The Factor Structure and Psychometric Properties of the Persian Version of the Revised Prenatal Coping Inventory (Nu-PCI)

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ABSTRACT

Introduction: Familiarity with coping strategies is essential for stress management during pregnancy. The Revised Prenatal Coping Inventory (Nu-PCI) was developed to assess coping strategies during pregnancy.

Aim: This study aimed to assess the factor structure and psychometric properties of the Persian version of the Nu-PCI.

Materials and Methods: After forward-backward translation, the Nu-PCI was administered to 210 pregnant women who were enrolled in two teaching referral clinics in the North of the Islamic Republic of Iran (Babol). The participants completed the Persian Nu-PCI and Ways of Coping Questionnaire (WCQ), which was used to determine the validity of the Persian Nu-PCI. To test construct validity of the Persian Nu-PCI, a principal components factor analysis was performed.

Results: Principal components analysis with varimax rotation showed a best fitting 3-factor structure similar to the original with three coping subscales: planning-preparation, avoidance, and spiritual-positive coping. The Persian Nu-PCI was internally consistent and within the acceptable range (α=0.89–0.97). The alpha coefficients for the Nu-PCI and the subscales of planning-preparation, avoidance, and spiritual-positive coping were high. Test-retest coefficients for the Nu-PCI and subscales were 0.98–0.99. The Nu-PCI and its subscales correlated with the WCQ in the entire sample and within each trimester.

Conclusion: The Persian version of the Nu-PCI and the subscales of planning-preparation, avoidance, and spiritual-positive coping represent the first reliable standardized tool for measuring coping strategies during pregnancy in the Islamic Republic of Iran. Therefore, it can be applied as a quick and accurate preliminary screening tool for evaluating coping strategies throughout pregnancy in clinics and other medical and research settings.

INTRODUCTION

Pregnancy is an important life event for many women [1], and it is associated with various physical and psychological changes. Although most pregnant women adapt well to these changes, many women experience noticeable distress [2], which can be brought on by changes in roles and life situations, as well as relationship problems [1]. Emotional distress during pregnancy increases the risk of negative outcomes for both mother and newborn, such as increased risk of premature birth, low birth weight, pre-eclampsia, gestational diabetes, use of analgesia, and unplanned Caesareans [3,4]. Research emphasizes that, psycho-social factors are important predictors for pregnancy stress [5]. Recent evidence also supports that stress management can reduce complications in pregnancy [6].

Coping has been defined as any attempt, successful or unsuccessful, to manage conditions that are sensed as stressors [7]. Coping can also refer to a dynamic process by which a person responds to stressful situations [8-11]. Lazarys RS and Folkman S (1984) reported that, strategies of coping related to changing cognitive or behavioral factors were the most successful at managing stressful occurrences [7]. A study found that, individuals can cope with stressful situations and that coping can act as a moderator in reducing emotional distress [12]. Coping efforts may influence birth outcomes by reducing or preventing negative emotional, behavioural, cognitive, and physiological responses to stressors [13,14]. Previous studies have shown that, multiple coping strategies may be successfully used in stressful situations [15,16].

There are several tools to evaluate coping strategies. Most studies use the general 19-item Utrecht coping list, which includes emotion-focused coping and problem-focused coping [17,18]. Adapting coping strategies such as active and problem-focused coping strategies better resolve the stressor and thereby, protect against adverse birth outcomes, whereas, maladaptive forms of

coping are passive and generally less effective [12,16].

Problem-focused coping strategies relieve stress, whereas, emotion-focused coping strategies decrease negative affective responses to stress [12]. Avoidance coping is a form of emotion-focused coping and in this strategy, the person attempts to escape from the feelings of distress related to the stressor. Avoidance coping is frequently associated with negative emotional outcomes [19-22]. A recent systemic review of coping during pregnancy showed that, poor coping skills during pregnancy were associated with postpartum depression, and preterm birth [23]. Coping styles during pregnancy can be influenced by the context of the stressful situation, personal characteristics, environmental factors, social class, ethnicity, education, and emotional responses [24-26]. Cultural factors also influence a pregnant woman's perception and expression of her stress and coping strategies. Therefore, use of standardized and validated assessment instruments is essential in the Iranian pregnant population. Yali AN and Lobel N (1999) developed a pregnancy-specific coping measure, the Prenatal Coping Inventory (PCI) [12]. The 36-item PCI was derived in parts from Lazarus RS and Folkman S [7]. Hamilton JG and Lobel M (2008) created the revised prenatal coping inventory (Nu-PCI), an adapted and expanded version of the PCI [24]. The aim of this study was to translate and validate a culturally adapted Persian version of the Nu-PCI.

