

Validity and Reliability of Form C of the Multidimensional Health Locus of Control Scale in Pregnant Women

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Received: 28 November 2017

Revised: 13 January 2018

Accepted: 28 January 2018

What's Known

• Forms A and B of the Multidimensional Health Locus of Control (MHLC) scale have been widely studied in clinical and non-clinical populations; quantitative research has been done to determine the psychometric properties of form C of this scale in the clinical group. This shows an important vacuum in MHLC-C studies.

What's New

• The results of this study showed that the MHLC-C scale has acceptable reliability and validity and can be used as a complementary instrument with other MHLC instruments in specific medical conditions.

Abstract

Background: The health locus of control (HLC) can indirectly determine the health status. The current study aimed to assess the validity and reliability of Form C of the Multidimensional Health Locus of Control (MHLC-C) scale in pregnant women.

Methods: 554 pregnant women participated in this cross-sectional study conducted in 2017; they referred to community health centers affiliated with Mashhad and Gonabad Medical Sciences Universities. Multi-stage random sampling was done. In this study, first, the questionnaire was translated into Farsi; then, face validity and construct validity were done through exploratory factor analysis, and concurrent criterion validity was also examined. Moreover, the reliability was assessed through internal consistency and stability methods.

Results: The results of the exploratory factor analysis showed that the MHLC-C scale consisted of four subscales, i.e. Chance, Internal, Other People, and Doctors, which accounted for 51.18% of variance. The results of the reliability analysis showed an acceptable internal consistency for the scale (Cronbach's alpha coefficient for subscales from 0.62 to 0.90). Also, the test-retest results showed good stability for all subscales other than Doctors ($P < 0.05$). The concurrent validity of Forms B and C of MHLC scale showed a positive and significant correlation between subscales.

Conclusion: The results of this study showed that the MHLC-C scale had acceptable validity and reliability in pregnant women and is suggested as an applicable criterion for assessing individuals control beliefs with any medical or health-related condition in Iran.

Please cite this article as: Mirzania M, Khajavi AJ, Moshki M. Validity and Reliability of Form C of the Multidimensional Health Locus of Control Scale in Pregnant Women. *Iran J Med Sci.* 2019;44(4):307-314. doi: 10.30476/IJMS.2019.44957.

Keywords • Validity • Reliability • Internal-external control • Pregnancy

Introduction

Pregnancy is one of the most sensitive and important stages in women's lives.¹ This period is considered as a vulnerable period in women, during which mothers experience many psychological and physiological changes². The importance of pregnancy is remarkable since the health and well-being of a mother are directly effective in the life of another person.¹ One of the factors affecting maternal and infant health is pregnant mothers' attitudes and beliefs.³ The locus of control (LOC), first used by Rotter

