Psychometric Evaluation of the Korean Version of the Adapted Illness Intrusiveness Rating Scale

Sun-Mi Chae¹, PhD, RN, Chun-Ja Kim¹, PhD, RN, Hyera Yoo², DNSc, RN

¹Assistant Professor, Ajou University College of Nursing, Seoul, Korea
²Associate Professor, Ajou University College of Nursing, Seoul, Korea

Purpose To examine the psychometric properties of the Korean version of the adapted Illness Intrusiveness Rating Scale (a-IIRS). The a-IIRS is a modified version of the original IIRS that measures illness-disruptions to daily life in patients with diverse diagnoses. While the psychometric properties of the original IIRS have been validated, no study has been conducted to validate the Korean version of a-IIRS.

Methods After translation and back-translation processes, the Korean version of a-IIRS was developed. A pilot test was conducted with 10 patients with chronic diseases. A convenience sample of 380 patients with diabetes, hypertension, and/or arthritis was used. Exploratory and confirmatory factor analyses, known-group technique, hypothesized relationships, internal consistency, and item analysis were tested.

Results Three factors were extracted from principal components analysis with varimax rotation: Relationships and Personal Development, Instrumental Life, and Intimacy. Confirmatory factor analysis corroborated the good fit of the three-factor model. Illness intrusiveness was significantly different among the study subjects categorized into three groups according to different health status: poor, fair and good. The instrument was positively correlated with the scales of fatigue and depression. The tool demonstrated high internal consistency with adequate item-total correlations.

Conclusions The findings are consistent with previous study results on IIRS and support the reliability and validity of the Korean version of a-IIRS. The instrument is culturally relevant for Korean patients with chronic diseases. Health care professionals need to consider illness intrusiveness when caring for patients with chronic diseases and promote their quality of life. [Asian Nursing Research 2010;4(4):194–204]

Key Words chronic disease, Korea, psychometrics, questionnaires

INTRODUCTION

With the continual extension in the human lifespan, the incidence of chronic diseases has been growing worldwide. According to the 2005 National Health and Nutrition Survey in Korea, the number of people with chronic diseases such as diabetes or hypertension is increasing with the aging of society.

*Correspondence to: Hyera Yoo, DNSc, RN, Ajou University College of Nursing, San 5, Wonchon-dong, Yeongtong-gu, Suwon, Korea. E-mail: hryoo@ajou.ac.kr

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Seven of the 10 leading causes of death in Korea were chronic diseases in 2007, including cerebrovascular and cardiovascular diseases (Statistics Korea, 2008). Medical expenses for treating diabetes and hypertension in Korea have increased 8–9 fold in the last decade (Korea Ministry for Health, Welfare, & Family Affairs, 2009).

For the patients with chronic diseases, self-management is an important aspect to improve their health status and consequently decrease medical expenses (Bodenheimer, Lorig, Holman, & Grumbach, 2002; Fries, Koop, Sokolov, Beadle, & Wright, 1998). Self-management is defined as learning and practicing the necessary skills to carry on an active and emotionally satisfying life in the face of a chronic condition (Lorig, 1993). Besides managing chronic physical symptoms, maintaining social life and dealing with emotional difficulties are essential skills for self-management (Corbin & Strauss, 1988). To help the patients with chronic illnesses, it is crucial for nursing professionals to understand and assess illness-induced social life disturbances and emotional difficulties as well as chronic physical problems. However, few studies in Korea have focused on the social life disturbances of patients with chronic diseases.

Illness intrusiveness explains the disturbance of social life caused by chronic diseases or life-threatening conditions in terms of interference with valued social activities or meaningful role changes of patients with chronic disease. According to the theoretical framework of illness intrusiveness, disease and treatment factors influence subjective well-being indirectly through illness intrusiveness. Psychosocial and contextual factors also affect illness intrusiveness and subjective well-being (Devins, 1994, 2010).

