
| 4 | I am confident in my ability to do exercise well. | 1 | 1 | 1.6 |
| 5 | I know I am capable of doing strenuous exercise. | 1 | 1 | 1.6 |
| 6 | I often focus on my reason for participating during my exercise activities. | 1 | 1 | 1.6 |
| 7 | When I fail during my exercise activities, I keep trying. | 1 | 1 | 1.6 |
| 8 | The degree of my compatibility with others during exercise activities is favorable. | 1 | 1 | 1.5 |
| 9 | I wait to start exercising until there is no way to fix it. | 1 | 1 | 1.6 |
| 10 | During exercise activities, my mind is diverted to things other than exercise activities. | 1 | 1 | 1.58 |
| 11 | I believe that my volition is strong enough to do intense exercise activities. | 1 | 1 | 1.6 |
| 12 | During my exercise activity, I do not focus on things other than exercise activities. | 1 | 1 | 1.6 |
| 13 | If I fail during exercise activities, I will try harder. | 1 | 1 | 1.58 |
| 14 | I fear what others will think of me when I do not do well in my exercise. | 1 | 1 | 1.5 |
| 15 | Experience has shown me that I really need to pull myself together to participate in my exercise activities. | 1 | 1 | 1.6 |
| 16 | I think a lot about my reasons for participating in exercise. | 1 | 1 | 1.6 |
| 17 | Even if my exercise activity does not go well, I will try again. | 1 | 1 | 1.6 |
| 18 | I wait until the last minute before starting my exercise activities. | 1 | 1 | 1.6 |

The SPSS software version 24 was used for data analysis.

At first, the KMO measure of sampling adequacy was applied, the value of which varied between zero and one. A higher value indicated a better factor analysis. Values above 0.9 were excellent and values between 0.8 and 0.9 were considered good (25). Values between 0.5 and 0.7 were average.

A KMO value of 0.834 and the significant level of the Bartlett's test indicated the adequacy of sampling. Therefore, other stages of factor analysis were carried out.

The principal component analysis method was used to determine the factor structure of the scale. Using the findings of the scree plot, variance table, and the main eigenvalue columns, a maximum of five subscales (factors) were extracted with eigenvalues higher than 1, Fig 1 and Table 2.

After examining the matrix table of factors, the varimax rotation method was used to determine the factor loading of each question, Table 3.

According to the results, it can be seen that after varimax rotation, the questions with suitable factor loadings were loaded on their factors, Table3.

Table 2. Main eigenvalue and total variance explained by each eigenvalue

| Factors | % Of Variance | Cumulative (%) | Eigenvalue |
|---------|---------------|----------------|------------|
| 1 | 29.942 | 29.942 | 5.390 |
| 2 | 12.962 | 42.904 | 2.33 |
| 3 | 7.617 | 50.521 | 1.37 |
| 4 | 6.535 | 57.056 | 1.17 |
| 5 | 5.929 | 62.985 | 1.06 |