MATERIALS AND METHODS

Participant Selection: This cross-sectional study was conducted between November 2012 and January 2014. Two hundred ten pregnant women who received prenatal care in two of the teaching hospitals of the Babol University of Medical Sciences were selected as participants. The Kaiser-Meyer-Olkin (KMO), a measure of sampling adequacy, was 0.92. A KMO>0.70 has been indicated as middling and >0.90 as marvelous.

All aspects of the study were approved by the Medical Ethics Committee of the Babol University of Medical Sciences. Inclusion criteria were women aged over 18 years without pregnancy complications and willingness to participate in the study. Women with pregnancy complications such as hypertension, diabetes, preterm labour, and maternal bleeding were excluded from the study. Available sampling was utilized to recruit the participants based on their gestational age. Of 210 eligible women who participated in the study, 70 were in the first trimester (1–13 weeks), 70 in the second trimester (14–26 weeks), and 70 in the third trimester (27–42 weeks). Two midwives collected demographic and obstetrics data such as pregnancy risks, gestational age, and mother's age and education. The participants completed the revised Prenatal Coping Inventory (Nu-PCI) and WCQ during a prenatal visit. The midwives gave a brief explanation regarding the purpose of the study and how to complete the questionnaires. The subjects were also told that, their responses would be treated with utmost confidentiality. The questionnaires took approximately 20 min to complete. To examine the test-retest reliability of the Persian Nu-PCI, 30 pregnant women completed the Nu-PCI again two weeks after their first survey.

Translation procedure: The original Nu-PCI was translated into Persian by two official English translators. Two other English-speaking translators, who were blind to the original scale, translated this Persian version of the Nu-PCI back into English. The forward and backward translations were submitted to a three-member bilingual expert committee consisting of two psychologists and a midwife. The committee discussed difficulties, mistakes, and various options for the items. The committee proposed to delete the questions related to alcohol. As alcohol consumption is a crime in Iran, the committee was concerned that the subjects would not answer honestly. Thus, items 21 and 40 were omitted. The resultant 40-item translated questionnaire was discussed in the committee and the divergence between the translations was resolved. As a preliminary test, the pre-final version of the Persian Nu-PCI was administered to 30 pregnant women. During this testing, if we observed that some phrases were difficult for the subjects, we corrected the translation.

Measures: RNu-PCI; Yali AM and Lobel M (1999) developed a 36-item PCI [12]. Hamilton JG and Lobel M (2008) added new items to the original PCI and developed a 42-item measure. In the Nu-PCI, respondents report how often they used different coping mechanisms in the past month on a range from 0 to 4 (0, never; 1, almost never; 2, sometimes; 3, fairly often; 4, very often). The Nu-PCI consists of 42 items with three reliable coping subscales: planning-preparation, avoidance, and spiritual-positive coping. This scale has been validated in a previous study. Cronbach's alpha for the planning-preparation subscale in early, mid, and late pregnancy was 0.82, 0.85, and 0.86, respectively. Cronbach's alpha for the avoidance subscale ranged from 0.77 to 0.80 during pregnancy. Cronbach's alpha for the spiritual-positive subscale varied from 0.73 to 0.78 over the three trimesters of pregnancy [24].

Ways of Coping Questionnaire (WCQ): Folkman S and Lazarus RS developed the WCQ to identify thoughts and actions that people use to cope with stressors [27]. This scale consists of 66 items and eight subscales that cover self-controlling (trying to keep feelings from interfering with activities), seeking social support (talking to others

about the problem), confrontive coping (directly challenging the stressful event), distancing (making light of the problem), accepting responsibility (believing one is responsible for the problem), planful problem-solving (seeking a solution to the problem), positive re-appraisal (re-evaluating the problem to find unexpected benefits), and escape/avoidance (avoiding people and reminders of the problem) [27,28]. The WCQ is a valid and reliable scale of coping strategies that is widely used in psychological research. The Persian version of the WCQ was used in this study [29].