Clinical studies have demonstrated evidences of the conceptual relations within the illness intrusiveness theoretical framework. Devins and colleagues (1990) examined the relation between illness intrusiveness and fatigue which is identified as a disease factor from the theoretical framework. Their study presented that illness intrusiveness rose as fatigue increased in patients with chronic disease. In a study with multiple sclerosis patients, good health status resulted in less illness intrusiveness (Shawaryn, Schiaffino, LaRocca & Johnston, 2002). In addition, the relation between illness intrusiveness and depression has been clinically proved with rheumatoid arthritis patients, indicating more illness intrusiveness caused more depressive symptoms (Devins, Edworthy, Guthrie, & Martin, 1992).

The Illness intrusiveness Rating Scale (IIRS) measures how much the disease or treatment disrupts daily activities. It has been used for patients with various chronic conditions such as diabetes, arthritis, or cardiovascular diseases (Beling, Rowa, Antony, Sommerfeldt, & Swinson, 2001; Devins et al., 2001, 2006). The psychometric properties of IIRS have been reported to be robust in both English and Hungarian versions (Beling et al., 2001; Devins et al., 2001, 2006; Novak et al., 2005). The Korean version of IIRS was also translated and validated (Kim, Kim, Lee, Choi, & Park, 2005). However, the factor structure of the Korean version was not consistent with the original three-factor model that previous studies found (Devins et al., 2001, 2006; Kim et al., 2005; Novak et al.). Devins (2010) suggests further studies be conducted to examine the underlying factor structure in the Korean translation.

It has been found that some sensitive questions such as sex, self-expression, religious expression, and community involvement were unanswered. Thus the Stanford Patient Education Research Center adapted the original IIRS by adding the “not applicable” category to each question to promote responses and used it to evaluate self-management programs for chronic disease patients (Lorig et al., 1996; Stanford Patient Education Research Center, 2010). While the concepts of items remained the same in the adapted IIRS (a-IIRS), the format and style of the questions were changed to increase the readability and user-friendliness. For example, the a-IIRS uses a full sentence each time to ask a question (i.e., “How much does your illness and/or treatment interfere with your feeling of being healthy?”) although the original IIRS presents just a main concept word for each question item. In addition, the a-IIRS specifically inquires each item to make it easily understood.
The a-IIRS has been used in several studies to assess the psychosocial impact of chronic disease (Lorig, Ritter, Laurent, & Plant, 2006; Lorig, Ritter, Plant, Laurent, & McNeil, 2008; Ritter, Lorig, Laurent, Matthews, 2004); however, the psychometric properties of the a-IIRS have been scarcely discussed. Furthermore, the a-IIRS has never been used in a Korean population with chronic diseases.

**Purpose**
The study purpose was to evaluate the validity and reliability of the Korean version of a-IIRS. The specific study aims were to examine the following psychometric properties of the scale: (a) exploratory and confirmatory factor analysis, (b) known-group differences, (c) correlations with fatigue and depression, and (d) internal consistency with item analysis.

**METHODS**

**Translation process**
According to the translational guidelines for cross-cultural adaptation (Guillemin, Bombardier, & Beaton, 1993), two independent scholars who have studied in the US translated the instrument. An expert panel reviewed the translated instrument separately and discussed it at a consensus meeting in the aspects of cultural relevance and translation comprehensibility. The expert panel comprised three registered nurses with experience both in research and practice for patients with chronic diseases. During the discussion, two items about “how much does your illness or treatment interfere with your financial situation?” and “how much does your illness or treatment interfere with diet?” in the source instrument were modified into “how much does your illness or treatment interfere with medical costs?” and “how much does your illness or treatment interfere with eating habits?”, respectively. Korean patients are expected to answer properly on illness-related specific questions like medical costs instead of their general financial situation because they feel reluctant to answer a question that conveys their socioeconomic status. In Korean, the word “diet” commonly refers to various methods of reducing food intake to lose weight, rather than the nutritional balance of a healthy diet. In addition, the Korean word for diet, “shik-yi” is not commonly used by some old adults, so the word “diet” was changed to “eating habits” in the Korean version.

