The Herth Hope Index: A Validation Study within a Sample of Iranian Patients with Heart Disease

Abstract

Introduction: The objective of this study was to examine the psychometric characteristics of the Persian version of the Herth Hope Index (HHI-Persian version) within a sample of Iranian patients with heart disease (HD). Methods: The present research used a clinical sample of HD patients hospitalized in a medical institution in Qazvin, Iran. A total of 500 patients were selected via convenience sampling method and were divided into two subsamples to test for exploratory factor analysis (EFA) (n = 250) and confirmatory factor analysis (CFA) (n = 250) separately. Construct validity of the HHI-Persian version was evaluated using EFA and CFA. The reliability of the HHI-Persian version was first assessed using internal consistency (i.e., Cronbach’s alpha) and construct reliability. Results: Exploratory factor analysis with varimax rotation revealed that the index had a one factor consisting of 11 items (eigenvalue = 4.784) which explained 38.309% of the total variance. The results showed that the single factor consisting of 11 items has a good fit ($\chi^2 [42, n = 250] = 107.242, P < 0.001$; $\chi^2/df = 2.553$, adjusted goodness-of-fit index [GFI] = 0.889, GFI = 0.929, comparative fit index = 0.938, normed fit index = 0.903, Tucker–Lewis Index = 0.918, incremental fit index = 0.918, and root mean square error of approximation = 0.079 [90% confidence interval = 0.079 (0.061–0.098)])). Cronbach’s alpha and construct reliability were 0.856 and 0.878, respectively, which indicates the good reliability of the HHI. Conclusion: The findings demonstrated that the HHI-Persian version is a valid and reliable instrument that has potential utility in future research.

Keywords: Heart disease, hope, Iran, reliability, validity

Introduction

Heart disease (HD) is considered to be one of the most widespread chronic diseases in most parts of the world. It has been predicted that 25 million people will experience HD by 2020. HD is characterized by progression over years and episodic exacerbations that become more frequent and life threatening over time. The Global Burden of Disease Study in 2013 estimated that 30% of all deaths worldwide were caused by HD. In Iran, HD was the first leading cause of death during the last decade. A result of a study in Iran showed that the prevalence of HD in an adult sample (30–79 years) was 19.4%.

Previous empirical research has shown that HD is associated with a number of physical and psychological consequences. Cardiogenic shock, cardiac rupture, ventricular aneurysm, fatal dysrhythmia, ischemia, and stroke are among the physical concerns. In addition, anxiety and depression are also commonly reported by HD patients. Anxiety has been shown to have a negative effect on the physical recovery of patients. Thus, HD also imposes a high economic burden on the health-care system as recovery can be lengthy due to the associated health consequences that can occur following the disease. Therefore, holistic approaches have become increasingly popular. For example, health-care providers have become more aware of the importance of well-being variables, such as maintaining hope, in the treatment of HD.

Maintaining hope for patients who have experienced HD is often a goal of clinical care. Research has found that hope as a therapeutic variable impacts a patient’s overall well-being, immune function, and quality of life. On the other hand, lack of hope and hopelessness has been found to be associated with increased morbidity rates and decreased lifespan.

Hope has been recognized across disciplines as an important motivational
state to overcome adversities in life such as the experience of life-threatening illnesses.\cite{13} The majority of the hope studies, up until this past decade, have been conducted in North America.\cite{14,15} Such studies have identified a need to better understand hope within a variety of cross-cultural contexts.\cite{16} However, there are very few tools designed to measure hope that have been translated into languages other than English or have undergone rigorous psychometric testing in non-English-speaking countries (e.g., the Nowotny Hope Scale,\cite{17} the Miller Hope Scale,\cite{18} the Herth Hope Scale [HHS],\cite{19} and the Herth Hope Index [HHI]).\cite{20} Researchers who have conducted studies investigating hope outside of North America suggest that hope is influenced by cultural context.\cite{21,22} It is widely recognized that direct literal translation of any English language tool is not a reliable method for constructing psychometric measures. Failure to use culturally sensitive and psychometrically sound instruments may compromise the validity and generalizability of research findings.\cite{23,24} Therefore, it is critical that research instruments are translated into valid and reliable measures that best represent the cultural context of the study.

