

Construct Validity of the Revised Piper Fatigue Scale in Korean Women with Breast Cancer

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For cancer patients, particularly undergoing cancer treatments, fatigue is one of the most prominent and distressful symptoms (Greenberg, Sawicka, Eisenthal, & Ross, 1992; Haylock & Hart, 1979; Kobashi-Schoot, Hanewald, van Dam, & Bruning, 1985; Winningham et al., 1994). Fatigue leads to mood disturbance (Blesch et al., 1991; Mock et al., 1997). Fatigue interferes with interpersonal relationships (Dodd, 1988) and daily activities (Ferrell, Grant, Dean, Funk, & Ly, 1996; Irvine, Vincent, Graydon, Bubela, & Thompson, 1994). Furthermore, fatigue decreases adjustment (Lee, 1998), and quality of life (Dean & Ferrell, 1995). Therefore, it is important to assess the level of fatigue and to plan appropriate strategies to manage it.

To assess the level of fatigue, a reliable and valid instrument is necessary. The revised Piper Fatigue Scale (PFS) (Piper et al., 1998) is a self-reported instrument measuring cancer-related fatigue. The scale has established reliability and validity in American women with breast cancer. However, it is questionable whether the instrument is appropriate for a cross-cultural application (Piper et al.). Thus, the purpose of the present study as a secondary

analysis of a larger study (Lee, 1998) was to examine the construct validity of the revised PFS in Korean women with breast cancer. In addition, internal consistency reliability of the scale was examined.

BACKGROUND

Fatigue in cancer patients has been described as a symptom (Glaus, 1993; Rhodes, et al., 1988; Richardson, 1995). A symptom is subjective and apparent only to the affected individual (Rhodes & Watson, 1987). It is a phenomenon experienced by a person that is not directly observable by another but instead becomes known only through the report of the person being assessed. A symptom has many meanings and dimensions not limited to physical or psychological definitions (Ruffin & Cohen, 1994). Teel, Meek, McNamara, and Watson (1997) noted that a symptom is the integration of multidimensions such as sensory, affective, and cognitive elements. Thus, cancer related fatigue might be characterized as subjective and multidimensional.

In cancer literature, fatigue is a self-recognized phenomenon that is subjective in nature (Irvine,

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Vincent, Graydon, & Bubela, 1998). Fatigue is also acknowledged as a multidimensional phenomenon, such as physical, psychological, cognitive, temporal, situational, and behavioral (Aistars, 1987; Irvine et al., 1994; Piper 1997; Piper, Linsey, & Dodd, 1987).

To measure subjective and multidimensional fatigue, Piper and her colleagues developed (1989) the Piper Fatigue Scale (PFS) and revised the scale (1998) in samples of patients with cancer. When the PFS was originally developed, it was in two forms; a 42-item baseline form (PFS-B) and a 40-item current form (PFS-C). The original PFS was comprised of the temporal subscale, the intensity/severity subscale, the affective subscale, and the sensory subscale.

The original PFS was revised to confirm its multidimensionality and to reduce the number of items. As the PFS-C items were almost identical to the items on the PFS-B, the PFS-B format was dropped. The PFS-C was administered to 382 breast cancer patients (mean age = 50 years) in a cross-sectional study, and the obtained data were used for a principal axis factor analysis with an oblique rotation (Piper et al., 1998). The analysis revealed four factors (subscales) of fatigue: Behavioral/Severity (six items), Affective Meaning (five items), Sensory (five items), and Cognitive/Mood (six items). The revised PFS consists of a total of 22 items.

Cronbach's alpha of the revised PFS did not drop below .92 for any of the factors, and the Cronbach's alpha for the entire scale was .97. In other studies, alpha coefficients of the revised PFS for internal consistency reliability have been reported as .87 to .99 in samples of women with breast cancer receiving chemotherapy (Berger, 1998) and radiation therapy (Mock et al., 1997).

Reliability and validity of the revised PFS have been established in samples of American patients with breast cancer (Berger, 1998; Mock et al., 1997; Piper et al., 1998). To use the reliable and valid in-

strument in a culture other than the one for which it was originally designed, the instrument needs to be reassessed since the psychometric properties of an instrument may be threatened by the culture (Waltz, Strickland, & Lens, 1991). Varricchio (1997) noted that, especially, construct validity of a self-reported instrument measuring health-related concepts is sensitive to cultural differences. Piper et al. (1998) recommended that the construct validity of the revised PFS be tested in other cultures using factor analysis.

