

Psychometric Testing of an Arabic Translation of the Revised-Illness Perception Questionnaire (IPQ-R) for Chronic Illness Patients

Salah ABERKANE

Submitted: 20 Jul 2016

Accepted: 6 Jul 2017

Online: 18 Aug 2017

Department of Psychology, Faculty of Human and Social Sciences, University of Khenchela, Algeria

To cite this article: Aberkane S. Psychometric testing of an Arabic translation of the Revised-Illness Perception Questionnaire (IPQ-R) for chronic illness patients. *Malays J Med Sci.* 2017;24(4):74–85. <https://doi.org/10.21315/mjms2017.24.4.9>

To link to this article: <https://doi.org/10.21315/mjms2017.24.4.9>

Abstract

Background: Researchers lack a properly validated instrument to measure perceptions of chronic disease in Arabic language contexts. This study aimed to adapt and validate the Revised-Illness Perception Questionnaire (IPQ-R) for Arabic speaking chronic illness patients.

Methods: A cross-sectional design was conducted to examine the psychometric properties of the adapted English version of the IPQ-R for Arabic speaking chronic illness patients. The study instrument was an Arabic version of the IPQ-R prepared through a translation process. The reliability and validity of the instrument were assessed using exploratory and confirmatory factor analysis and Cronbach's alpha coefficient. Three hundred and sixteen participants (ages 16–79) from the Batna region in Algeria completed the IPQ-R.

Results: A total of 316 (100%) patients responded to this study. Regarding internal consistency, Cronbach's alpha a coefficient was consistently higher than 0.45. Several areas of fit were identified and substantial changes to the measurement model were made, such as the deletion of 22 items from the original 38 -item IPQ-R and two items from the original 18 causal items this accounted for 64.63% of the total variance, and the respecification of indicators had to be applied to achieve acceptable model fit. The final model consists of two sections: The 16-item Arabic IPQ-R, which had a good fit; (CMIN/Df = 1.30, $P < 0.001$, CFI = 0.93, RMSEA = 0.08, SRMR = 0.03), and was similar to the Arabic 16 causal items (CMIN/DF = 1.11, $P < 0.001$, CFI = 0.95, RMSEA = 0.080, SRMR = 0.02).

Conclusion: The factor structure concurred with prior finding despite differences to the type of sample and cultural considerations that might explain these findings. Replication of this study in Algerian patients with specific illness, such as silicosis, breast cancer and multiple sclerosis. Further psychometric testing on other large samples is recommended.

Keywords: illness perception, exploratory factor analysis, confirmatory factor analysis, chronic illness

Introduction

Progress in several areas of health care science has produced a remarkable reduction to the number of diseases related mortalities despite an increasing prevalence of chronic illness. These illnesses have been managed in a variety of nonmedical settings, including at home, at workplace, and in community settings,

rather than in the healthcare system such as at a hospital or nursing facility (1). Chronic health conditions have begun to affect an increasing number of Algerians. People affected by chronic illnesses often face wide-ranging chronic health problems. Consequently, has become increasingly important classify the factors that positively and negatively influence people's chronic health outcomes. Changing lifestyles and

further advances in medical science will continue to have a major influence on individuals' health and overall well-being and will result in increases to the incidence and prevalence of chronic illnesses.

As chronic conditions are rarely linked to one specific cause, they are managed rather than cured. In the year the cited study was conducted, approximately 20 million people in Algeria lived with at least one chronic condition (2). Han et al. defined chronic illness as 'a state of disease with irrevocable pathological change, lasting for more than three months and eventually causing permanent disability.' Germino (3) further explains chronic illness as continuous and pervading previous features of life. Chronic illnesses are permanent and do not have predictable resolutions (1, 3, 4). They are now the principal cause of mortality and disability in the world and their prevalence is increasing as the global population ages (5, 6).

Each person produces their own cognitive and emotional representations of their illness in order to understand the broad range of problems related to it and to take the necessary action to manage it (7). Based on cognitive and emotional factors, illness management is mainly represented in the form of the Illness Perception Model (IPM) or Common Sense Model, which provides a clearer view of illness representations in the following areas give a clearer view of illness representations:

1. Cause: Personal ideas about the various causes of illness that include beliefs about its biological, medical, behavioural, or psychological causes.
2. Consequence: Views about the expected outcome that consists of beliefs about the impact of the illness on mental and physical health.
3. Timeline: Views about the illness trajectory (particularly the cyclical nature) of the chronic disease held by the patient, such as beliefs about the course of the illness and the persistence of symptoms.
4. Control: Views on how to control symptoms, including beliefs as to whether the illness can be controlled at all.

Additionally, a sixth dimension, illness coherence, has been added to the model since its original inception. This added dimension refers