The field of health-related disciplinary research has taken a lead role in the development of instruments to measure the multidimensional aspects of hope. One example is the original HHS and, its abbreviated version, HHI, which is the most, widely translated and psychometrically tested tool in a language other than English.\cite{16,25} The HHI is currently translated into 24 languages (i.e., Portuguese, Japanese, German, Swedish, and Italian). As demonstrated in translations of the HHI in other languages, cultural differences may exist, and some concepts or items in the original instrument may be inappropriate for people in another culture (i.e., I have a faith that gives me comfort and I have deep inner strength). Given these issues, it is critical to develop a culturally sensitive and psychometrically sound translated version of the HHI specific to the Iranian culture. This would make the study of hope possible with the Iranian people, which is important to understanding factors that influence hope and lead to enhanced interventions in patient care. Therefore, the purpose of this study was to create a Persian version of the HHI and to determine the psychometric properties within a sample of Iranian patients with HD.

**Methods**

**Participants and settings**

The present research used a clinical sample of HD patients hospitalized in a medical institution in Qazvin, Iran, over a 4-month period (i.e., between May and August 2016). We adopted a convenience sampling technique of 500 adult patients who were hospitalized in a medical institution in Qazvin city and divided them into two subsamples to test for exploratory factor analysis (EFA) (\(n = 250\)) and confirmatory factor analysis (CFA) (\(n = 250\)) separately. Participation in the study was guided by the following inclusion criteria: each participant must (1) have documented HD based on electrocardiogram results and confirmation of a cardiologist in addition to the presence of known cardiac enzymes and other forms of universally accepted medical diagnosis technique (s) of HD carried out by qualified doctors; (2) have not exhibited signs of, or be diagnosed with, known psychological problems such as anxiety and depression for a period of at least 4 weeks prior to the data collection date; and last, (3) have stable vital signs. A sample size of 5–10 times the number of items tested is suggested as the minimum for conducting a factor analysis.\cite{26}

A demographic questionnaire and the HHI were used for data collection purposes. Next, we focused on collecting data relating to their social support as well as religious beliefs. The perceived level of social support and religiosity was measured with empirically validated survey scales developed by nursing researchers. We adapted and simplified the aforementioned scales in order to avert the potential burden of time needed to complete the surveys for respondents, especially since they were experiencing HD. For each item within the utilized measurement scales, we asked our respondents to rate them using a 10-point Likert-type scale. For example, the strength of religious beliefs was identified on a scale of 1–10 (1 = the weakest, 10 = the strongest) and the amount of social support received was identified on a scale from 1 to 10 (1 = the least, 10 = the most).

**Measures**

**The Herth Hope Index**

The HHI is a 12-item abbreviated version of the HHS measuring the multidimensional aspects of hope based on Dufault and Martocchio’s (1985) conceptual framework of hope. It uses a 4-point Likert scale to access a participant’s level of hope. The total score of HHI ranges from 12 to 48, with a higher score corresponding to higher levels of hope.\cite{20} The HHI has been used in studies worldwide, with individuals experiencing varied health conditions in both hospital and community settings. The validity and the reliability of HHI have been well established in different studies around the world.\cite{20,27,28}

The World Health Organization protocol was used to translate the HHI into Persian.\cite{29} In this regard, translation process is the crucial factor which requires careful attention, which means that translators have to be committed to keep the original concept and meaning of a questionnaire while translating to the different societies with different cultures.\cite{30} We employed the forward-backward translation technique for translating the scale from English into Persian. Accordingly, two English–Persian translators were invited to independently translate the HHI. An expert panel consisting of the authors of this article and two certified...
translators assessed and unified the two translations and produced a single Persian translation of the HHI. Thereafter, two Persian–English translators were asked to backtranslate the Persian HHI into English. This English version of the HHI was confirmed in terms of the accuracy of the translated material and the similarity of our English HHI with the original English HHI.

**Construct validity**

Construct validity was evaluated through EFA with Varimax rotation. The Kaiser–Meyer–Olkin (KMO) test and the Bartlett’s test of sphericity were used to check the appropriateness of the study sample and the model. The number of factors was determined based on eigenvalues ≥1 and scree plot. Items with absolute loading values of 0.4 or greater were regarded as appropriate.\[31\] Next, the results from the EFA were confirmed and validated using CFA. Then, the factor structure obtained from the EFA was then examined using a CFA on 250 different patients using AMOS software version 19 (IBM SPSS Statistics for Windows, Version 24.0, Armonk, IBM Corp., NY: USA).

**Reliability assessment**

The reliability of the HHI-Persian version was first assessed using internal consistency (i.e., Cronbach’s alpha) and construct reliability (CR) [Figure 1]. Specifically, alpha values of 0.7 or greater indicate satisfactory internal consistency;\[32\] CR >0.7 demonstrates good reliability.\[33\]

**Ethical consideration**

Our study was approved by our main affiliated university’s medical sciences’ Ethics Committee. All participants were informed about the study aims and procedures. Participants were also informed that participation was entirely voluntary and would not affect their medical care. Furthermore, all participants signed an informed consent form prior to participating in the study. Patient confidentiality was assured by carrying out the survey in a quiet treatment area. All personal data were anonymous by the use of generic codes.

