

Factor Structure of the Korean Version of Illness Intrusiveness Rating Scale: Cross-cultural Implications

The Illness Intrusiveness Rating Scale (IIRS) measures illness-induced disruptions to 13 domains of lifestyles, activities, and interests. A stable three-factor structure has been well documented; however, the cross-cultural validity of this scale needs to be tested. This study investigated the factor structure of the Korean version of IIRS in 712 outpatients at a university medical center. A predominant diagnosis of the patients was rheumatoid arthritis (47%). The Center for Epidemiological Studies-Depression Scale (CES-D), and Health Assessment Questionnaire (HAQ) were also administered. Exploratory Principal Component Analysis identified a two-factor structure, "Relationships and Personal Development (RPD)" and "Instrumental", accounting for 57% of the variance. Confirmatory analyses extracted an identical factor structure. However, a goodness-of-the fit test failed to support two-factor solution ($\chi^2=138.2$, $df=43$, $p<.001$). Two factors had high internal consistency (RPD, $\alpha=.89$; Instrumental, $\alpha=.75$) and significantly correlated with scores of HAQ (RPD, $r=.53$, $p<.001$; Instrumental, $r=.44$, $p<.001$) and CES-D (RPD, $r=.55$, $p<.001$; Instrumental, $r=.43$, $p<.001$). These findings supported construct validity of the Korean version of IIRS, but did not support cross-cultural equivalence of the factor structure.

Key Words : Cross-cultural Comparison; Reproducibility of Results; Validity; Factor Analysis, Statistical; Psychiatric Status Rating Scales

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INTRODUCTION

Individuals with chronic disease suffer from life style disruption and difficulty with every day activities or interests (1-3). This is largely due to a devastating illness itself (e.g., pain, physical disability) but in part also due to treatment-related factors such as adverse effects (3). Devins and his colleagues termed this illness-induced lifestyle disruption as "illness intrusiveness" (4). It was suggested illness intrusiveness stands as a common underlying determinant of quality of life in chronic disease or a mediator of psychosocial impact of illness (3, 5).

They also developed a thirteen-itemed self-report scale called the Illness Intrusiveness Rating Scale (IIRS), which defines illness intrusiveness as lifestyle and activity disruptions that arise as a result of an illness and/or its treatment (4). Specifically, IIRS measures illness-induced interference in 13 life domains important to quality of life; health, diet, work, active recreation (sports), passive recreation (reading, listening to music), finances, relationship with partner, sex life, family relations, other social relations, self-expression/self-improvement, religious expression, and community and civic involvement (4). This scale has been widely used in a various population of chronic diseases including end-stage renal disease

(4, 6), multiple sclerosis (5), rheumatoid arthritis (2), cancer (7), hyperhidrosis (8), lupus (9), and transplant population (10) and more recently in psychiatric disorders such as anxiety disorder (11), bipolar disorder (12), and sleep disorder (13).

Moderate to high reliability and validity of IIRS was reported through a number of studies (e.g., see review by Devins [3]). IIRS also showed a stable and common three factor solution across diverse patient populations further enabling its comparison among different disease groups (14).

Despite the rigorous attention in psychosomatic research and the degree of examination of the psychometric properties this scale has received, one area needing further evaluation is the cross-cultural adaptation of IIRS (14). Even the psychological instrument with excellent psychometric properties in the original language sometimes yields the poor construct validity in different language versions (15). To our best knowledge, French and Chinese language versions are currently being investigated but have not yet been published and a Korean version had been developed but its validity has never been tested (16).

In order to examine this issue, we developed a Korean version of IIRS and tested its cross-cultural adaptation through investigating construct validity (i.e., factor analysis, internal consistency, and correlation with other scores of functional

disability and depressive symptoms).