in social learning theory (SLT), is one of the concepts in understanding health behaviors and beliefs. This concept is defined as the degree to which people believe their health is controlled by internal or external factors.⁴ Evidence shows that pregnancy is one of the particular clinical domain where LOC is of great importance. For example, women with external LOC orientation have longer labor pain than women with an internal LOC orientation.⁵ Also, LOC has been reported to be an influential construct in adherence to prenatal health regimes.⁶ Wallston and colleagues in 1976 employed the SLT and the LOC, and they provided the unidimensional health locus of control (HLC) scale.⁷ The HLC is one of the factors that determine the health behaviors of a person. These behaviors, in turn, determine the health status of a person. Therefore, theoretical orientation of the HLC is an indirect determinant of health status.⁸ In 1978, Wallston and colleagues merged the unidimensional HLC scale with Levenson's Internal, Powerful others and Chance (IPC) scale in order to predict health-related behaviors more effectively, and thus created a Multidimensional Health Locus of Control (MHLC) scale, including Forms A and B. These forms indicate the individuals' general health beliefs.⁹ Each form includes 18 items and three subscales of a six-point Likert scale (strongly disagree to strongly agree) which contain Internal HLC (IHLC) representing the degree of one's belief in internal factors and responsible behaviors towards his/her own illness and health, Powerful others HLC (PHLC) showing to what degree one believes his/her health is determined by others, and Chance HLC (CHLC) showing the degree to which one believes that his/her health depends on luck, fate, and chance.¹⁰ In 1994, Wallston and colleagues developed the third form of this instrument, called Form C of the Multidimensional Health Locus of Control (MHLC-C) scale, in order to assess individuals control beliefs with any medical or health-related condition.¹¹ This form consists of 18 items and four subscales including Internal HLC (IHLC) (6 items), Chance HLC (CHLC) (6 items), Doctors HLC (DHLC) (3 items), and Other People HLC (OHLC) (3 items). Doctors HLC is defined as the degree to which one believes that his/her health is determined by doctors; and the Other people HLC represents to what degree one believes that his/her health is influenced by the actions of others.^{9, 12} This tool has no cut-off point and the mean or median score is used for final evaluation.¹³ The score for each subscale is independent, from 6 to 36 (for the Internal and Chance subscales), and from 3 to 18 (for Doctors and Others People subscales).⁸ In fact,

the MHLC scale (Forms A and B) was designed in general and was not appropriate in all medical or health-related conditions.¹² The underlying rationale supporting this new instrument was that the HLC for a specific condition may be relevant to the health outcomes in comparison with the general HLC.^{12, 14} Although Forms A and B of the MHLC scale have been widely studied in clinical and non-clinical populations, but few studies have been conducted to determine the psychometric properties of Form C of this scale in the clinical settings. This shows an important vacuum in MHLC-C studies. It is expected that this instrument can be the most appropriate one for the clinical domain (including pregnancy).¹⁴ Forms A and B of this scale have been translated in Iran and their validity and reliability have been confirmed among the students, but the psychometric properties of the Form C of this scale have not been studied in Iran.^{15, 16} Hence, the aim of this study was to assess the validity and reliability of MHLC-C scale in pregnant women.

Participants and Methods

Participants

554 pregnant women participated in this cross-sectional study conducted in 2017. They referred to community health centers affiliated with Mashhad and Gonabad Medical Sciences Universities in order to receive prenatal care. Multi-stage random sampling was done in such a way that, from the community health centers of Mashhad and Gonabad, two community health centers were selected randomly from each point. From each center, based on the population of covered pregnant women and among those with inclusion criteria, samples were selected through simple random sampling method. The participants in this study were selected based on the following criteria: being Iranian, at least 18 years old, gestational age of 8-32 weeks, reading and writing literacy, no significant medical or obstetric history before or during pregnancy. Exclusion criteria were: failure to sign the informed consent form and failure to respond to all questions in the scale. The goals of the study were explained in detail to the pregnant women and they were reminded that participation in the study was voluntary. Then, written informed consent was received from the participants.

Procedures

Having received the permission from the designer of the scale, the researcher translated the scale based on the standard method of Beaton and colleagues.¹⁷ The original version

of MHLC-C scale was translated into Farsi by two experts. Then, the two translations were compared and the final version was written with slight variations in the vocabulary. Next, the final translated version was again translated into the original language by two experts who were not in contact with the previous translators. Then, an observer assessed the translated text in order to check the consistency of the translated texts with the original one, and the required revisions were made. Afterward, face validity and construct validity were examined through exploratory factor analysis, and concurrent criterion validity was examined. Moreover, the reliability was assessed through internal consistency and stability methods.

Face Validity

According to Wallston⁸ in each item, the term "pregnancy" replaced the term "condition". The qualitative method was employed to determine the face validity. Five experts in the field of study gave their comments regarding the level of difficulty, irrelevancy, and ambiguity of the items in qualitative terms. Subsequently, the researcher corrected the items and returned the questionnaire in order to receive the final approval.