**Results**

Table 1 shows the detailed frequencies/percentages or mean/standard deviation of the participants’ demographic information. As shown in the table, most of the patients in this study were women and married.

Table 2 shows the results of performing EFA on the HHI-Persian version using the first dataset (n = 250). The KMO was 0.889, and the Bartlett’s test of sphericity was statistically significant (P < 0.001), indicating that the sampling was adequate. Through the process of ignoring factors with eigenvalue less than 1, EFA extracted one factor consisting of 11 items together accounting for 38.309% of the variance. Item 6 was deleted due to its weak factor loading (0.113).

Next, the factor structure obtained with EFA was assessed and validated using maximum likelihood CFA with 250 participants. Based on the modification indices, two pairs of measurement errors (between items 2 and 10 and between items 4 and 11) were allowed to freely covary [Figure 2]. The results showed that, after reviewing model modification indices for sources of model misfit, the single factor consisting of 11 items has a good fit (χ² [42, n = 250] =107.242, P < 0.001; χ²/df = 2.553, adjusted goodness-of-fit index [GFI] = 0.889, GFI = 0.929, comparative fit index = 0.938, normed fit index = 0.903, Tucker–Lewis index = 0.918, incremental fit index = 0.918, and root mean square error of approximation = 0.079 [90% confidence interval = 0.079 (0.061–0.098)]). Most item
loadings were greater than 0.5, except item 5 with a factor loading of 0.45.

**Reliability**

The construct showed a good internal consistency measured by Cronbach’s alpha ($\alpha = 0.856$) and good CR (0.856).

**Description of the questionnaire and scoring procedures**

The HHI-Persian version with 11 items is scored on a Likert scale (range: 1–4, with 1 defined as strongly disagree, 2 defined as disagree, 3 defined as agree, and 4 defined as strongly agree) format. Consequently, the total score of the scale ranges from 11 to 44. Higher scores indicate higher hope level in a patient with HD.

**Discussion**

The primary aim of this study was to psychometrically evaluate the HHI-Persian version within a sample of Iranian patients with HD. EFA and CFA were used to investigate and confirm the underlying structure of the scale. EFA showed that the HHI-Persian version represents a unidimensional construct accounted for 38.309% of the variance among patients with HD. Similarity, Italian and Japanese versions of the HHI also represented a unidimensionality index. Other studies have reported a two-factor model, and these findings were from samples with serious mental health problems, cancer, and older people. Herth found that all items loaded on one of the three originally formed subscales of the HHS: temporality and future, positive readiness, and expectancy and interconnectedness. In addition, Geiser et al. and Balsanelli et al. developed the German and Portuguese versions of HHI and explored three-factor structure that accounted for 56.4% and 58% of variance, respectively.

When adapting a questionnaire to a different cultural context, the specific understanding of the items and intercorrelations...
can change due to the translation process or the cultural and medical setting. Hair et al. stated that low variance indicates the inappropriate construct validity of a tested instrument in human sciences.

A CFA model was used in order to determine the validity of the HHI-Persian version. The results suggested that the model fitness for all indicators was appropriate. Thus, regarding the CFA results, the observed indicators were confirmed, and all fitness indicators reported a suitable standard level. The Japanese version of the HHI also demonstrated good fitness characteristics. Furthermore, the CFA of the Italian version of HHI revealed that a single-factor model adequately represented the structure of the HHI. Conversely, the original three-factor solution could not be confirmed in the sample of 341 people with severe mental health problems.

In the present study, the reliability of HHI-Persian version was evaluated as being highly suitable based on Cronbach’s alpha coefficients and CR. Cronbach’s alpha for the original HHI was found to be 0.97 and with a 2-week test–retest reliability of 0.91. In addition, the Dutch version of HHI had a Cronbach’s alpha of 0.84 and a test–retest reliability of 0.79. In addition, Cronbach’s alpha assessment of the Portuguese, Japanese, German, and Italian versions of HHI was between 0.82 and 0.89. A research conducted in Iran showed a good internal stability of the measure. To the best of our knowledge, no other studies have calculated the CR of the HHI; thus, we could not compare our results with previous studies.

Limitation
Several limitations could be identified in the present study. The study did not draw from a randomized or representative sample; hence, there is a possibility that the HHI-Persian version may not be suitable for other groups of patients; for instance, palliative and acute care. While the sample size was sufficient for the purpose of the study, further research could draw from a larger sample of different patient populations in order to compare participant groups, seek clarification of the factor structure, and develop normative data. The lack of test–retest reliability is another limitation of this study.