MATERIALS AND METHODS

Subjects

Subjects were 712 outpatients diagnosed with a variety of medical diagnoses. Diagnostic distribution included sero-positive rheumatoid arthritis (46.5%); end-stage renal disease under current dialysis (14.5%), either peritoneal or hemodialysis; diabetes (13.1%); hypertension (11.7%); cancer (9.4%) and others (4.9%). The sample was predominantly women (65.6%), married (77.9%) and completed high school or higher education (62.5%). Mean age was 49.6 yr (SD=14.75) and mean duration of illness was 8.3 yr (SD=5.2).

All the patients were recruited from the outpatient units of the Department of Internal Medicine and Hospital for Rheumatic disease at Hanyang University Medical Center in Seoul during one month period. Research associates approached candidate patients after reviewing the medical charts for the above mentioned five diseases and obtained informed consent to participate in the survey. By convenient sampling, 827 patients were approached and 115 either refused to participate or did not complete the questionnaire, leaving 712 as a final sample. The study was approved by the ethics review board at the Hanyang University Medical Center.

Procedure

Subjects were asked to complete the Korean version of the IIRS (IIRS-K), Korean Health Assessment Questionnaire (HAQ) and the Korean version of The Center for Epidemiologic Depression Scale (CES-D). Cross-cultural validation data are available for HAQ (17) and CES-D (18). Additionally, clinical and socio-demographic information was obtained from the patients and their medical records.

Measures

The IIRS captures 13 domains of everyday functioning and asks the respondents how illness or its treatment interferes with each domain. Respondents rate along a 7-point Likert scale, ranging from 1=not very much to 7=very much [4]. A total score can range from 13 to 91. Authors of this study agreed on a Korean language version (IIRS-K) after a translation and back-translation process.

Health Assessment Questionnaire (HAQ) (19), widely used self-rating instrument to measure functional disability in chronic illnesses and the Center for Epidemiologic Depression Scale (CES-D), a self-reporting depression scale composed of 20 items were also administered (20). Previous literature supports the association of IIRS total score with disability and depressive symptoms (2, 9, 21).

Statistical analysis

Initial factor structure of IIRS-K was examined by exploratory principle component analysis (PCA) with Varimax rotation in randomly split cases (n=356). This exploratory method was chosen because our objective of this study was to validate the Korean version of IIRS, although a three factor solution and its stability among diagnostic groups is known for original English version (4).

To further corroborate the stability of factor structure, remaining cases (n=356) were analyzed by confirmatory PCA with oblique rotation. Maximum likelihood factor analysis was also employed to test the goodness-of-fit of the model. We conducted Pearson correlation among total or factor scores of IIRS, HAQ and CES-D scores. Finally, we calculated the internal consistency of the items and factors. All data analyses were conducted using the Statistical Package for the Social Sciences (SPSS) 10.0 for Windows.

RESULTS

Exploratory factor analysis

Exploratory PCA with Varimax rotation in the exploratory sample (n=356) extracted two factors, of which the number was determined by size of eigenvalue, variance explained, and the scree test. Items with factor loading exceeding 0.40 and no cross-loadings were assigned to factors.

As shown in Table 1, Factor 1 labeled "Relationships and Personal Development" included eight items: financial situation, relationship with spouse, sex life, family relations, other

Table 1. Exploratory principal component analysis of Korean IIRS (n=356)

Items	Factor loadings	
	Relationship and personal developments	Instrumental
1. Health	-	0.74
2. Diet	-	0.75
3. Work	-	0.71
4. Active recreation	0.45	0.59
5. Passive recreation	-	0.69
6. Financial situation	0.60	-
7. Relationship with spouse	0.71	-
8. Sex life	0.64	-
9. Family relations	0.70	-
10. Other social relations	0.80	-
11. Self-expression	0.78	-
12. Religious expression	0.64	-
13. Community involvement	0.69	-
Eigen value	4.42	3.01
Percent total variance	34.0	23.1

Loadings smaller than 0.40 are not displayed. IIRS, Illness Intrusiveness Rating Scale.

social relations, self-expression/self improvement, religious expression, community and civic involvement. Factor 2, termed "Instrumental" included four items: health, diet, work, and passive recreation. This two-factor solution accounted for 57% of the total variance. Item 4, active recreation had cross loadings (0.40 or greater on two-factors) and was excluded for subsequent statistical analyses.