to how well people understand their illnesses and the extent to which they think about them in a coherent way (8). These representations consist of several features such as chronicity, consequences, and severity that demonstrate the coping strategies developed by chronically ill individuals. This is shown through its application to several health problems, including asthma (9, 10), multiple sclerosis (11), heart disease (12), infertility (13), chronic pain (14), cancer (15) and allergies (10). It is evident that goals development and achievement is guided by an individual's representation of his or her chronic illness as is the evaluation of coping strategies outcomes. Additionally, quality of life may be related to cognitive representations of both illness and treatment (1, 16). Chronic illness has a major effect on patients' disability levels and the range of difficulties experienced varies greatly from one individual to the next (17). The study about chronic illness perception in an Algerian sample population used a version of the Revised-Illness Perception Questionnaire (IPQ-R) adapted for chronic illness patients with asthma, diabetes, high blood pressure, and chronic kidney disease. Given the growing interest in patient perception, as a tool to both understand the nature of disease management and to develop psychological interventions to ease the burden of self-care behavior in chronic illnesses. Weinman et al. believed it was possible to develop a flexible. Theoretical, and psychometrically based evaluation questionnaire that could be adapted for specific patient groups in relation to specific health threats or contexts (7, 18). The concept of illness perception, as measured by IPM, is particularly relevant in chronic illnesses. By definition, most patients live with a chronic illness over a protracted period. As such, it is important to understand how they perceive their illnesses, in order to comprehend how they cope with their medical situation. This questionnaire was translated into Arabic because no Arabic language scales measuring the illness representation in patients with chronic conditions had previously been published. This paper presents the results of the data collected on chronic illness perception in the Arabic speaking patients and tests the psychometric properties of the translated version of the IPQ-R. We hypothesised that factor analysis of the Arabic version would yield three sections reflecting the 38 IPQ-R items, identity and causal attributions dimensions.

Method

Participants

A sample of 316 patients with chronic illnesses were recruited from Algerian clinics affiliated with hospitals in the Batna and Arris regions from September 2013 to September 2014. Patients receiving treatment for four illness types; asthma, diabetes, high blood pressure and chronic kidney disease were studied to validate of the IPQ-R in this region. An ability to read and write in the Arabic language and a medical diagnosis of a chronic condition were required for inclusion in the study. All eligible patients in each clinic were invited to participate. The characteristics of the four illness groups are presented in Table 1. About 48.7% of the sample were women. The majority of the participants had married (53.8%); 3.8% were divorced, and 36.0% had never been married. With regard to the educational attainment, 22.7% of the participants reported that they had never attended school, 14.5% said that they had completed primary school, 27.2% had finished middle school, 25.3% were secondary school graduates, and 10.1% had attended a post-secondary institution. A majority of the participants had median economic level, 75.3%. The participants' mean age was 43.9 (SD = 15.7). All participants had experienced illness for at least six months (M = 8.1 years, SD = 7.3). Morbidity profiles indicated that 19.6% of the study sample had asthma, 31.0% had chronic kidney disease, 25.9% had high blood pressure, and 23.4% had diabetes.

Translation of the IPQ-R

Permission to translate and validate the IPQ-R was obtained from its original authors (8). Two native Arabic speakers, who were aware of the IPQ-R's objectives, first translated the IPQ-R to Arabic. Two native-English speakers, who were not familiar with the IPQ-R, performed a

back-translation from the Arabic into English. Any discrepancies between the Arabic and English translators were resolved by agreement. The original and back translated English versions were judged comparable by a third native English speaker. The Arabic version was judged to be an accurate translation of the original English version. The final Arabic version was approved by the original authors.

Measures

The Revised-Illness Perception Questionnaire (IPQ-R)

The IPQ-R is divided into three sections: illness identity, causal attributions and IPQ dimensions. These sections were presented separately. The identity scale is presented first and consists of the 12 commonly experienced symptoms included in the original IPQ: pain, nausea, breathlessness, weight change, fatigue, stiff joints, sore eyes, headaches, upset stomach, sleep difficulties, dizziness and loss of strength. Two new symptoms, sore throat and wheeziness, were added to the list. The instructions for this subscale were also altered. The IPQ-R first asks patients to rate whether or not they have experienced each symptom since the onset their illness using a yes/no response format. They are then asked if they perceive these symptoms to be particularly related to their illness using the same format. The sum of the yes-rated items on this second rating forms the illness identity subscale. In the following section the identity, consequences, timeline acute/ chronic, timeline cyclical, coherence, and emotional dimensions of the IPQ-R are rated on the original 5-point Likert type scale: strongly disagree, disagree, neither agree nor disagree, agree, or strongly agree. The causal attribution dimension is presented as a separate section which uses the same Likert-type scale. The number of attribution items was extended from 10 to 18 (8).

Table 1. Characteristics of patient samples

Illness Group	N	Gender (% Male)	Length of Illness Mean (SD) years	Age Mean (SD) years
Asthma	62	63.3	10.9 (10.0)	40.7 (13 .9)
Diabetes	74	64.6	5.6 (4.9)	45.2 (16.0)
High Blood Pressure	82	36.5	10.1 (7.3)	55.1 (14.0)
Chronic Kidney disease	98	60	6.4 (5.6)	35.6 (11.9)

Data analysis

The validation of the IPQ-R questionnaire was calculated by exploratory/confirmatory factor analysis. The initial model was based on the eight-factor model obtained from a previous exploratory factor analysis. Each of the observed variables was initially assumed to be associated with the factor variable that had its largest factor loading from the varimax rotation results of the exploratory factor analysis. The adoption of varimax rotation was motivated by its wide use in factor analysis. This is an orthogonal rotation of the factor axes to maximise the squared load variance of a factor on all variables in a factor matrix, by the extraction factors. Among the many procedures that exist for rotational factors, but the decision is usually fair if the factors will be, a priori, limited to being orthogonal or will be unrestricted when limited; the program of choice of each is varimax.

There are several options available for unrestricted rotation, most of which give reasonable solutions. Some like oblique rotation include a parameter to define that influences the degree to which the solution is forced towards orthogonality. The most elegant unrestricted rotation begins with varimax, then using oblique rotation, such as promax to provide an unrestricted version of the choice of varimax rotation (19, 20). Internal consistency was assessed using Cronbach's alpha coefficient. All statistical analyses were performed with IBM SPSS Statistics version 22.0 and AMOS software version 22 for confirmatory factor analysis. Sample characteristics were described using means, and standard deviation.