Conclusion
The 11-item HHI-Persian version with one factor was found to be a valid and reliable instrument for assessing hope among patients who have experienced HD in Iran. Future validation studies on multiple populations are needed to refine, modify, or verify the HHI-Persian version as a valid and reliable instrument for measuring hope. In addition, it would be helpful to use other existing Persian measures relevant to “hope” or other clinically relevant grouping methods to validate the translated version. Moreover, the development of a more cross-culturally adaptable measure of hope may be warranted in order to enhance future study in the area of health research at an international level.

Acknowledgment
The authors would like to express their gratitude to the patients who bravely participated in this study. We gratefully acknowledge the Ameneh Yaghoobzadeh for your collaboration in this study.

Financial support and sponsorship
This work was supported by the National Institutes of Health (grant numbers 728, 2016) and Qazvin University and Medical Sciences (No. P. 62).

Conflicts of interest
There are no conflicts of interest.

References
1. Sharif Nia H, Haghdooost AA, Nazari R, Bahrami N, Soleimani MA, Pormand K. Relationship of risk factors and ST segment changes with symptoms of acute coronary syndrome. Koomesh 2013;15:46-53.
2. Yousefi P. Survey of Quality of life in Hospitalized Cardiac Failure Patients in Shafa and Afzalipoor Hospital Kerman, Iran.
Soleimani, et al.: Psychometric evaluation of the Herth Hope Index

3. Strada EA, Homel P, Tennstedt S, Billings JA, Portenoy RK. Spiritual well-being in patients with advanced heart and lung disease. Palliat Support Care 2013;11:205-13.

4. Bhatnagar P, Wickramasinghe K, Williams J, Rayner M, Townsend N. The epidemiology of cardiovascular disease in the UK 2014. Heart 2015;101:1182-9.

5. Khademvatani K, Aghakhani N, Esm-Hoseini G, Hazrati A, Alinezhad V, Nazari H, et al. Study of relationship between spiritual health, anxiety and depression in acute myocardial infarction patients hospitalized in Seyyedoshohada hospital in Urmia. Urmia Med J 2015;25:1092-101.

6. Hadaegh F, Harati H, Ghanbarian A, Azizi F. Prevalence of coronary heart disease among Tehran adults: Tehran lipid and glucose study. East Mediterr Health J 2009;15:157-66.

7. Soleimani MA, Pahlevan Sharif S, Allen KA, Yaghoobzadeh A, Sharif Nia H, Gorgulu O, et al. Psychometric properties of the Persian version of spiritual well-being scale in patients with acute myocardial infarction. J Relig Health 2017;56:1981-97.

8. Yeganeh Khah MR, Abedini A, Akbari H, Ziyayi Nezhad MT. Comparison of different methods of education on reducing the anxiety of patients with myocardial infarction. Iran J Nurs 2012;24:36-44.

9. Huffman JC, Smith FA, Blais MA, Januzzi JL, Fricchione GL. Comparison of psychological assessment and support in patients suffering from cardiovascular disease or undergoing cardiac treatment. J Cardiovasc Dis Diagn 2014;2:1000161.

10. Cathaliffe JR. The concept of hope in nursing 3: Hope and palliative care nursing. Br J Nurs 2002;11:977-83.

11. Cathaliffe JR. The concept of hope in nursing 6: Research/education/policy/practice. Br J Nurs 2002;11:1404-11.

12. Ciarrochi J, Parker P, Kashdan TB, Heaven PC, Barkus E. Hope and emotional well-being: A six-year study to distinguish antecedents, correlates, and consequences. J Posit Psychol 2010;5:520-32.

13. Koopman WJ, LeBlanc N, Fowler S, Nicolle MW, Hulley D. Hoping, coping, and quality of life in adults with myasthenia gravis. Can J Neurosci Nurs 2016;38:55-64.

14. Stoll DP, Czaszor N, Szoke H, Bagdi P. The importance of psychological assessment and support in patients suffering from cardiovascular disease or undergoing cardiac treatment. J Cardiovasc Dis Diagn 2014;2:1000161.

15. Cathaliffe JR. The concept of hope in nursing 3: Hope and palliative care nursing. Br J Nurs 2002;11:977-83.

16. Cathaliffe JR. The concept of hope in nursing 6: Research/education/policy/practice. Br J Nurs 2002;11:1404-11.

17. Elliot JA. Interdisciplinary Perspectives on Hope. New York: Nova Science Publishers, Inc.; 2005.

18. Ripamonti CI, Buonaccorso L, Maruelli A, Bandieri E, Boldini S, Pessi MA, et al. Hope herth index (HHI): A validation study in Italian patients with solid and hematological malignancies on active cancer treatment. Tumori 2012;98:385-92.