After consensus was reached, a bilingual scholar who has taught at a college in the U.S. translated the preliminary Korean version back into English. The back-translated version was compared with the original to confirm the adequacy and accuracy of the translation by the three researchers. The back-translated version differed from the source scale in terms of the questions for financial situation and diet items. It also showed different examples for active and quiet recreation that are more culturally relevant to Koreans. For example, among the examples of the item about active recreation, gardening was replaced with hiking in the Korean version. Overall, the back-translated version was contextually equivalent to the source scale.

The Korean version was finalized after validating the comprehensibility and clarity through a pilot test with 10 patients with diabetes, hypertension, and/or arthritis. The patients were asked after completing the questionnaire if there were any items that they could not understand and that needed to be changed for clarity. They disclosed that the items were easy to understand and they had no concerns or questions about the instrument.

**Sample**
A convenience sample of 380 patients with chronic diseases was recruited for the study from outpatient clinics at a university medical center in South Korea. The sample size was satisfactory for the study considering 13 items in the instrument: for factor analysis, about 5–10 participants per item are considered adequate, and a sample of 300 is classified as good (DeVellis, 2003). The Kaiser-Meyer-Olkin (KMO) Measure of Sampling Adequacy (MSA) also attested to the adequacy of the sample size.

The inclusion criteria for the participation were (a) a medical diagnosis of diabetes, hypertension, and/or arthritis, (b) aged 20 or older, and (c) verbal communicability.
Data collection

To increase the interrater reliability, three professional research assistants were hired from a survey company and given a 2-hour question and answer training for this study by the researchers. Clarifying and increasing the comprehension level of the question items for each assistant were the major objectives of the training. Following a training session on data collection, the three research assistants contacted participant candidates visiting at outpatient clinics in a university hospital and interviewed those who agreed to participate in the study. Data were collected from October to December, 2009.

Instruments

The original IIRS was developed by Devins et al. (1983) and adapted by Lorig, Sobel, Ritter, Laurent, and Hobbs (2001). The IIRS measures daily functioning interrupted by disease or its treatment. While the original IIRS has three domains of life which are “Relationship and Personal Development”, “Intimacy”, and “Instrumental Life” (Devins et al., 2001, 2006), the a-IIRS consists of five subscales: “Physical Well-Being and Diet”, “Work and Finances”, “Marital, Sexual, and Family Relations”, “Recreation and Social Relations”, and “Other Aspects of Life” (Lorig et al., 2001). Like the original scale, the a-IIRS comprises 13 items using a 7-point Likert-type scale, ranging from 1 to 7, with a higher score indicating greater illness intrusiveness.

The scale of Energy/Fatigue was used to measure fatigue, which was adapted from the Medical Outcomes Study (Lorig, et al., 1996; Stewart, Hays, & Ware, 1992), adding one item. It measures how an individual has felt during the previous month using 5 items with scores ranging from 0 to 4, with a higher score indicating more fatigue. The subscale from MOS has been translated into Korean and widely used in Korean population, yet no information was found for psychometrics of the adapted Energy/Fatigue scale. The Cronbach’s alpha coefficient was .89 in a previous study (Lorig et al., 1996) and .83 in this study.

Depression was measured with a 9-item Patient Health Questionnaire (PHQ 9; Kroenke, Spitzer, & Williams, 2001) that inquired how often the respondent had been bothered by different problems over the previous 2 weeks using a 4-point Likert-type scale ranging from 0 to 3, with a higher score indicating greater depression. The alpha coefficient was .94 in the study of Lim and colleagues (2009) and .81 in this study.

Self-rated health status was measured using a single item with scores ranging from 1 to 5, with a higher score indicating poorer health status. Test-retest reliability was .92 in the previous studies with chronic illness patients (Lorig et al., 1996).