STATISTICAL ANALYSIS

The demographic data were described using the mean and standard deviation. Cronbach's alpha was used to assess internal consistency of the Persian Nu-PCI. Pearson correlation coefficient between the scale scores at test (first survey) and retest (two weeks after first survey) was calculated for test-retest reliability of the Persian Nu-PCI. To examine the relationship between the Nu-PCI and WCQ, Pearson correlation was conducted. To test construct validity of the Persian Nu-PCI, a principal components factor analysis was performed. Varimax oblique rotation was performed to identify factor analysis. All statistical analysis was performed using SPSS version 18.0; $p < 0.05$ indicated statistical significance.

RESULTS

[Table/Fig-1] shows the demographic characteristics of the subjects taken as a whole and divided by trimester. The mean age and education of the participants was 24.43 years (SD = 4.8 years) and 10.70 years (SD = 2.7 years), respectively. There were no significant differences in age, education, and parity among pregnant women in the first, second, and third trimesters.

Reliability

[Table/Fig-2] shows the means, standard deviations, and Cronbach's alpha coefficients (α) for the Persian Nu-PCI and the three subscales in the first, second, and third trimesters of pregnancy. The alpha coefficients, which assess internal correlation, were high (0.49–0.97) for the three subscales of planning-preparation, spiritual-positive, and avoidance throughout the pregnancy.

To examine the test-retest reliability of the Persian Nu-PCI, Pearson correlation coefficient between the scale scores at test (first survey) and retest (two weeks after the first survey) were calculated for women in the first, second, and third trimesters [Table/Fig-3]. The test-retest coefficient for the Persian Nu-PCI was 0.98, and the three subscales ranged from 0.98 to 0.99.

Validity

Correlation between the Nu-PCI and WCQ: [Table/Fig-4] shows the correlations of the Persian Nu-PCI and its subscales with the

Variables	First Mean (SD)	Second Mean (SD)	Third Mean (SD)	All subjects Mean (SD)
Age	24.26 (5.19)	24.57(4.2)	24.48 (4.93)	24.43 (4.8)
Education	10.96 (2.68)	10.49 (2.68)	10.64 (2.77)	10.70 (2.71)
Parity	1.68 (1.19)	0.85 (0.86)	0.71 (0.85)	1.08 (1.06)

[Table/Fig-1]: Demographic characteristics of women in three trimesters of pregnancy.

Nu-PCI	First trimester (N=70)		Second trimester (N=70)		Third trimester (N=70)		All subjects (N=210)	
	Mean (SD)	α	Mean (SD)	α	Mean (SD)	α	Mean (SD)	α
Planning-preparation	2.14(1.03)	0.960	2.32(1.00)	0.969	2.49(1.01)	0.970	2.32(1.02)	0.966
Avoidance	1.48(1.11)	0.959	1.36(1.50)	0.993	1.32(0.36)	0.485	1.39(1.09)	0.964
Spiritual-positive coping	2.90(0.99)	0.924	2.77(0.94)	0.891	2.94(0.86)	0.847	2.87(0.93)	0.890
Nu-PCI-40 item	1.97(0.66)	0.918	1.98(0.77)	0.942	2.06(0.53)	0.904	2.00(0.66)	0.924

[Table/Fig-2]: Internal consistency for Nu-PCI and subscales in three trimester of pregnancy.

Nu-PCI	Mean (SD) at test 1 (N=30)	Mean (SD) at test (N=30)	r*
Planning-preparation	2.22±0.88	2.18±0.94	0.983**
Avoidance	2.18±0.94	2.12±1.12	0.995**
Spiritual-positive coping	2.76±1.12	2.80±1.04	0.995**
Nu-PCI-40 item	2.28±0.54	2.73±0.93	0.977**

[Table/Fig-3]: Test-retest reliability of the Nu-PCI and subscales during pregnancy.
*Pearson correlation coefficient