19. Nowotny ML. Assessment of hope in patients with cancer: Development of an instrument. Oncol Nurs Forum 1989;16:57-61.

20. Miller JF, Powers MJ. Development of an instrument to measure hope. Nurs Res 1988;37:6-10.

21. Cathaliffe JR. Development and refinement of an instrument to measure hope. Sch Inq Nurs Pract 1991;5:39-51.

22. Cathaliffe JR. Abbreviated instrument to measure hope: Development and psychometric evaluation. J Adv Nurs 1992;17:1251-9.

23. Waltz CF, Strickland OL, Lenz ER. Measurement in Nursing and Health Research. 5th ed. New York: Springer Publishing Company; 2017.

24. Sartorius N, Kuyken W. Translation of health status instruments. Quality of Life Assessment: International Perspectives. Berlin: Springer-Verlag, Heidelberg; 1994. p. 3-18.

25. Wahl AK, Rustoen T, Lerdal A, Hanestad BR, Knudsen O Jr., Mourn T, et al. The Norwegian version of the herth hope index (HHI-N): A psychometric study. Palliat Support Care 2004;2:255-63.

26. Sharif Nia H, Pahlevan Sharif S, Goudarzian AH, Haghdoot AA, Ebadi A, Soleimani MA. An evaluation of psychometric properties of the Templers’s death anxiety scale-extended among a sample of Iranian chemical warfare veterans. Hayat 2016;22:229-44.

27. Bentzin E, Berg A. The Swedish version of herth hope index – An instrument for palliative care. Scand J Caring Sci 2003;17:409-15.

28. Chan KS, Li HC, Chan SW, Lopez V. Herth hope index: Psychometric testing of the Chinese version. J Adv Nurs 2012;68:2079-85.

29. World Health Organization. Process of Translation and Adaptation of Instruments. World Health Organization; 2009. Available from: https://www.who.int/substance_abuse/research_tools/translation/en/. [Last accessed on 2019 Apr 06].

30. Sh P, Kaghahanizade M, Ebadi A. Review of translation and cultural adaptation process of questionnaires. Educ Strategies Med Sci 2009;2:117-20.

31. Saggino A, Kline P. Item factor analysis of the Italian version of the death anxiety scale. J Clin Psychol 1996;52:329-33.

32. Jorritsma W, de Vries GE, Dijkstra PU, Geerthzen JH, Reneman MF. Neck pain and disability scale and neck disability index: Validity of Dutch language versions. Eur Spine J 2012;21:93-100.

33. Hair JF, Black WC, Babin BJ, Anderson RE. Multivariate Data Analysis. Essex, England: Pearson Education Limited; 2013. Available from: https://is.muni.cz/el/1423/podzim2017/PSY028/um_Hair_-_Multivariate_data_analysis_7th_revised.pdf. [Last accessed on 2019 Apr 06].

34. Hirano Y, Sakita M, Yamazaki Y, Kawai K, Sato M. The herth hope index (HHI) and related factors in the Japanese general urban population. Jpn J Health Hum Ecol 2007;73:31-43.

35. Van Gestel-Timmermans H, Van Den Bogaard J, Brouwers E, Herth K, Van Nieuwenhuizen C. Hope as a determinant of mental health recovery: A psychometric evaluation of the herth hope index-Dutch version. Scand J Caring Sci 2010;24 Suppl 1:167-74.

36. Geiser F, Zajackowski K, Conrad R, Imbierowicz K, Wegener I, Herth KA, et al. The German version of the herth hope index (HHI-D): Development and psychometric properties. Oncol Res Treat 2015;38:356-60.

37. Balsanelli AC, Grossi SA, Herth KA. Cultural adaptation and validation of the herth hope index for portuguese language: Study in patients with chronic illness. Texto Contexto Enfermagem 2010;19:754-61.

38. Sartore AC, Grossi SA. Herth hope index – Instrument adapted and validated to Portuguese. Rev Esc Enferm USP 2008;42:227-32.

39. Yaghoobzadeh A, Soleimani MA, Allen KA, Chan YH, Herth KA. Relationship between spiritual well-being and hope in patients with cardiovascular disease. J Relig Health 2018;57:938-50.

40. Choobdari M, Dastgerdi R, Sharifzadeh G. The impact of self-care education on life expectancy in acute coronary syndrome patients. J Birjand Univ Med Sci 2015;22:19-26.