Confirmatory Analysis

As the two factors in exploratory analysis were intercorrelated (0.70), a confirmatory PCA with oblique rotation was used for the remaining half of the cases ($n=356$). The same two-factor structure was extracted. This result was replicated for total subjects ($n=712$). However, when we employ maximum likelihood factor analysis with oblique rotation to test the goodness-of-fit of the two factor model, statistically significant chi-square test resulted suggesting more factors are needed ($\chi^2=138.2$, $df=43$, $p<0.001$).

Reliability

We calculated reliability (alpha coefficient) of two subscales in the entire sample ($n=712$). The alpha coefficients for Relationships and Personal Development subscale were 0.89 and Instrumental 0.75. Each item of IIRS-K had coefficients ranging 0.48-0.74; total items 0.92. Thus, reliability was high for both factors and also for total items.

Correlation with disability and depression

Two factors significantly correlated with scores of HAQ (Relationships and Personal Development, 0.53, $p<0.001$; Instrumental, 0.44, $p<0.001$) and CES-D (Relationships and Personal Development, 0.55, $p<0.001$; Instrumental, 0.43, $p<0.001$).

DISCUSSION

This study examined the factor structure of IIRS-K in a sample of chronic medical diseases, predominantly rheumatoid arthritis. Exploratory PCA and further confirmatory factor analysis extracted two factor structure, "Relationships and Personal Development" and "Instrumental". This result is comparable to original IIRS with three-factor solution; instrumental, intimacy, and relationships and personal development (14).

Overall speaking, more relational aspects were emphasized in the factor structure of IIRS-K when compared with the original IIRS (Table 2). For example, Intimacy (Item 7.8) in the original IIRS submerged in Relationships and Personal Development (Item 6-13) in IIRS-K. These two items (relationship with spouse and sex life) may be seen as a part of

Table 2. Comparison of factor structures between the original and Korean version of the Illness Intrusiveness Rating Scale

Items	Factor loadings	
	Original	Korean
Health	Instrumental	Instrumental
Diet	Cross loading	Instrumental
Work	Instrumental	Instrumental
Active recreation	Instrumental	Cross loading
Passive recreation	RPD	Instrumental
Financial situation	Instrumental	RPD
Relationship with spouse	Intimacy	RPD
Sex life	Intimacy	RPD
Family relations	RPD	RPD
Other social relations	RPD	RPD
Self-expression	RPD	RPD
Religious expression	RPD	RPD
Community involvement	RPD	RPD

RPD, Relationships and Personal Development.

private and intimate sector distinct from relationship with others by North Americans, but Koreans may see that relationship and involvement with partners as a continuum of relations with others. This value of interdependence and harmony with others rather than individualism was described for Asians (22) and sometimes explained in the Confucian ideal (23).

Even Item 6, financial situation was loaded under factor "Relationships and Personal Development", not "Instrumental". It is not uncommon in Korea many patients with chronic illnesses depend financially on their family or relatives for medical expenditure because of incomplete coverage by medical insurance and welfare system. One research shows that Asian Americans are more likely to seek social support for their stress compared with European Americans (24).

Items on Instrumental (item 1, 2, 3, 5) of IIRS-K bear some differences to original Instrumental (item 1, 3, 4, 6). Item 2, diet had cross-loading and was excluded in IIRS but included in this study. Besides, Item 4, active recreation included as Instrumental in IIRS was dropped in IIRS-K. This item had cross loading on both Instrumental and Relationships and Personal Development. Koreans seem to foster more interpersonal aspects of exercises, which was shown as an example in the questionnaire. Item 5, passive recreation belonged to Instrumental, which was under Relationships and Personal Development in original IIRS. Once again, examples for passive recreation were reading and listening to music, which may be seen as mechanical and daily activities.