Ethical considerations

This study, conducted as part of the Chronic Disease Self-Management Program Study for Korean patients, was approved by the Institutional Review Board at the A University Hospital (AJIRB-MED-SUR-09-174). The research assistants explained the purpose, benefits, and risks of the study to the participants. Participation in the study was voluntary, and written consents were obtained. The information provided by the participants remained confidential throughout the study.

Statistical analysis

Exploratory factor analysis was undertaken in order to determine the underlying structure of the scale since the Korean version of a-IIRS has never been validated. Principal component analysis with varimax rotation was utilized to test the validity of the scale. In order to extract the initial factors, only the factors with an Eigenvalue 1 or more were selected. Factor loadings of .30 or more were considered significant to assign items to factors. For the items with significant loadings on multiple factors, the most conceptually related factors were chosen for the items (Pett, Lackey, & Sullivan, 2003). Confirmatory factor analysis was performed using Analysis of Moments Structure (AMOS) version 4.0 (SPSS Inc, Chicago, IL) to confirm the model fit extracted from the exploratory factor analysis.

To evaluate the correlations with fatigue and depression, Pearson’s correlation coefficients were calculated. Analysis of variance was used to compare illness intrusiveness among three groups with different health status: poor, fair and good.
The internal consistency of the scale was tested by using Cronbach’s alpha. Item-total correlations were conducted to evaluate the homogeneity of the Korean version of a-IIRS. In line with the recommendation from Kline (1986), cutoffs of .20–.80 were used for the acceptance of item-total correlations. According to Nunally and Bernstein (1994), greater than .30 for item-total correlations is an arbitrary guideline, and coefficients greater than .20 will increase the reliability.

The data were analyzed using SPSS for Windows Version 13.0 (SPSS Inc., Chicago, IL) and AMOS version 4.0 (SPSS Inc., Chicago, IL). Statistical significance was accepted for two-sided \( p \) values of less than .05.

### RESULTS

The study participants were evenly distributed among three different diseases: diabetes (34.2%), hypertension (31.8%), and arthritis (33.9%). The majority of the participants were women (56.6%) and almost all were married (96.6%). The mean age was 49.49 (\( SD = 12.17 \)) years. The means of illness intrusiveness among arthritis, diabetes, and hypertension groups were 42.11 (\( SD = 11.08 \)), 40.09 (\( SD = 11.06 \)), and 39.37 (\( SD = 11.61 \)), respectively. There was no significant difference in illness intrusiveness among those three groups (\( F = 1.99, p = .138 \)).

#### Exploratory factor analysis

To examine the adequacy of the sample for factor analysis, the KMO, Individual MSA, and Bartlett’s Test of Sphericity were generated. The KMO statistic was .83, which suggested that the sample size was sufficient relative to the number of items of the scale. The Bartlett’s test for the 13-item matrix was also statistically significant (\( \chi^2 = 1703.77, df = 78, p < .001 \)), which indicated that the data from this study were appropriate for factor analysis. The individual MSA ranged from .64 to .94, suggesting that the correlations among the individual items were strong enough to conduct factor analysis (Pett et al., 2003). Therefore, no item was removed for factor analysis.

Three factors were extracted as shown in Table 1: Relationships and Personal Development (Factor 1), Instrumental Life (Factor 2), and Intimacy (Factor 3). Of the 13 items, three items had cross loadings. Two items, “recreation with family” and “feeling healthy”, had cross loadings on Factors 1 and 2, and one item, “religious activities”, had cross loadings on Factors 1 and 3. The items of recreation with family and religious activities loaded more strongly and conceptually closely on Factor 1 and the item of feeling healthy on Factor 2. The three extracted factors accounted for 57.3% of the total variance. Factor 1 includes the items of quiet recreation, recreation with family, social activities, religious activities, community activities, and self-improvement; its Eigenvalue was 3.20, and the percent of variance was 24.6%. Five items of feeling healthy, eating habits, work, active recreational activities, and medical costs were loaded on Factor 2; its Eigenvalue was 2.50, and it explained 19.2% of the variance. Factor 3 comprises the items of relationship with spouse and sex life, and explained 13.5% of the variance with an Eigenvalue of 1.75.