Results

Exploratory Factor Analysis and Reliability

To validate the factor structure of the IPQ-R and to determine which of the items best represented each of the dimensions, two separate principal components analyses (PCA) were conducted on the preliminary data collected from the 316 patients. The causal items were entered into a separate PCA as, unlike the other dimensions, they could be grouped into a number of factors. Varimax rotation produced seven factors which accounted for 66.64% of the total variance and the selection criteria was Eigen values greater than one. Factor analyses were used to evaluate the factor structure of the

IPQ-R. Prior to analysis, we screened the data for univariate outliers. The appropriateness of factor analysis was supported by the fact that the Kaiser–Meyer–Olkin measure of sampling adequacy was at an adequate level (0.74) (21). A similarly strong case for factor analysis was provided by a Bartlett's test of sphericity: $\chi^2(703, N = 316) = 2009.30, P < 0.001$.

The identity component was not entered into either analysis because it is rated on a different scale. In the first analysis, the 38 items representing the timeline (acute/chronic), timeline cyclical, consequence, personal control, treatment control, illness coherence, and emotional representation dimensions were entered into the PCA. All subscales demonstrated good internal reliability. The Cronbach's alpha for the sub-scales are presented in Table 2.

Another was computed on the 18 causal items. Varimax rotation produced five factors which accounted for 64.63% of the total variance. The appropriateness of factor analysis was supported by the fact that the Kaiser–Meyer–Olkin measure of sampling adequacy was at an adequate level (0.817). A similarly strong case for factor analysis was provided by a Bartlett's test of sphericity: $\chi^2(311, N = 316) = 1013.30, P < 0.001$. The factor loadings for the individual items and their factors are presented in Table 3. The first factor, psychological attributions, accounted for 34.37% of the total variance. The second factor which external attributions, accounted for 9.69% of the variance, and the third factor, medical factors, accounted for 7.89% of the variance. The fourth factor, behavioral factors, accounted for 6.83% of the variance, and the final factor biological attributions, accounted for 5.85% of the variance. The Cronbach's alpha coefficient for the other factors are presented in Table 3.

The Validity and Internal Reliability of the Identity Subscale

The validity of the identity subscale was tested to investigate the frequencies with which different symptoms were approved as part of patients' illness identity. All of the symptoms were approved by a percentage of the patients, confirming the validity of the range of symptoms included in the identity subscale. The most frequently approved symptom was fatigue, which was identified by about 71% of the patients as a symptom specific to their illness. Loss of strength, sleep difficulties and stiff joints were also approved by over about 30% of the patients. Sore throat and pain were endorsed by about

Table 2. Principal components analysis of the IPQ-R items

Number of original item	Items	1	2	3	4	5	6	7
Emotional representations ($\alpha = 0.802$)								
37	Having this illness makes me feel anxious*	0.820	0.037	0.090	0.081	-0.128	-0.116	0.090
38	I get depressed when I think about my illness*	0.808	0.101	0.110	0.065	0.039	-0.070	-0.021
34	When I think about my illness I get upset*	0.780	0.083	0.139	0.237	-0.224	0.072	-0.097
33	My illness makes me feel afraid*	0.749	0.095	0.128	-0.036	-0.084	-0.165	-0.038
35	My illness makes me feel angry	0.743	0.010	0.190	0.253	-0.014	-0.020	0.006
36	My illness does not worry me ^r	-0.059	0.035	-0.089	-0.020	0.005	-0.101	0.134
Timeline acute/chronic ($\alpha = 0.800$)								
3	My illness will last for a long time*	0.025	0.870	0.012	0.069	-0.089	-0.015	0.085
5	I expect to have this illness for the rest of my life*	0.102	0.836	0.080	-0.007	0.071	-0.077	-0.021
2	My illness is likely to be permanent rather than temporary*	0.069	0.770	-0.098	0.177	-0.162	-0.021	0.121
4	This illness will pass quickly ^r	0.182	0.430	0.151	-0.192	-0.150	0.026	-0.128
1	My illness will last a short time ^r	0.027	0.362	-0.120	0.035	0.036	0.135	-0.204
6	My illness will improve in time ^r	-0.063	0.019	0.044	0.085	0.126	-0.030	0.052
Illness coherence ($\alpha = 0.801$)								
30	I don't understand my illness* ^r	0.136	0.004	0.818	0.048	-0.099	-0.176	0.020
29	My illness is a mystery to me* ^r	0.264	0.092	0.737	0.115	0.050	-0.042	-0.156
28	The symptoms of my condition are puzzling to me* ^r	0.318	0.153	0.711	0.203	0.013	0.137	-0.088
31	My illness doesn't make any sense to me ^r	-0.016	0.058	-0.606	-0.093	-0.057	0.263	-0.044
32	I have a clear picture or understanding of my condition	-0.047	-0.133	0.483	-0.115	-0.171	0.333	0.359
Consequences ($\alpha = 0.570$)								
15	My illness has serious financial consequences*	0.268	0.137	0.123	0.767	0.045	-0.045	-0.107
16	My illness causes difficulties for those who are close to me*	0.279	0.294	0.321	0.491	0.039	-0.031	0.100
14	My illness strongly affects the way others see me	-0.081	-0.020	0.104	-0.221	0.334	0.435	-0.265
12	My illness has major consequences on my life	0.095	-0.594	0.181	0.274	0.131	-0.123	-0.190
11	My illness is a serious condition	-0.008	0.488	0.023	0.082	-0.034	-0.049	0.174
13	My illness does not have much effect on my life ^r	0.170	0.259	0.063	0.339	-0.109	-0.632	0.004
Personal control ($\alpha = 0.452$)								
21	I have the power to influence my illness*	-0.064	-0.046	0.154	0.096	0.570	-0.051	-0.146
17	There is a lot which I can do to control my symptoms	0.181	0.090	0.120	0.721	-0.254	-0.059	0.054