Construct Validity

To evaluate the construct validity based on factor analysis, the sample size should be 10 to 20 times the number of questionnaire items.¹⁸ In addition, based on the Munro and colleagues' suggestion, a minimum sample size of at least 500 people is preferred for performing factor analysis.¹⁹ Therefore, in the present study, taking into account the probability of more than 10 percent sample loss, 554 questionnaires were delivered to the pregnant women. All of the distributed questionnaires were completed by researcher's follow-up. Before performing factor analysis, the appropriateness of data and the feasibility of the factor analysis must be ensured. The adequacy of the sample size and the intensity of the relationship between the variables were investigated in order to evaluate the appropriateness of the data. Also, two tests were carried out. The first test of the Kaiser-Meyer-Olkin (KMO), which measures the correlation between factors, and Bartlett's Test of Sphericity (BTS) were used to evaluate the significance of the data matrix.¹⁸ Also, it should be mentioned that a principal components analysis (PCA) and the two above-mentioned tests were carried out in order to determine the sufficiency of the extraction of factors and their probable number. In the present study, principal axis factoring (PAF) was used. The orthogonal

rotation approach was also considered by the varimax method in order to achieve a simple structure. The criterion for selecting the cut-off point for the factor loading was 0.32.¹⁸ In order to determine the probable number of underlying factors, three methods were employed: Kaiser's criterion, scree plot and parallel analysis. Parallel analysis is the most authoritative methods for extracting factors that are not often reported in the research articles. In this method, the amount of true real values are compared with those of special random values and each factor whose special value is more than a special random value is accepted as a factor derived from factor analysis.²⁰ Data analysis was performed using SPSS 22 and Monte Carlo PA software.

Concurrent Validity

In order to study the concurrent criterion validity, Form B of the Multidimensional Health Locus of Control (MHLC-B) scale was employed. This form consists of 18 items and three components, i.e. IHLC, PHLC, and CHLC, that measures the beliefs of individuals in the above-mentioned cases.⁹ Validity and reliability of the Persian version of this form had been verified.¹⁶

Reliability

Reliability of MHLC-C scale was determined using internal consistency and stability. To assess internal consistency, Cronbach alpha coefficient was calculated for each subscale. According to Wallston, the Cronbach's alpha coefficient of 0.6 was considered as the minimum acceptable criterion for the internal reliability of the instrument.¹³ The test-retest method was used to determine the stability. The questionnaire was distributed twice in a sample of 40 people randomly selected from research population over a period of 8 weeks. The Pearson correlation coefficient was calculated between the two-time responses. In this phase, 3 questionnaires were excluded from the study due to the point that some questions had not been responded, and the remaining 37 questionnaires were considered for analysis. The ultimate Persian version was thus obtained ([Appendix 1](#)).

Results

In the present study, the mean age of pregnant women was 27.55 years (SD=5.49 years) and the mean age of pregnancy was 21.83 weeks (SD=7.94 weeks). The basic characteristics of the participants in the study are reported in table 1.

In the exploratory factor analysis, performed to verify the construct validity, KMO was 0.837,

Table 1: Basic characteristics of participants (n=554)

Variables		n (%)
Education	Primary	44 (7.9)
	Cycles	89 (16.1)
	Diploma	236 (42.6)
	Associate degree	40 (7.2)
	Undergraduate	133 (24)
	Post-graduate and Higher	12 (2.2)
Number of pregnancies	1	239 (43.1)
	2	197 (35.6)
	3	80 (14.4)
	3>	38 (6.9)
Planned pregnancy	Yes	464 (83.8)
	No	90 (16.2)
Abortion	Yes	106 (19.1)
	No	448 (80.9)

indicating that the variance in the data was suitable for factor analysis and the data was factorized. Similarly, Bartlett's spherical test was significant ($\chi^2=4146.32$, degree of freedom (df)=153, $P<0.001$). As a result, the employment of factor analysis based on the data correlation matrix was also justified.