#### Confirmatory factor analysis

To examine the 3-factor model fit extracted from the exploratory factor analysis, confirmatory factor analysis was performed. Relative chi-square, which is referred to CMIN/DF in AMOS, the goodness-of-fit index (GFI), the adjusted-goodness-of-fit (AGFI), and the root mean square residual (RMSR) were used as criteria standards for the adequacy of the model fit in the study (Bollen, 1989; Cole, 1987): CMIN/DF 2.0–5.0, GFI ≥ .85, AGFI ≥ .80, and RMSR ≤ .10. The confirmatory factor analysis results demonstrated the adequate fit of the three-factor model in this study: CMIN/DF = 4.21 (CMIN = 261.24, \( df = 62 \)), GFI = .90, AGFI = .86, and RMSR = .09. As shown in Figure 1, the factor coefficients of all items except eating habits ranged from .44 to .82. The correlation coefficients between the factors indicated that they were positively and moderately correlated (Intimacy and Instrumental Life, \( r = .35 \); Intimacy and Relationships and Personal Development, \( r = .51 \); Instrumental Life and Relationships and Personal Development, \( r = .59 \)).
Known-group differences
The known-group technique is a construct validation approach that hypothesizes a difference in the critical attributes due to some known characteristic (Polit & Beck, 2008). We compared illness intrusiveness according to health status. The group with poor health reported a significantly higher score of illness intrusiveness than the other two groups ($F = 25.12$, $p < .001$), and the scores of the three factors in the groups with poor and fair health were also significantly higher than those in the good health group (Table 2).

Hypothesized relationships
To test the relationships of the instrument with other related concepts, correlations with fatigue and depression were examined. The total scale had significantly positive correlations with fatigue ($r = .38$, $p < .01$) and depression ($r = .34$, $p < .01$), indicating that illness intrusiveness increased with increasing fatigue and depression. The correlation coefficients of the three factors with fatigue ($r = .17$ to $.49$) and depression ($r = .12$ to $.41$) were also statistically significant, albeit Relationships and Personal Development and Instrumental Life exhibited rather weak correlations (Table 3).

Reliability
To examine the internal consistency of the instrument, Cronbach’s alpha coefficients were calculated. The reliability coefficient of the total 13 items was $.84$ with the factors demonstrating the alpha coefficients of $.83$ for Relationships and Personal Development, $.69$ for Instrumental Life, and $.71$ for Intimacy. As shown in Table 4, the corrected item-total scale correlations ranged from $.22$ to $.70$, indicating the adequate contribution of the items to a-IIRS. Therefore, these results indicate the satisfactory homogeneity of the items in the Korean version of a-IIRS.

DISCUSSION
To the best of our knowledge, this is the first study to test the psychometric properties of the Korean

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Table 1
Factor Loadings for the Three Extracted Factors