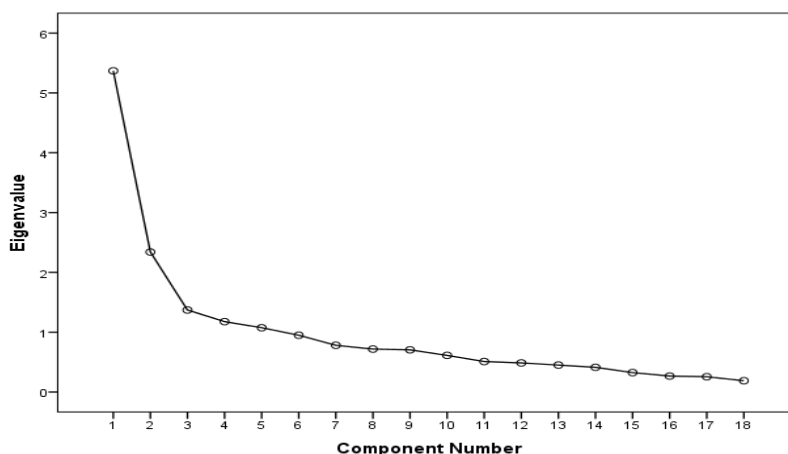


Figure 1. Scree plot of exploratory factor analysis

Table 3. After varimax rotation and factor loading of each question

| Questions | 1 | 2 | Factor 3 | 4 | 5 |
|--|-------|-------|----------|-------|-------|
| I believe that my volition is strong enough to do intense exercise activities. | 0.847 | | | | |
| If I fail during exercise activities, I will try harder. | 0.811 | | | | |
| I know I am capable of doing strenuous exercise. | 0.779 | | | | |
| When I fail during my exercise activities, I keep trying. | 0.765 | | | | |
| Even if my exercise activity does not go well, I will try again. | 0.705 | | | | |
| I am confident in my ability to do exercise well. | 0.690 | | | | |
| The degree of my compatibility with others during exercise activities is favorable. | 0.649 | | | | |
| I only start my exercise activity when I have to. | | 0.346 | | | |
| During exercise activities, my mind is diverted to things other than exercise activities. | | 0.844 | | | |
| I often find it difficult to concentrate during my exercise activities because I think about things that are not related to the activity itself. | | 0.788 | | | |
| During my sports activity, I do not focus on things other than exercise activities. | 0.440 | | | | |
| I wait until the last minute before starting my exercise activities. | | | 0.746 | | |
| I wait to start exercising until there is no way to fix it. | | | 0.645 | | |
| Experience has shown me that I really need to pull myself together to participate in my exercise activities. | | | 0.583 | | |
| I feel that I should care about other people's opinions during my exercise activities. | | | | 0.791 | |
| I fear what others will think of me when I do not do well in my exercise. | | | | 0.726 | |
| I think a lot about my reasons for participating in exercise. | | | | | 0.826 |
| I often focus on my reason for participating during my exercise activities. | | | | | 0.673 |

Factor 1: Self-confidence (12-8-4-17-7-5-13-11); Factor 2: Lack of concentration (2-3-10); Factor 3: Postponing training (15-9-18); Factor4: Seeking approval from others (1-14); Factor 5:Reasons (6-16).

Next, to confirm the structural validity of the Persian version of the VEQ, a confirmatory factor analysis was performed using the AMOS version 24 software to evaluate the relationship between the questions and the factors.

Since the indicators were not in an acceptable range, the experts' solution was to use the

recommendations of the adjustment indicators offered by software, especially the correlation between errors, Fig 2.

The results of the factor analysis of the Persian version of the VEQ indicated that the model had a good fit and values and parameters of the model were statistically significant, Table 4.

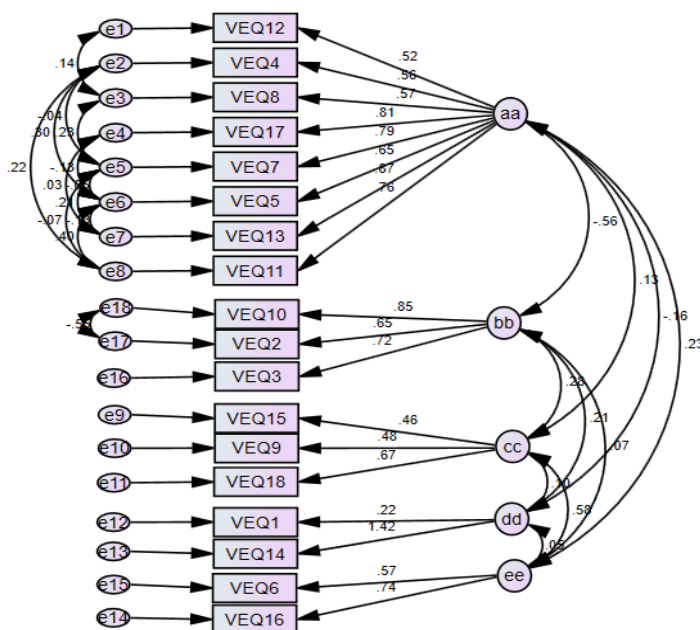


Figure 2. Standardized factor loadings and covariance of the confirmatory factor analysis (5-factor model, 18 questions)

Table 4. Model fitting statistics using Amos software to validate structural constructs

| Model fitting indicators | Value | Acceptable range | Interpretation |
|--------------------------|-------|------------------|----------------|
| X ² /df | 2.15 | < 3 | OPTIMAL |
| TLI | 0.884 | > 0.9 | OPTIMAL |
| CFI | 0.915 | > 0.9 | OPTIMAL |
| RMSEA | 0.070 | < 0.08 | OPTIMAL |
| NFI | 0.869 | > 0.9 | OPTIMAL |
| PNFI | 0.636 | > 0.6 | OPTIMAL |
| IFI | 0.917 | > 0.9 | OPTIMAL |

In the present study, reliability was calculated using the Cronbach's alpha coefficient. The results showed that the overall Cronbach's alpha coefficient calculated for the tool and its factors including self-confidence, lack of concentration, postponing training, reasons, and seeking approval

from others were acceptable (> 0.7).

The results of external reliability of the questionnaire using test-retest method (2 weeks apart) in 30 randomly selected students showed acceptable time reliability at a significance level of 0.05, Table 5.