In the analysis of the number of probability factors based on the Kaiser's criterion, initial eigenvalue greater or equal to 1 (one) in the table of explained variance indicates that four factors are higher than one and can be factorized. These four factors explain 51.18% of the total variance of data (Table 2).

The scree plot showed that the first failure or change in the curve occurred in factor three, which, taking into account the various recommendations which should be one more and one less than the failure point to determine the number of factors¹⁸, can be two to four factors. Finally, the results of the parallel

analysis confirmed the four factors as the factors derived from the exploratory factor analysis (Table 3).

The structure of the factors and their loading rate through the PAF extraction method and orthogonal rotation with the varimax method are shown in table 4.

According to the results of the exploratory factor analysis, items 16, 11, 9, 15, 4, and 2 loaded on Chance; items 8, 6, 12, 17, 1, and 13 loaded on Internal; items 10, 7, and 18 loaded on Other People, and items 3, 14, and 5 loaded on Doctors. Factor loadings were suitable for all items, and the minimum factor load was equal to 0.51, which was higher than the acceptable level.

The results of the concurrent validity with the MHLIC-B scale showed that the Internal, Chance, Doctors, and Other people subscales of Form C had the highest correlation with their counterparts in Form B. Furthermore, the internal subscale of Form C was significantly correlated with the

Table 2: Total Variance Explained

Factor	Initial Eigenvalues			Rotation Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	4.668	25.936	25.936	3.729	20.715	20.715
2	3.243	18.014	43.950	2.685	14.915	35.630
3	1.851	10.282	54.232	1.616	8.976	44.606
4	1.414	7.857	62.088	1.184	6.578	51.184

Extraction Method: Principal Axis Factoring

Table 3: Parallel Analysis (Monte Carlo PA)

Factor Number	Actual eigenvalue from PAF	Random order from parallel analysis	Decision
1	4.66	1.32	Accept
2	3.24	1.26	Accept
3	1.85	1.21	Accept
4	1.41	1.17	Accept
5	0.98	1.13	Reject

Rejected after factor 4

Table 4: Rotated Factor Matrix^a

	Factor			
	1	2	3	4
Item 16	0.841			
Item 11	0.830			
Item 9	0.825			
Item 15	0.807			
Item 4	0.708			
Item 2	0.657			
Item 8		0.732		
Item 6		0.727		
Item 12		0.666		
Item 17		0.604		
Item 1		0.580		
Item 13		0.563		
Item 10			0.797	
Item 7			0.708	
Item 18			0.613	
Item 3				0.604
Item 14				0.594
Item 5				0.516

Factor 1: Chance; Factor 2: Internal; Factor 3: Other People; Factor 4: Doctors

Powerful others of Form B. Also, Doctors and Other People subscales were correlated with the Internal subscale of Form C (Table 5).

The results of the reliability of the MHLC-C scale showed that Cronbach's alpha coefficient for each of Chance, Internal, Other people, and Doctors subscales was 0.90, 0.82, 0.75, and 0.62, respectively. The results of the test-retest showed that in a period of 8 weeks, there was a positive correlation between all subscales and only Doctors subscale showed a significant difference between the first and second pairs (Table 6).

Discussion

This study was aimed to assess the validity and

reliability of MHLC-C scale to provide a basis to employ this scale in Iran. This scale has been used in many studies worldwide due to some features of it such as ease of implementation, objectivity and appropriate validity, especially in the field of health, health promotion and health psychology.¹³ The results of the current research also indicate that the MHLC-C scale has an acceptable validity and reliability in pregnant women. The results of the exploratory factor analysis and the selection of an eigenvalue greater than 1 (one) revealed a four-factor solution for this scale, which was supported by scree plot and parallel analysis. On the other hand, these results are consistent with the factor model presented by the original authors of the

Table 5: Correlation matrix for subscales of Form C and B of the Multidimensional Health Locus of Control (MHLC) scale.