<table>
<thead>
<tr>
<th>Items</th>
<th>Factor 1a</th>
<th>Factor 2b</th>
<th>Factor 3c</th>
</tr>
</thead>
<tbody>
<tr>
<td>12. Involvement in community activities</td>
<td>.78</td>
<td></td>
<td></td>
</tr>
<tr>
<td>10. Social activities or meetings with friends</td>
<td>.74</td>
<td></td>
<td></td>
</tr>
<tr>
<td>13. Self-improvement activities</td>
<td>.74</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5. Quiet recreation or hobbies, such as reading or watching a movie</td>
<td>.65</td>
<td></td>
<td></td>
</tr>
<tr>
<td>9. Recreation or hobbies with the family</td>
<td>.63d</td>
<td>.40</td>
<td></td>
</tr>
<tr>
<td>11. Religious or spiritual activities</td>
<td>.52d</td>
<td></td>
<td>.34</td>
</tr>
<tr>
<td>3. Work, including job or house work</td>
<td></td>
<td>.81</td>
<td></td>
</tr>
<tr>
<td>4. Recreational activities using your body vigorously, such as playing sports or climbing mountain gardening</td>
<td></td>
<td>.81</td>
<td></td>
</tr>
<tr>
<td>6. Medical costs</td>
<td>.54</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1. Feeling of being healthy</td>
<td>.41</td>
<td>.47d</td>
<td></td>
</tr>
<tr>
<td>2. Eating habits</td>
<td></td>
<td>.46</td>
<td></td>
</tr>
<tr>
<td>7. Relationship with the spouse</td>
<td></td>
<td>.87</td>
<td></td>
</tr>
<tr>
<td>8. Sex life</td>
<td></td>
<td>.75</td>
<td></td>
</tr>
<tr>
<td>Eigenvalue</td>
<td>3.20</td>
<td>2.50</td>
<td>1.75</td>
</tr>
<tr>
<td>Variance (%)</td>
<td>24.6</td>
<td>19.2</td>
<td>13.5</td>
</tr>
</tbody>
</table>

Note. aRelationships and personal development; binstrumental Life; cintimacy; dthe factor on which the item with cross loadings was placed.
version of a-IIRS. Our results were consistent with the illness intrusiveness theoretical framework and support the use of a-IIRS in Korean patients with chronic illnesses.

The study findings established the validity and reliability of the Korean version of a-IIRS for use with Korean patients who are diagnosed with chronic illnesses. The a-IIRS seems more user-friendly than the original IIRS to Korean populations in terms of the questionnaire’s format, readability, and comprehensibility. The use of the a-IIRS Korean version was easy to answer to the Korean patients because each question item was fully described in a phrase to enhance understanding of the question. An expert review and a pilot test of the translated a-IIRS helped to guarantee the accuracy and clarity of the instrument and increase its cultural relevance.

In our study, three factors were extracted from the exploratory factor analysis, and the three factor model fit was also confirmed from the confirmatory

Figure 1. Three-factor structure of the Adapted Illness Intrusiveness Rating Scale with standardized parameter estimates.

Table 3

<table>
<thead>
<tr>
<th>Scale</th>
<th>Fatigue</th>
<th>Depression</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total</td>
<td>.38**</td>
<td>.34**</td>
</tr>
<tr>
<td>Relationships and personal development</td>
<td>.17**</td>
<td>.25**</td>
</tr>
<tr>
<td>Instrumental life</td>
<td>.27**</td>
<td>.12*</td>
</tr>
<tr>
<td>Intimacy</td>
<td>.49**</td>
<td>.41**</td>
</tr>
</tbody>
</table>

Note. *p < .05. **p < .01.

Table 2

Comparison of Illness Intrusiveness Among the Three Different Health Status Groups (N = 379)*

<table>
<thead>
<tr>
<th>Self-rated health status M (SD)</th>
<th>F (p)</th>
<th>Post hoc</th>
</tr>
</thead>
<tbody>
<tr>
<td>Good (a) (n = 107)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>a-IIRS total</td>
<td>2.69 (0.78)</td>
<td>3.20 (0.83)</td>
</tr>
<tr>
<td>Factor 1b</td>
<td>2.50 (0.85)</td>
<td>2.89 (0.99)</td>
</tr>
<tr>
<td>Factor 2c</td>
<td>0.95 (0.53)</td>
<td>1.18 (0.59)</td>
</tr>
<tr>
<td>Factor 3d</td>
<td>2.37 (1.32)</td>
<td>2.95 (1.48)</td>
</tr>
</tbody>
</table>