Table 5. External reliability index (test-retest coefficient) of the questionnaire in 5 subscales

| Subscales (factors) | Number of question | ICC | 95% CI | P-value |
|------------------------------|--------------------|-------|-------------|---------|
| Self-confidence | 8 | 0.744 | 0.461-0.878 | < 0.001 |
| Lack of concentration | 3 | 0.841 | 0.667-0.925 | < 0.001 |
| Postponing training | 3 | 0.816 | 0.613-0.912 | < 0.001 |
| Seeking approval from others | 2 | 0.903 | 0.796-0.956 | < 0.001 |
| Reasons | 2 | 0.573 | 0.204-0.797 | < 0.001 |

Discussion

A review of the literature showed that there was no tool to measure the volition in exercise in Iran. Therefore, the present study was conducted to evaluate the validity and reliability of the VEQ.

The statistical population of this research was 310 students from 18 to 40 years of age in different fields of Kashan University of Medical Sciences with an average age of 21.94 ± 3.03 years and 65.2% of them were women.

The research population in the original version of Volition in Exercise Questionnaire (VEQ) was selected from bachelor's and master's students at the University of Copenhagen. However, the number of participants was 785 with an age range of 19 to 57 years and with an average age of 23 ± 2.85 years, 68% were women (18). The research community in the Italian version of the questionnaire (VEQ-I) was selected from the first-year University course of the University of Rome; The number of participants was 534, with an age range of 19 to 44 years and an average age of 21.04 ± 2.27 years (15). Unlike the present study, in the German version of the questionnaire (VEQ-D), the research population was adults. The number of participants was 571 people with an age range of 18 to 64 years and with an average age of 28.1 ± 11.5 years, 58.7% were women (26).

The Lawshe method was used for content validity assessment. In this regard, five experts in the field of exercise psychology expressed their opinions and comments. The results of Lawshe analysis showed that the questionnaire was had an acceptable content validity content and none of the items were deleted.

Exploratory and confirmatory factor analyses were used to measure the construct validity of the questionnaire. Exploratory factor analysis using principal component analysis led to the extraction of five factors with eigenvalues higher than 1;

moreover, the scree plot also suggested five factors.

However, in the confirmatory and exploratory factor analysis of the original version of the questionnaire (VEQ) and two versions, German (VEQ-D) and Italian (VEQ-I), 6 factors were identified and confirmed (15, 18, 26).

result of Model fitting statistics in this study included $\chi^2/df = 2.15$, TLI = 0.884, CFI = 0.915, RMSEA=0.070 Compared to the Fit indices results of the original version of the VEQ questionnaire ($\chi^2/df = 2.1$, TLI = 0.94, CFI = 0.95, RMSEA = 0.052), In the German version questionnaire ($\chi^2 = 282.289$, TLI = 0.987, CFI = 0.989, RMSEA = 0.049) and in the Italian version questionnaire (TLI = 0.943, CFI = 0.960, RMSEA = 0.039) which shows the consistency of the results of this research (15, 18, 26).

The results obtained from the reliability of the Persian version of the volition in exercise questionnaire using Cronbach's alpha showed a high reliability of 0.7 and was at an acceptable level. The results of reliability consistency in the original version of the questionnaire (VEQ) and the Italian version (VEQ-I) also showed that 5 out of 6 factors had Cronbach's alpha between 0.7 and 0.83, and for the factor of approval from others, Cronbach's alpha was 0.63. However, in the German version (VEQ-D), Cronbach's alpha was satisfactory in 4 out of 6 factors, and in two factors approval from others and coping with failure, were below the threshold of 0.7. (15, 18, 26).

The results of the external reliability of the questionnaire using the test-retest method of the Persian version of the volition in exercise questionnaire using the ICC were significant in all factors; But in the other three versions, the external reliability was not done

Since volition is one of the most important topics in psychology, especially sports psychology, it is

necessary to have a suitable tool to measure volition. according to the results of the present study, the Persian version of the VEQ is a reliable tool for measuring the volition in exercise.

Conclusion

The present study was conducted to evaluate the validity and reliability of the VEQ. Five volitional factors were identified and validated based on 18 items related to exercise participation. Like the original version, it has an acceptable validity and reliability.

This instrument has shown the potential to be a useful and valid tool that can be applied to investigate the role of volition in facilitating exercise participation. However, validation in other samples (with lower physical exercise levels) is needed.

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Conflict of interest

The authors declare no conflict of interest.

Authors' contribution

S. SH and H. F; conceived the presented idea, S. SH; wrote the manuscript with support from H. F, F. A and A. D. All authors read and approved the manuscript.

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