Form C subscales	Form B subscales		
	Internal	Chance	Powerful others
Internal	1**	0.075	0.284**
Chance	0.075	1**	0.037
Doctors	0.284*	0.006-	0.555**
Other People	0.163*	0.048	0.854**

*P<0.05; **P<0.01

Table 6: Paired sample correlations of Form C of the Multidimensional Health Locus of Control (MHLC-C) subscales by using test-retest

Pair	N	Correlation	P
Internal 1 & 2	37	0.751	0.95
Chance 1 & 2	37	0.731	0.12
Doctors 1 & 2	37	0.785	0.02
Other people 1 & 2	37	0.616	0.75

P<0.05

questionnaire⁸ and some other studies.²¹⁻²⁴ However, in a study by Jomeen and colleagues, who examined the psychometric properties of this scale in a sample of pregnant women, they reported a three-factor structure for this scale.¹² Other study results of 374 Hungarian patients with cancer, diabetes, irritable bowel syndrome, cardiovascular, and musculoskeletal disorders also showed a three-factor structure in which the Doctors and Others People subscales were placed on a shared component.¹⁴ In this research and based on the explained variance, Chance, Internal, Other people, and Doctors subscales were the first to fourth factors, respectively, whereas in the study conducted by Wallston and colleagues, Internal, Chance, Doctors, and Other People subscales were the first to fourth factors, respectively.⁸ Marks and colleagues argued that Asians, especially those living in the Middle East, have a stronger belief in luck, especially fame and destiny, summarized in the Chance HLC subscale based on their cultural, ethnic, and religious beliefs.²⁵ This was also true for the participants in this study, and the Chance subscale explained the most variance in data. The results obtained from the concurrent implementation with the MHLC-B scale in this study are in line with the results of the Wallston's study.⁸ He showed that the subscales of Form C had a positive and significant correlation with their counterparts in Form B. The results of this study showed an acceptable internal consistency for the MHLC-C scale (Cronbach's alpha coefficient for subscales from 0.62 to 0.90). In Wallston and colleagues' study, Cronbach's alpha coefficient was suitable for all subscales, ranging from 0.66 to 0.83.⁸ In the study of Lundgren and colleagues, the Cronbach alpha coefficient of subscales was reported to be 0.61 to 0.82.²¹ The results of the test-retest reliability of the study showed a good stability for all subscales other than Doctors. In fact, various results have been reported for the reliability (stability) of the MHLC scale in various studies, which depend on factors such as the study population and the duration of the time between the responses.²⁶ To sum up, it should be mentioned that the evidence confirms the validity and reliability of the MHLC-C scale in pregnant women. Although the present study is the first one conducted in Iran to assess the psychometric properties of MHLC-C scale, it has its own limitations and delimitations. One of the limitations of this study was that those who had at least the primary education participated in the study, so the results cannot be generalized to illiterate mothers. Also, the socio-economic status of participants was not considered, but it is an important socio-cultural variable that

cannot be overlooked and can be helpful in explaining health control beliefs. Considering the importance of the MHLC scale all over the world and its various efficacies, especially in the field of health, conducting confirmatory factor analysis of this instrument and its application on different samples and groups of patients are recommended in future studies.

Conclusion

Given the importance of HLC in the field of pregnancy and childbirth, the availability of the appropriate tool for accurately evaluating women's health control beliefs in this period is very important. The results of this study showed that the MHLC-C scale has acceptable face validity, concurrent validity, construct validity, internal consistency, and stability reliability in pregnant women and can be used to assess individuals control beliefs with any medical or health-related condition.

Acknowledgement

We would like to express our special thanks to the Vice-Chancellor of Research and Technology of Gonabad Medical Sciences University who gave us the opportunity to do this project as well as all the mothers who, with their sincere participation, made this research possible.

Conflict of Interest: None declared.

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