(continued on next page)

Table 2. (continued)

Number of original item	Items	1	2	3	4	5	6	7
22	My actions will have no affect on the outcome of my illness	-0.111	-0.001	-0.006	-0.130	0.121	0.028	-0.220
18	What I do can determine whether my illness gets better or worse	-0.095	0.139	-0.025	0.192	-0.101	0.104	-0.525
20	Nothing I do will affect my illness ^r	-0.126	0.046	-0.148	0.013	0.162	0.214	-0.019
19	The course of my illness depends on me	0.064	0.217	0.058	0.066	-0.005	-0.177	0.011
Treatment control ($\alpha = 0.583$)								
27	There is nothing which can help my condition ^{*r}	-0.102	-0.008	-0.206	0.076	0.030	0.637	0.021
25	The negative effects of my illness can be prevented (avoided) by my treatment	0.317	0.340	0.141	0.140	-0.022	0.282	-0.179
26	My treatment can control my illness	0.012	-0.122	0.093	0.056	0.128	-0.039	0.103
23	There is very little that can be done to improve my illness ^r	-0.093	-0.073	-0.023	0.112	-0.016	0.085	-0.629
24	My treatment will be effective in curing my illness	-0.001	0.084	-0.087	0.176	0.111	0.045	0.345
Timeline cyclical ($\alpha = 0.541$)								
8	My symptoms come and go in cycles [*]	-0.218	-0.061	-0.212	0.018	0.383	0.004	0.500
9	My illness is very unpredictable	-0.214	-0.290	-0.158	0.060	-0.445	0.342	0.075
7	The symptoms of my illness change a great deal from day to day	-0.160	-0.008	-0.056	-0.203	-0.773	0.092	0.097
10	I go through cycles in which my illness gets better and worse.	0.118	-0.021	0.057	0.034	-0.066	-0.013	-0.153

Note: *items were accepted; r items reverse scored.

10% of the patients while the remaining eight symptoms were all endorsed by more than 15% of the patient group. Because the identity subscale consisted of disparate symptoms and due to the fact that some of these symptoms were more relevant to particular illnesses than to others, the internal consistency of this scale was less important than those of the other subscales. Nevertheless, the subscale does demonstrate a relatively high degree of internal reliability, with a Cronbach's alpha coefficient of 0.77. This suggests that patients attribute a relatively high or low number of symptoms to their illness (8).

Confirmatory Factor Analysis of the Arabic Version of the IPQ-R

If present, abnormality can be adjusted. Goodness of fit was assessed using the ratio of minimum discrepancy to degrees of freedom (CMIN/DF) in addition to other commonly

used indices including comparative fit index (CFI), root mean square error of approximation (RMSEA), and standardised root mean square residual (SRMR). Typically, CMIN/DF values smaller than two, CFI values greater than 0.95, RMSEA values smaller than 0.06, and SRMR values smaller than 0.08 are all indicative of good fit (22).

Fit indices were satisfactory in this study's results. For example, the results in the first section of the IPQ-R were: CMIN/DF = 1.30, RMSEA = 0.086, and CFI = 0.93, which was approximately similar to the second section of the IPQ-R (Table 4). However, it should be noted that factorial structures with more than five indicators per factor are difficult to confirm; therefore, the choice of the prior values was satisfactory, and the CFI and the RMSEA are affected by the number of items (23, 24) (Figure 1 and Figure 2).

Table 3. Principal components analysis of the IPQ-R causal items

Causal factors	1	2	3	4	5
Psychological attributions ($\alpha = 0.814$)					
My own behaviour	0.821	0.140	-0.014	0.069	0.116
My mental attitude e.g. thinking about life negatively	0.671	0.019	0.292	0.275	0.085
My emotional state e.g. feeling down, lonely, anxious, empty	0.666	0.333	0.392	0.199	0.202
My personality	0.595	0.398	0.097	0.031	0.108
External attributions ($\alpha = 0.731$)					
Chance or bad luck	0.087	0.721	-0.009	0.156	0.137
Accident or injury	0.161	0.654	0.153	0.377	0.013
Overwork	0.359	0.621	0.268	0.162	-0.009
Stress or worry	0.438	0.594	0.169	-0.118	-0.029
Medical attributions ($\alpha = 0.770$)					
Hereditary - it runs in my family	0.285	-0.121	0.780	0.160	0.061
Diet or eating habits	-0.209	0.433	0.652	-0.003	0.299
Family problems or worries caused my illness	0.517	0.317	0.148	-0.009	0.058
Ageing	0.343	0.333	0.546	0.060	0.003
Poor medical care in my past	0.098	0.204	0.516	0.087	0.480
Behavioral attributions ($\alpha = 0.692$)					
Smoking	0.056	0.059	-0.016	0.824	0.230
Alcohol	0.100	0.278	0.050	0.715	0.210
Altered immunity*	0.159	0.085	0.399	-0.574	-0.117
Biological attributions ($\alpha = 0.632$)					
A germ or virus	0.067	0.019	0.266	0.061	0.825
Pollution in the environment	0.233	0.051	-0.119	0.296	0.719