Nu-PCI	First trimester (N=70)			Second trimester (N=70)			Third trimester (N=70)			All subjects (N=210)		
WOCQ	P-S	E-S	Total	P-S	E-S	Total	P-S	E-S	Total	P-S	E-S	Total
Planning-preparation	0.707**	- 0.012	0.470**	0.450**	-0.114	0.126	0.555**	0.310**	0.488**	0.542**	-0.009	0.309**
Avoidance	-0.175	0.540**	0.270*	-0.098	0.593**	0.593**	0.183	0.345**	0.293*	-0.070	0.606**	0.394**
Spiritual-positive coping	0.446**	-0.028	0.282*	-0.042	- 0.025	-0.005	0.128	0.071	0.112	0.231**	-0.005	0.113
Total Nu-PCI	0.371**	0.458**	0.568**	0.175**	0.532**	0.560**	0.534**	0.368**	0.507**	0.356**	0.420**	0.509**

[Table/Fig-4]: Pearson correlation of the Nu-PCI and its subscales scores with WOCQ and two subscales during three trimester of the pregnancy.
WOCQ: Ways of Coping Questionnaire; P-S: Problem-solving, E-S: Emotional-solving.
**p<0.01, *p<0.05

Factor 1 (Planning-preparation)		Factor 2 (Avoidance)		Factor 3 (Spiritual-positive coping)	
Item	PME	Item	PME	Item	PME
1	0.818	4	0.762	6	0.856
2	0.818	7	0.780	9	0.838
3	0.810	8	0.772	16	0.850
5	0.825	10	0.815	32	0.508
11	0.807	15	0.683	35	0.822
12	0.832	18	0.756	39	0.812
13	0.827	20	0.792		
14	0.819	24	0.802		
17	0.749	25	0.698		
19	0.821	26	0.772		
21	0.758	28	0.842		
22	0.835	29	0.816		
23	0.765	30	0.772		
27	0.789	31	0.824		
33	0.716	34	0.707		
38	0.796	36	0.786		
40	0.768	37	0.795		

[Table/Fig-5]: Principal component analysis with varimax rotation of the Persian version of the revised prenatal coping inventory (Nu-PCI).
PME - Pattern Matrix Element

variance. [Table/Fig-5] lists the items with large pattern matrix elements. The three factors were labeled as: planning-preparation, with 17 items (1, 2, 3, 5, 11, 12, 13, 14, 17, 19, 21,22, 23, 27, 33, 38, and 40); avoidance coping, with 17 items (4, 7, 8, 10, 15, 18, 20, 24, 25, 26, 28, 29, 30, 31, 34, 36, and 37); and spiritual-positive coping, with six items (6, 9, 16, 32, 35, and 39). All three factor loadings were significant, ranging Pattern Matrix Element (PME) from 0.716 to 0.835 for planning-preparation, from 0.698 to 0.842 for avoidance coping, and from 0.508 to 0.856 for spiritual-positive coping.

DISCUSSION

This is the first study that assesses the psychometric properties of a Persian version of the Nu-PCI in a population of pregnant Iranian women.

We showed that, the alpha coefficients for the Persian Nu-PCI and the subscales of planning-preparation, avoidance, and spiritual-positive coping were high throughout pregnancy. These findings also validated that the Persian Nu-PCI was internally consistent for all domains. In addition, the test-retest coefficients for the Persian Nu-PCI and its three subscales were high, indicating high reproducibility over time. Overall, psychometric testing of the Persian Nu-PCI showed sufficient reliability for use in pregnant Iranian women. Although the literature showed that, epidemiologic research was limited due to the unavailability of adequate and consistent assessment procedures, our reliability finding is comparable with the results of similar studies. These studies also showed high internal Nu-PCI reliability (Cronbach's alpha = 0.73–0.85) [12,22,24]. Giurgescu et al., (2006) reported reliability coefficients of the PCI subscales in pregnant women ranges from 0.71 to 0.83 for preparation-planning and 0.66 to 0.75 for avoidance [22,30]. Borcherding KE (2009) also showed high Cronbach's alpha of the PCI subscales (0.73–0.96) [31].

Our study found that, the strongest correlation with the WCQ was in planning-preparation, and the weakest correlation was in spiritual-positive coping, both throughout the entire sample and also in all three trimester of pregnancy. Yali AM and Lobel M (2008) found that, Cronbach's alpha coefficients across the first, second, and third trimesters were, respectively, 0.82, 0.85, and 0.86 for planning-preparation; 0.77, 0.79, and 0.80 for avoidance; and 0.73, 0.78, and 0.77 for spiritual-positive coping [22].