Note. a-IIRS = Adapted Illness Intrusiveness Rating Scale. *Missing data were excluded; brelationships and personal development; cinstrumental life; dintimacy.
factor analysis: Relationships and Personal Development, Instrumental Life, and Intimacy. This result conflicts with the subscales the a-IIRS English version proposed (Lorig et al., 2001). Of the five subscales in the a-IIRS English version, four subscales were merged to two factors in this study. For example, the two subscales, “Physical Well-being and Diet” and “Work and Finances” were merged to the Instrumental Life factor. Also the other two subscales, “Recreation and Social Relations” and “Other Aspects of Life” were to the factor of Relationships and Personal Development. In addition, two items, “recreation or hobbies with the family” and “recreational activities using your body vigorously” were relocated to the factors, Relationships and Personal Development and Instrumental Life, respectively. However, the three factor structure of the a-IIRS Korean version was consistent with the original IIRS versions in English and Hungarian (Bieling et al, 2001; Devins et al., 2001; Novak et al., 2005), except the original IIRS Korean version presenting two factors (Kim et al., 2005). These discrepancies in the factor structure may reflect cross-cultural differences. Therefore further evaluations should be performed to identify the underlying factor structures of the a-IIRS in both English and Korean.

Meanwhile the item of eating habits in the Korean version of a-IIRS showed inconsistency between the results from exploratory and confirmatory factor analyses. In contrast to the result from exploratory factor analysis that demonstrated a strong factor loading of this item on the factor of Instrumental Life, the confirmatory factor analysis exhibited a significant but slightly low factor coefficient. This item has caused incongruent results from the factor analysis for the original scale in previous studies. In the studies of Devins et al. (2001) and Novak et al. (2005), the item was excluded from factor analysis because it did not meet the analysis criteria, but similar to our own study, other studies had no objections to including it in factor analysis (Bieling et al., 2001; Kim et al., 2005).

Items with weak factor loadings but important contribution to the scale should not be eliminated from the scale (Pett et al., 2003). Most Korean patients with chronic illnesses believe that their diseases and/or treatment have forced them to change their eating habits or diet to a healthier pattern. In our study, the item of eating habits had the fifth highest score out of 13 items, following the items of medical costs, health, sex life, and social activities with friends, indicating that eating habits were commonly affected by the disease and/or its treatment.

### Table 4

<table>
<thead>
<tr>
<th>Item</th>
<th>M (SD)</th>
<th>Corrected item-total correlation</th>
<th>Cronbach’s alpha if item deleted</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Feeling of being healthy</td>
<td>4.19 (1.72)</td>
<td>.43</td>
<td>.83</td>
</tr>
<tr>
<td>2. Eating habits</td>
<td>3.17 (1.51)</td>
<td>.22</td>
<td>.84</td>
</tr>
<tr>
<td>3. Work</td>
<td>3.07 (1.54)</td>
<td>.53</td>
<td>.82</td>
</tr>
<tr>
<td>4. Active recreational activities</td>
<td>3.18 (1.59)</td>
<td>.56</td>
<td>.82</td>
</tr>
<tr>
<td>5. Quiet recreation</td>
<td>2.71 (1.29)</td>
<td>.47</td>
<td>.83</td>
</tr>
<tr>
<td>6. Medical costs</td>
<td>4.29 (1.30)</td>
<td>.45</td>
<td>.83</td>
</tr>
<tr>
<td>7. Relationship with the spouse</td>
<td>2.36 (1.55)</td>
<td>.42</td>
<td>.83</td>
</tr>
<tr>
<td>8. Sex life</td>
<td>3.25 (1.83)</td>
<td>.41</td>
<td>.83</td>
</tr>
<tr>
<td>9. Recreation with the family</td>
<td>2.96 (1.39)</td>
<td>.70</td>
<td>.81</td>
</tr>
<tr>
<td>10. Social activities with friends</td>
<td>3.24 (1.38)</td>
<td>.67</td>
<td>.81</td>
</tr>
<tr>
<td>11. Religious activities</td>
<td>2.01 (1.25)</td>
<td>.46</td>
<td>.83</td>
</tr>
<tr>
<td>12. Involvement in community activities</td>
<td>3.00 (1.38)</td>
<td>.42</td>
<td>.83</td>
</tr>
<tr>
<td>13. Self-improvement activities</td>
<td>3.10 (1.55)</td>
<td>.64</td>
<td>.81</td>
</tr>
</tbody>
</table>
The item of eating habits is very important with strong cultural relevance to Korean patients with chronic illnesses. Therefore, even in the face of the inconsistency in the factor analysis, the item of eating habits should remain in the scale, in line with the suggestion from Devins and colleagues that the item should be in the total score although it does not belong to a subscale (Devins, 2010; Devins et al., 2001). Our findings support retaining the item of eating habits in the total scale. Future studies may need to confirm whether this item should be within the factor of Instrumental Life.