Note: * items were removed

Table 4. Goodness-of-fit indices of the Arabic version of the IPQ-R

	N	CMIN/df	RMSEA	CFI	SRMR	GFI
16 IPQ-R items	316	1.30	0.08	0.93	0.03	0.95
16 Causal items	316	1.11	0.08	0.95	0.02	0.99

Discussion

This study aimed to build the factor structure of an Arabic translation of the IPQ-R and to validate the English-language questionnaire proposed by Moss-Morris et al. (8) in a sample group of Algerian patients with chronic illnesses. Other studies have examined the psychometric study of the IPQ-R in other languages. These studies, including evaluations of Swedish and Chinese translations of the

IPQ-R among myocardial infarction patients and hypertension patients in Taiwan, respectively (25, 26), have incorporated modifications in order to be useful to the other dimensions to realise a good model fit. Furthermore, previous psychometric studies of Moss-Morris et al.'s original IPQ-R have examined its use by patients with different chronic diseases (27–29, 30, 31), including a sample of African origin patients with type 2 diabetes (31). The measurement models used in these studies have

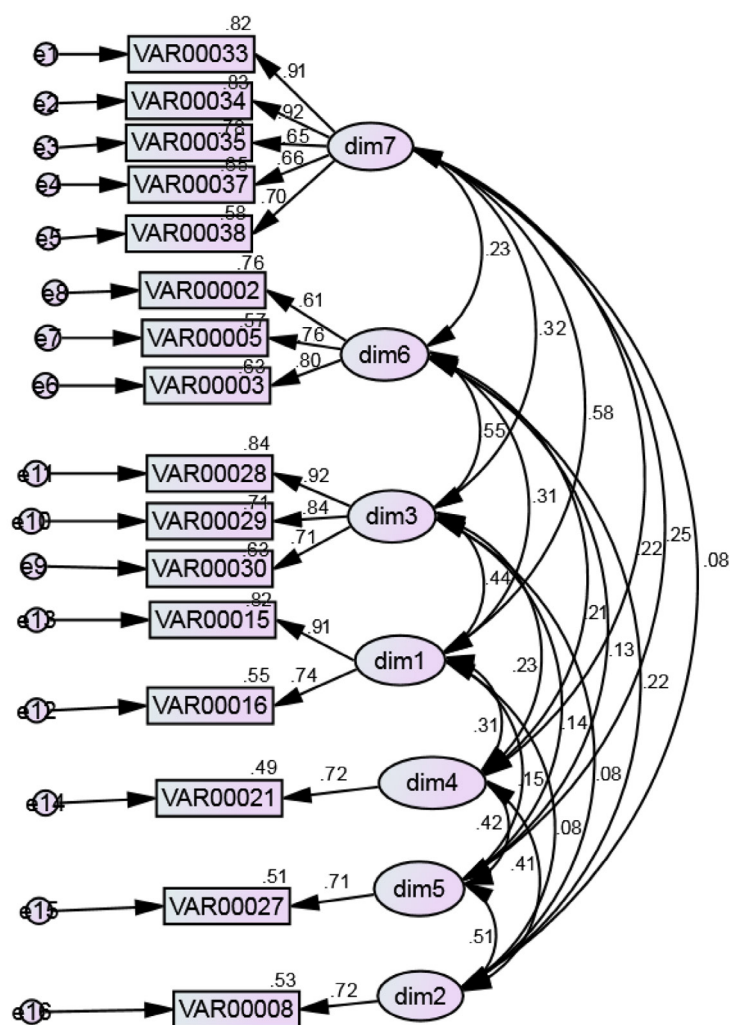


Figure 1. Factor loadings and correlations among the factors based on the results of the CFA of the 16 items from 38 IPQ-R items
dim7: Emotional representations; dim6: Timeline acute/chronic; dim3: Illness Coherence; dim1: Consequences; dim4: Personal control; dim5: Treatment control; dim2: Timeline cyclical

been identified and changed where the model fit was accepted, including by the deletion of some items. In contrast, a previous study using the IPQ-R to assess chronic illness representations among health professionals with schizophrenia demonstrated poor internal consistency in a confirmatory factor analysis (32). These findings were similar to those of another study conducted among users of drug injections in china (33).

The items that have been accepted in this study (2, 3, 5, 8, 10, 15, 16, 21, 27, 28, 29, 30, 34, 35, 37, and 38) should be systematically analysed in further studies of the Arabic IPQ-R. Prior studies have also suggested the reliability of the timeline (cyclical) and treatment control factors. Although still above average in acceptable reliability, the reliability of personal control was

lower than that of the other factors in the model. Our study found that there were satisfactory ranges, such as missing values proportion, the percentage of parameter and standard error bias (34). The causal item identified at different rating of the causal factors than the original IPQ-R because the varimax rotation produced five factors which accounted for 64.63% of the total variance. The appropriateness of factor analysis was supported by the fact that the Kaiser–Meyer–Olkin measure of sampling adequacy was at an adequate level (0.817), and a similarly strong case for factor analysis was demonstrated by a Bartlett's test of sphericity. The illness identity sub-scale was changed to separate the concept of a disease from the form of its somatic symptoms. Patients were asked to