Gathering data indicates sufficient validity for use of the Persian Nu-PCI in pregnant Iranian women. This study showed a significant correlation of the Nu-PCI and its subscales with the WCQ throughout pregnancy. Additionally, the Persian Nu-PCI domains indicated the ability to correlate with the WCQ domains, indicating a satisfactory convergent validity of the instrument. As with Yali AM and Lobel M (2002) and Hamilton JG and Lobel M (2008), strong correlations in the domain scores of the Nu-PCI showed a sufficient concurrent validity [22,24]. The WCQ, a similar instrument that is widely used in psychological research, showed a valid scale of coping strategies [27, 28], and there were acceptable reliability coefficients and correlations with related constructs in items of the questionnaire [12,23,24].

The results of our principal components analysis showed a satisfactory three-factor solution for the Persian Nu-PCI, explaining

WCQ divided by trimester and throughout pregnancy. The planning-preparation subscale was significantly and positively correlated with problem-solving in the WCQ (r=0.45–0.71, p<0.05) in all three trimesters and throughout pregnancy. Planning-preparation was also positively correlated with total WCQ (r=0.13–0.49, p<0.05). Avoidance coping was significantly and positively correlated with total WCQ in all three trimesters and throughout pregnancy (r = 0.27–0.59, p<0.05). Spiritual-positive coping is positively correlated with total WCQ. The Persian 40-item Nu-PCI significantly and positively correlated with total WCQ and both subscales (problem-solving and emotional-solving) in all three trimesters and throughout pregnancy (r = 0.17–0.56, p<0.05).

Factor analysis of the Nu-PCI: To test the construct validity of the Persian Nu-PCI, a principal components factor analysis was performed on the item responses from the total sample of 210 participants. Before performing the analysis, KMO and Bartlett's test of Sphericity were studied to determine whether the data were suitable for factor analysis. KMO measures the sampling adequacy. A KMO of 0.92 signifies proper correlation of the factors. Bartlett's test is used to measure the homogeneity of the test items, and it was significant for the factor analysis (p<0.001). Based on eigen values greater than 1, three factors accounted for 64% of the

64% of the total variance and including the domains of planning-preparation, avoidance, and spiritual-positive coping, which were labeled as the three factors. A study of the literature represented inconsistent findings in terms of factor solution of the PCI [12,17], while two recent validation studies suggested a best fitting three-factor structure for the Nu-PCI. The result of the three-factor structure of the Persian Nu-PCI is compatible with the suggested three-factor structure of the original Nu-PCI [22,24]. Huizink et al., used the generic 19-item Utrecht coping list. Emotion–focused coping and problem–focused coping (two factors) were recognized but it cannot consider the aspects of coping unique to prenatal context [17]. Yali AM and Lobel M determined different factors with Eigen values greater than one, accounting for 65% of the variance in the 36-item (PCI). The difference in factor structure of the PCI may reflect the measurement characteristics of the instrument itself and the essence of the prenatal coping response. It may also mirror the sample's cultural or linguistic peculiarities, which can affect understanding of the questions or concepts with which the instrument deals [22]. Additionally, sociodemographic factors that influence coping styles vary from study to study [31]. Further, validation is needed to investigate the nature of this gap, which may require cultural, linguistic, and conceptual adjustment.

LIMITATION

There are limitations in this study that need to be considered. Our study was conducted at outpatient clinics and all of the women had uncomplicated pregnancies; thus, further studies are needed on women with pregnancy complications. Despite this potential limitation, our results in connection with the validity and reliability are supported by previously conducted validation studies on the Nu-PCI [24].

CONCLUSION

In conclusion, the newly developed Persian Nu-PCI has been demonstrated to be a reliable and valid instrument with good psychometric properties in a community sample of pregnant Iranian women. It recognized firm, distinct, and conceptually interpretable ways of coping during pregnancy for decreasing and preventing the harmful effects of stress, and thus adverse physical and psychological pregnancy outcomes. We suggest it be applied as a quick and accurate preliminary screening tool for evaluating coping strategies through pregnancy in clinics and in other medical and research settings.

AUTHOR CONTRIBUTIONS

This work was performed in collaboration between all authors. Author FM conducted the design of the study. Authors FM, SE, and PH wrote the protocol, and wrote the first draft of the manuscript. Analyses were completed by author KS. All authors read and approved the final manuscript.

Ethical Issue: This study was approved by the Ethics Committee of the Babol University of Medical Sciences.

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