Therefore, we suggest that difference of factor structure from the original IIRS is in fact, reflection of cultural emphasis on relation with others and difference in life styles.

The limitation of corroborating two-factor solution in IIRS-K is that confirmatory maximum likelihood method failed to support the goodness-of-fit of the model. It generally means more factors are needed to account the structure but also may

reflect sensitivity to sample size. Moreover, two factors had moderate to high internal consistency and correlated with disease characteristics (i.e., functional disability) and emotional distress (i.e., depression) well demonstrating the construct validity of two factors.

Other weakness of this study includes convenient sampling method and disproportion of diagnostic distribution may hazard the representativeness of the subjects. Taken together, these findings suggest construct validity of IIRS-K; however, corroborating two-factor solution needs further investigation. Likewise, we did not find cross-cultural equivalence of three-factor structure of IIRS.

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<Appendix>

The Korean version of Illness Intrusiveness Rating Scale

한국판 질병 침습도 평가 척도

아래의 문항들은 당신의 질병 및 그 치료 과정이 당신의 생활에 얼마나 지장을 가져오고 있는가를 묻는 문항들입니다. 현재 당신의 상태를 보아서 가장 적절하다고 생각되는 곳 하나에 동그라미를 표 해주십시오. 만일 본인에게 해당되지 않는 문항이 있다면 생활에 별 지장이 없는 것으로 보고 1에 동그라미 표 해주십시오. 한 문항도 빠뜨리지 마시고 답해주십시오. 감사합니다.

당신의 질병 및 그 치료과정이 다음과 같은 삶의 영역에 얼마나 지장을 가져오고 있습니까?

1. 건강									
거의 지장을 주지 않는다.	1	2	3	4	5	6	7		아주 많은 지장을 주고 있다.
2. 식사(먹고 마시는 일)									
거의 지장을 주지 않는다.	1	2	3	4	5	6	7		아주 많은 지장을 주고 있다.
3. 업무 수행(일)									
거의 지장을 주지 않는다.	1	2	3	4	5	6	7		아주 많은 지장을 주고 있다.
4. 활동적인 여가 활동(예: 운동)									
거의 지장을 주지 않는다.	1	2	3	4	5	6	7		아주 많은 지장을 주고 있다.
5. 조용한 취미 생활(예: 독서, 음악 감상 등)									
거의 지장을 주지 않는다.	1	2	3	4	5	6	7		아주 많은 지장을 주고 있다.
6. 경제 상태(수입)									
거의 지장을 주지 않는다.	1	2	3	4	5	6	7		아주 많은 지장을 주고 있다.
7. 배우자(미혼인 경우는 이성친구)와의 관계									
거의 지장을 주지 않는다.	1	2	3	4	5	6	7		아주 많은 지장을 주고 있다.
8. 성생활									
거의 지장을 주지 않는다.	1	2	3	4	5	6	7		아주 많은 지장을 주고 있다.
9. 가족 관계									
거의 지장을 주지 않는다.	1	2	3	4	5	6	7		아주 많은 지장을 주고 있다.
10. 사람들과 사귀는 일									
거의 지장을 주지 않는다.	1	2	3	4	5	6	7		아주 많은 지장을 주고 있다.
11. 자기표현/자기개발									
거의 지장을 주지 않는다.	1	2	3	4	5	6	7		아주 많은 지장을 주고 있다.
12. 종교생활									
거의 지장을 주지 않는다.	1	2	3	4	5	6	7		아주 많은 지장을 주고 있다.
13. 사회와 지역사회에 참여와 공헌									
거의 지장을 주지 않는다.	1	2	3	4	5	6	7		아주 많은 지장을 주고 있다.