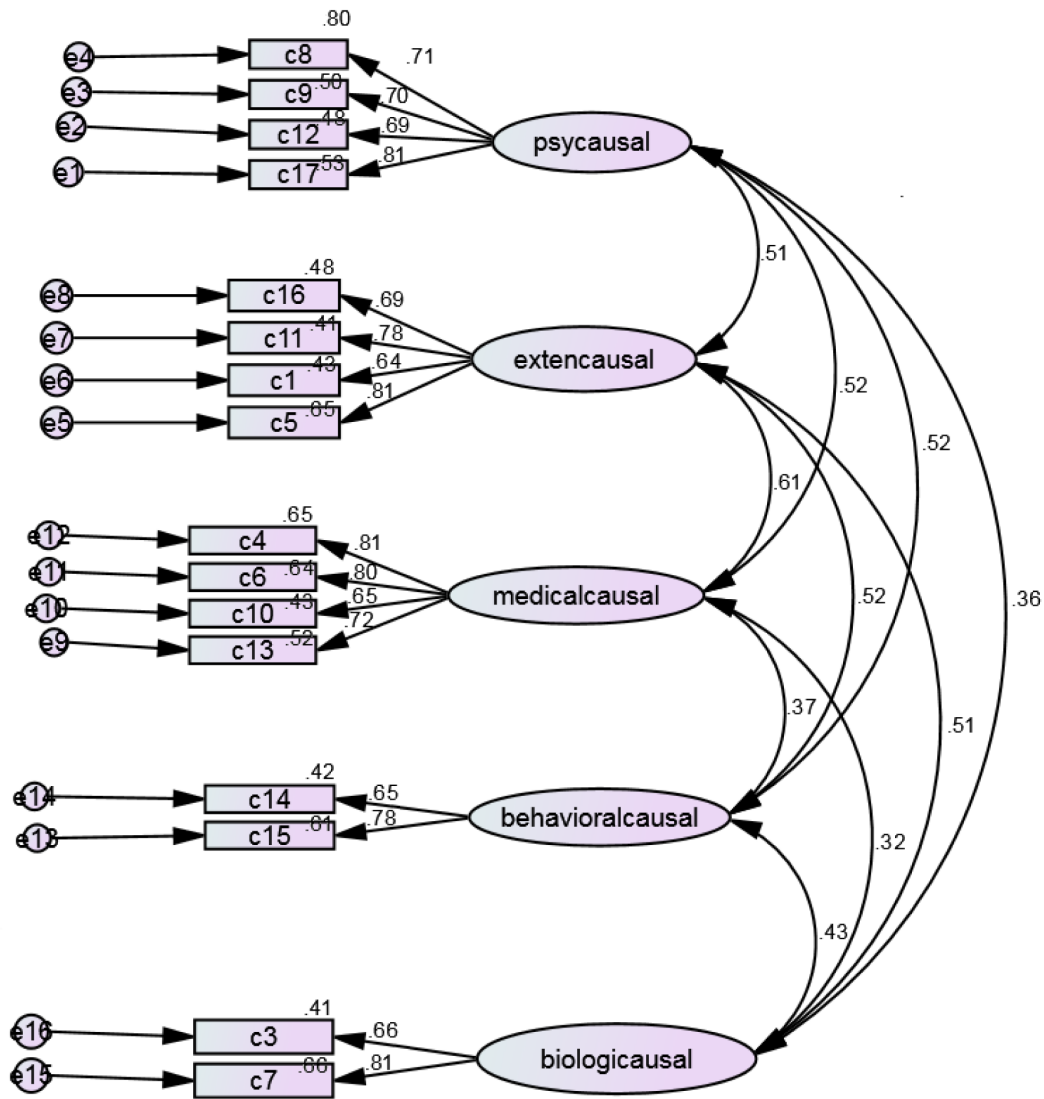


Figure 2. Factor loadings and correlations among the factors based on the results of the CFA of the IPQ-R causal items

identify each symptom related to their chronic disease by measuring the rate of each symptom. The literature, indicated that the value of the chi-square cannot be used as a formal test because it is sensitive to the size of the sample. In this case, the CMIN/DF ratio can be used as a criterion of sufficiency. If its value is equal to or less than five, the model has an acceptable fit quality (35, 36). However, the CMIN/DF value alone is insufficient to test the adequacy of the model; therefore, RMSEA, CFI, and the Index Quality Index (GFI) were recommended. According to Brown (36) and Hooper et al. (40), a RMSEA value of 0.05–0.08 indicates a good fit. According to Hooper et al. (40), there is a perfect fit between the model and the data if the CFI, GFI and AGFI coefficients are greater than 0.95.

Adjustment quality indices in this study had the same results, just as the original instrument. The results of the construct validity of the Arabic version of the instrument were therefore considered appropriate.

This study has numerous limitations. A result cannot be specified to patients with chronic diseases, and the post hoc changes to the model that lead us by adaptation indices and theoretical concerns, which must be considered in further exploratory analysis (34). In addition to the modifications we proposed a confirmatory of the revised psychometric test for the other sample. Furthermore, the sample size of 316 is smaller than advocated by methodological parameters (40). However, these suggestions must be re-evaluated in light

of future studies' findings (41). The current study also demonstrated significant differences in the Algerian patients' perceptions of chronic illness, according to age, illness type, length of illness, and level of educational attainment (8, 18). These results underscore the validity of the IPQ-R, thereby providing a tool for future studies on the perceptions of other specific illnesses.

Conclusions

The aim of this study was to validate and adapt an Arabic translation of the IPQ-R for Algerian patients with chronic illnesses. Regarding internal consistency, Cronbach's alpha coefficient was consistently higher than 0.45. The values in this study were higher than those found in the original IPQ-R validation study. This study opens the door to further research on illness perception by psychometric properties using our Arabic translation of the IPQ-R on larger samples using confirmatory and exploratory factor analysis which could investigate the behavioral and psychological outcomes of chronic illness representations and thus contribute to strategies to reduce the risks of unhealthy behaviors. In conclusion, the measurement model was identified and changed through the deletion of some items in order to establish an acceptable model fit. The type of sample and cultural considerations may explain these findings. It appeared to maintain the psychometric properties of the original IPQ-R and paves the way for further research including the improvement of measurement models by examining other and larger Arabic -speaking samples with specific chronic illnesses.