For the application of the revised PFS in other cultures, translation of the instrument is required. The most common and highly recommended procedure for translating an instrument is back translation (Chapman & Carter, 1979; Jones & Kay, 1992). In the procedure, an instrument is rendered into a target language by a translator; the resulting version is then translated back into the original language by a different translator. Items with apparent discrepancies between the two translations are then modified.

In a study with 122 Korean women with breast cancer (mean age = 44.40 years) (Lee, 1998), the revised PFS was translated into the Korean language (the target language) and back to English (the original language) by three bilingual speakers. Then, a panel was constituted to produce a final version. The panel consisted of three individuals who were experts in the intent of the measure, the concepts to be explored, and who were also bilingual. The panel compared the original language version and the back translated version to validate the translation. Based upon the results from the comparison, a final target language version was produced. In the study, Cronbach's alpha of the instrument was quite high: .95 for a total scale, from .85 to .91 for subscales. However, there are no reports deciding construct validity of the revised PFS in Korean patients with cancer.

METHOD

Sample and Procedure

A descriptive correlational design was used in the larger study (Lee, 1998) to obtain the data that were analyzed for the present study. A sample was accrued from outpatient clinics of major medical centers in Seoul, Korea. Potential participants were identified by the provider physicians at the outpatient clinics at seven to eight weeks post-surgery. The potential participants were given a description of the study and asked to contact the researcher if interested in participating. Those who wished to participate were met in a waiting room or a small private room while waiting to be seen by the physician or while waiting for the administration of chemotherapy or radiation therapy. During the contact, the purpose of the study and the nature of participation were outlined. Individuals were then invited to read a written explanation of the proposed study. If a patient articulated an understanding of the study and agreed to participate, the patient signed a consent form and was given a package containing questionnaires and a stamped, self-addressed return envelope. Participants were requested to return the questionnaires in the stamped, self-addressed return envelope. A follow-up letter conveying the importance of participating in the study was mailed three or four days after the questionnaires were given.

Of the women who met the selection criteria, 162 agreed to participate and signed the consent form. The final study sample comprised 122 participants since three withdrew from the study, thirty did not return their questionnaires, and others returned their questionnaires after the allotted time frame for the study. The sample of the 122 met the criteria for an adequate sample size for a factor analysis (at least five cases for each observed item) as suggested by Tabachnick and Fidell (1989).

Instruments

The instruments completed by the participants included the Demographic Information Form, the Medical Data Form, and the revised PFS (Piper et al., 1998) translated into Korean. The Demographic Information Form was used to obtain information on age, marital status, religion, education level, employment status, and income. The Medical Data Form was used to obtain information on the type of surgery, the stage of disease, and the type of post-treatment. Fatigue was measured by the revised PFS (Piper et al.) which was translated into Korean using a back translation technique in the study by Lee (1998). Each item of the revised PFS is scored from 0 to 10. A high score indicates a higher level of fatigue.

Data Analysis

The Statistical Package for the Social Sciences (SPSS for Windows®, Version 7.5) was used to analyze the data. Descriptive statistics were calculated to describe the demographic and medical characteristics of the sample. Each item of the revised PFS was screened using mean, standard deviation, and skewness. The Kaiser's measure of sampling adequacy (Kaiser, 1974) was computed to test the suitability of data for factor analysis.

Construct validity was tested using a principal axis factor analysis used by the developers of the revised PFS (Piper et al., 1998). Oblique rotation was used because it was assumed that factors of fatigue would be correlated with each other (Piper et al.). Loading criterion was set at .40 (Nunnally, 1978). Cronbach's alpha internal consistencies were estimated for the total scale and for the meaningful factors that emerged.

RESULTS

The age of the participants ranged from 27 to 63 years with a mean of 44.40 years ($SD=7.62$). The participants were predominantly married (87.7%), homemakers (68.7%), and Protestant (33.4%) or

Buddhist(28.7%). Most of the participants had at least a high school degree or above(73.5%). Seventy-four participants(60.7%) had a modified mastectomy. All participants had lymph node dissection as part of their surgery. Most of the participants were stage II (68.0%) and were undergoing chemotherapy(83.6%). A summary of the demographic and medical characteristics is presented in Table 1.