The severity of illness intrusiveness differed among the three groups with different health status, which corroborates the construct validity of the scale. The patients with good health had significantly lower illness intrusiveness than those with fair or poor health. This result supports the original finding by Cina and Clase’s study (1999). The patients who underwent surgery to treat hyperhidrosis demonstrated significantly lower IIRS scores than those who did not. These results indicate that individuals without a problem have lower illness intrusiveness than those with a problem.

It was found that correlations of the two factors, Relationships and Personal Development and Instrumental Life, with fatigue and depression were weak regardless of its statistical significance in this study. The cross-loaded three items from the exploratory factor analysis may have resulted in weak correlations of the two factors, which include these three items. Also the item of eating habits may have affected low correlation of the Instrumental Life factor since it is relatively less related to emotional components, such as fatigue or depression.

However, evidence for relationships of the total scale with fatigue and depression was established. Illness intrusiveness is related with disease characteristics and emotional distress (Devins et al., 2001). Significant correlations between illness intrusiveness and fatigue and depression were revealed in patients with myalgic encephalomyelitis (Goudsmit, Stouten, & Howes, 2009). Bieling et al. (2001) also found significant correlations between illness intrusiveness and depression and anxiety in patients with anxiety disorders. The present study findings replicated these studies. The Korean version of a-IIRS was positively correlated with the scales of Energy/Fatigue and PHQ 9, as fatigue and depression became more severe with increasing severity of illness intrusiveness.

The internal consistency of the Korean version of a-IIRS was reasonably good for the total scale. The original IIRS also showed good reliability coefficients in various samples and different languages (Bieling et al., 2001; Devins et al., 2001; Novak et al., 2005). Regarding the internal consistency of each factor, the Instrumental Life factor had a slightly lower alpha coefficient, .69, than the ideal cutoff value, >.70; however, this was within the minimally acceptable range of .65–.70 suggested by DeVellis (2003). Among the items in the Instrumental Life factor, the confirmatory factor analysis showed that the eating habits item had lower factor coefficient (.25) than others, which may influence to lower the internal consistency of the Instrumental Life factor including the item. Nevertheless, this item contributed to the total scale while the item-total correlation for this item was slightly lower than the other items. Furthermore, there was no change in the alpha coefficient even after the item was deleted. Therefore, our results demonstrate the good internal consistency of a-IIRS for use in Korean patients.

Lastly, our study showed no statistically significant difference in illness intrusiveness among three groups with arthritis, diabetes, and hypertension. It implies nursing professionals may need to consider developing a comprehensive self-management program for patients with chronic illnesses as a whole rather than a disease-specific intervention. Further examination of the disease-specific differences in illness intrusiveness should be performed in a various chronic illness groups with a larger sample size.

The study suffered some limitations. The use of a convenience sample limits the generalizability of our results. Our findings revealed inconsistent results from two factor analyses on the item of eating habits and a minimally acceptable reliability coefficient for the factor that included the item. Future studies may need to confirm this difference of a-IIRS in other populations.
CONCLUSION

The study findings verified the validity and reliability of the Korean version of a-IIRS and supported the cultural relevance of the instrument for use with Korean patients with chronic illnesses. Our findings will encourage Korean researchers and health care professionals to use the instrument in order to promote the quality of life in Korean patients with chronic illnesses.

REFERENCES