Acknowledgements

The author gratefully acknowledge and thank Pr Djabali N, Pr Maamria B from Batna 1 University. Special thanks to Dr Bentercia T, Dr Kebabla M and Mr Grouri A. for their support and assistance in conducting this research.

Ethical Approval

Human Research Ethics Committee of Batna 1 HAJ LAKHDAR University under No: 28/2017.

Correspondence

Dr Salah Aberkane
PhD (University of Batna)
Department of Psychology,
Faculty of Human and Social Sciences,
University of Khenchela,
Khenchala 40004, Algeria.
Tel: (+213) 0.32.73.12.36
Fax: (+213) 0.32.73.12.55
E-mail: aberkanearris@yahoo.fr; s.aberkane@univ-khenchela.dz

References

1. Han K, Lee P, Lee S, Park E. Factors influencing quality of life in people with chronic illness in Korea. *Journal of Nursing Scholarship*. 2003;**35**:139–144.
2. Nacereddine D. The spread of more than 10 chronic diseases, including infectious: scary numbers about the reality of deteriorating health in Algeria. *Djaridaty*; 2013.
3. Germino BB. When a chronic illness becomes terminal. *ANNA J*. 1998;**25**:579–582.
4. National Chronic Care Consortium. Primary care for people with chronic conditions: issues and models. Retrieved April 3, 2004 from <http://www.hhp.umd.edu/AGING/MMIP/TApapers/TApaper8.pdf>
5. Cioffi D. Beyond attentional strategies: a cognitive-perceptual model of somatic interpretation. *Psychological Bulletin*. 1991;**109**:25–41. <https://doi.org/10.1037/0033-2909.109.1.25>
6. Hampson SE. Personal models and the management of chronic illness: a comparison of diabetes and osteoarthritis. *Eur J Pers*. 1997;**11**(5):401–414. [https://doi.org/10.1002/\(SICI\)1099-0984\(199712\)11:5<401::AID-PER297>3.0.CO;2-K](https://doi.org/10.1002/(SICI)1099-0984(199712)11:5<401::AID-PER297>3.0.CO;2-K)
7. Weinman J, Petrie KJ, Moss-Morris R, Horne R. The illness perception questionnaire: a new method for assessing the cognitive representation of illness. *Psych Health*. 1996;**11**(3):431–445. <https://doi.org/10.1080/08870449608400270>
8. Moss-Morris R, Weinman I, Petrie KJ, Horne R. The revised-illness perception questionnaire (IPQ-R). *Psych Health*. 2002;**17**:1–16. <https://doi.org/10.1080/08870440290001494>

9. Horne R, Weinman J. Self-regulation and self-management in asthma: exploring the role of illness perceptions and treatment beliefs in explaining non-adherence to preventer medication. *Psychology and Health*. 2002;**17**:17–32. <https://doi.org/10.1080/08870440290001502>
10. Knibb RC, Horton SL. Can illness perceptions and coping predict psychological distress amongst allergy sufferers? *Br. J. Health Psychol*. 2008;**13**:103–119. <https://doi.org/10.1348/135910706X173278>
11. Jopson NM, Moss-Morris R. The role of illness severity and illness representations in adjusting to multiple sclerosis. *J Psychosom Res*. 2003;**54**(6):503–511. [https://doi.org/10.1016/S0022-3999\(02\)00455-5](https://doi.org/10.1016/S0022-3999(02)00455-5)
12. Cooper A, Lloyd G, Weinman J, Jackson G. Why patients do not attend cardiac rehabilitation: role of intentions and illness beliefs. *Heart*. 1999;**82**(2):234–236. <https://doi.org/10.1136/hrt.82.2.234>
13. Benyamini Y, Gozlan M, Kokia E. On the self-regulation of a health threat: cognitions, coping, and emotions among women undergoing treatment for infertility. *Cognitive Therapy and Research*. 2004;**28**(5):577–592. <https://doi.org/10.1023/B:COTR.0000045566.97966.22>
14. Alethea AS. Illness representation, coping and psychosocial outcome in chronic pain. PhD thesis. University of Southampton, School of Psychology, UK. 2010.
15. Elliott BA, Elliott TE, Murray DM, Braun BL, Johnson KM. Patients and family members: the role of knowledge and attitudes in cancer pain. *J Pain Symptom Manage*. 1996;**12**(4):209–220. [https://doi.org/10.1016/0885-3924\(96\)00124-8](https://doi.org/10.1016/0885-3924(96)00124-8)
16. Covic A, Seica A, Gusbeth-Tatomir P, Gavrilovici O, Goldsmith DJA. Illness representations and quality of life scores in haemodialysis patients. *Nephrol Dial Transplant*. 2004;**19**(8):2078–2083. <https://doi.org/10.1093/ndt/gfh254>
17. Moss-Morris R, Petrie KJ, Weinman J. Functioning in chronic fatigue syndrome: do illness perceptions play a regulatory role? *Br J Health Psychol*. 1996;**1**(1):15–25. <https://doi.org/10.1111/j.2044-8287.1996.tb00488.x>
18. Cameron LD, Leventhal H. Self-regulation, health, and illness: an overview. In: Cameron LD, Leventhal H, editors. *The self-regulation of health and illness behavior*. Routledge; 2003. pp. 1–14
19. Verma JP. *Data analysis in management with SPSS software*. India: Springer India; 2013. <https://doi.org/10.1007/978-81-322-0786-3>
20. Schinka JA, Velicer WF. *Handbook of psychology in research methods in psychology*. Hoboken, New Jersey: John Wiley and Sons, Inc.; 2003.
21. Wilkinson L. Task force on statistical inference, APA Board of Scientific Affairs. Statistical methods in psychology journals: guidelines and explanations. *American Psychologist*. 1999;**54**(8):594–604. <https://doi.org/10.1037/0003-066X.54.8.594>
22. Tabachnick BG, Fidell LS. *Using multivariate statistics*. 6th ed. Boston, MA: Pearson Education; 2013.
23. Floyd FJ, Widaman KF. Factor analysis in the development and refinement of clinical assessment instruments. *Psychological Assessment*. 1995;**7**(3):286–299. <https://doi.org/10.1037/1040-3590.7.3.286>
24. Cabassa LJ, Lagomasino IT, Dwight-Johnson M, Hansen MC, Xie B. Measuring Latinos' perceptions of depression: a confirmatory factor analysis of the illness perception questionnaire. *Cultur Divers Ethnic Minor Psychol*. 2008;**14**(4):377–384. <https://doi.org/10.1037/a0012820>
25. Chen SL, Tsai JC, Lee WL. Psychometric validation of the Chinese version of the illness perception questionnaire-revised for patients with hypertension. *J Adv Nurs*. 2008;**64**(5):524–534. <https://doi.org/10.1111/j.1365-2648.2008.04808.x>
26. Brink E, Alsén P, Cliffordson C. Validation of the Revised Illness Perception Questionnaire (IPQ-R) in a sample of persons recovering from myocardial infarction – the Swedish version. *Scand J Psychol*. 2011;**52**(6):573–579. <https://doi.org/10.1111/j.1467-9450.2011.00901.x>
27. Dempster M, McCorry NK. The factor structure of the revised illness perception questionnaire in a population of oesophageal cancer survivors. *Psycho-Oncology*. 2012;**21**(5):524–530. <https://doi.org/10.1002/pon.1927>

28. Hagger MS, Orbell S. A confirmatory factor analysis of the revised illness perception questionnaire (IPQ-R) in a cervical screening context. *Psych Health*. 2005;**20**:161–173. <https://doi.org/10.1080/0887044042000334724>
29. Wittkowski A, Richards HL, Williams J, Main CJ. Factor analysis of the revised illness perception questionnaire in adults with atopic dermatitis. *Psychol Health Med*. 2008;**13**(3):346–359. <https://doi.org/10.1080/13548500701487697>
30. Chilcot J, Norton S, Wellsted D, Farrington K. The factor structure of the revised illness perception questionnaire (IPQ-R) in end-stage renal disease patients. *Psychol Health Med*. 2012;**17**(5):578–588. <https://doi.org/10.1080/13548506.2011.647702>
31. Nicholls EE, Hill S, Foster NE. Musculoskeletal pain illness perceptions: factor structure of the Illness Perceptions Questionnaire-Revised. *Psychol Health*. 2013;**28**(1):84–102. <https://doi.org/10.1080/08870446.2012.714782>
32. Abubakari AR, Joney MC, Lauder W, Kirk A, Devendra D, Anderson J. Psychometric properties of the revised illness perception questionnaire: factor structure and reliability among African-origin populations with type 2 diabetes. *Int J Nurs Stud*. 2012;**49**(6):672–681. <https://doi.org/10.1016/j.ijnurstu.2011.11.008>
33. Fleming MP, Martin CR, Miles J, Atkinson J. The utility of the Illness Perception Questionnaire in the evaluation of mental health practitioners' perspectives on patients with schizophrenia. *J Eval Clin Pract*. 2009;**15**(5):826–831. <https://doi.org/10.1111/j.1365-2753.2008.01103>
34. Mo PKH, Lau JTF, Cheng KM, Mak WWS, Gu J, Wu AMS, et al. Investigating the factor structure of the Illness Perception Questionnaire-Revised for substance dependence among injecting drug users in China. *Drug Alcohol Depend*. 2015;**148**(1):195–202. <https://doi.org/10.1016/j.drugalcdep.2015.01.008>
35. Brown T. *Confirmatory factor analysis for applied research*. New York, USA: The Guilford Press; 2006.
36. Kline RB. *Principles and practice of structural equation modeling*. 2nd ed. New York, USA: The Guilford Press; 2005.
37. Schermelleh-Engel K, Moosbrugger H, Müller H. Evaluating the fit of structural equation models: test of significance and descriptive goodness-of-fit measures. *Methods of Psychological Research-Online*. 2003;**8**:23–74.
38. Tabachnick BG, Fidell LS. *Using multivariate statistics*. 4th ed. Needham Heights, MA: Allyn and Bacon Inc.; 2001.
39. Hooper D, Coughlan J, Mullen M. Structural equation modeling: guidelines for determining model fit. *The Electronic Journal of Business Research Methods*. 2008;**6**:53–60.
40. Bagozzi RP, Yi Y. On the evaluation of structural equation models. *J Acad Market Sci*. 1988;**16**(1):74–94. <https://doi.org/10.1177/009207038801600107>
41. Jackson DL. Sample size and number of parameter estimates in maximum likelihood confirmatory factor analysis: a Monte Carlo investigation. *Struct Equ Model*. 2001;**8**(2):205–223. https://doi.org/10.1207/S15328007SEM0802_3