Table 1. Demographic and Medical Characteristics (N=122)

Characteristic	n	Percent
Age in Years		
20-29	3	2.5
30-39	29	23.7
40-49	59	48.4
50-59	27	22.1
60-69	4	3.3
Marital Status		
Single-never-married	8	6.6
Married	107	87.7
Divorced	1	.8
Widowed	5	4.1
Separated	1	.8
Education		
Elementary School	6	4.9
Middle School	24	19.7
High School	51	41.8
Technical College	6	4.9
Baccalaureate Degree	31	25.4
Master Degree	2	1.6
Missing Data	2	1.6
Religion		
Buddhist	35	28.7
Protestant	42	34.4
Roman Catholic	21	17.2
None	22	18.0
Missing Data	2	1.0
Monthly Income		
Below 500,000 Won	3	2.5
500,000-999,999Won	8	6.6
1,000,000-1,499,999Won	24	19.7
1,500,000-1,999,999Won	25	20.5
2,000,000-2,499,999Won	25	20.5
Above 2,500,000Won	32	26.2
Missing Data	5	4.1
Employment		
Homemaker	84	68.9
Full-time	18	14.8

Table 1. 계속

Characteristic	n	Percent
Part-time	9	7.4
Retired	1	.8
Unemployed	4	3.3
Sick Leave	5	4.1
Missing Data	1	.8
Type of Surgery		
Modified Radical Mastectomy	74	60.7
Breast Conserving Surgery	48	39.3
Stage of Disease		
Stage I	39	32.0
Stage II	83	68.0
Follow-up Treatment		
Radiation	20	16.4
Chemotherapy	102	83.6
Menopausal Status		
Premenopause	95	77.9
Postmenopause	27	22.1

Item mean scores for the revised PFS were between 4.27 and 6.68, on a scale with a possible range of 0 to 10, with standard deviation being between 2.09 and 3.08. There was little skewness in the distributions of items, meaning that they were relatively symmetric in distribution. The value of the Kaiser's measure of sampling adequacy was .92 which is good for factor analysis(Kaiser, 1974).

A four-factor solution was extracted with the criterion of eigenvalues greater than one. After oblique rotation, the loading of items on factors is shown in Table 2.

A total of nineteen items loaded significantly on one of the four factors. Three items(G, L, & S) failed to load meaningfully on any factors, reflecting heterogeneity of the items on the scale. Six items from A to F loaded highly on Factor I. Four items from H to K loaded on Factor III. The items of M, N, O, and P loaded significantly on Factor IV. And items from Q to V, except S, meaningfully loaded on Factor II with item V loading strongest.

In the study by Piper et al. (1998), the items from A to F were clustered together and labeled as the Behavioral/Severity subscale, from G to K as the Affective Meaning subscale, from L to P as the Sensory subscale, and from Q to V as the Cognitive/

Table 2. Factor Loading

Subscale/Item ^a	Factor I	Factor II	Factor III	Factor IV
Behavioral/Severity				
A. Fatigue distress	.69			
B. Interference with work/school activities	.79			
C. Interference with socializing with friends	.82			
D. Interference with sexual activity	.74			
E. Overall interference with enjoyable activities	.69			
F. Fatigue intensity/severity	.65			
Affective Meaning				
G. Pleasant/unpleasant			—	
H. Agreeable/disagreeable			-.43	
I. Protective/destructive			-.68	
J. Positive/negative			-.79	
K. Normal/abnormal			-.84	
Sensory				
L. Strong/weak				—
M. Awake/sleep				-.55
N. Lively/listless				-.92
O. Refreshed/tired				-.88
P. Energetic/unenergetic				-.40
Cognitive/Mood				
Q. Patient/impatient		.59		
R. Relaxed/tense		.40		
S. Exhilarated/depressed		—		
T. Able to concentrate		.48		
U. Able to remember		.75		
V. Able to think clearly		.79		

^aSubscales and abbreviated items of the revised PFS

— Loading below than .40

Mood subscale. Comparing the factors emerged in the present study with the subscales labeled by Piper and her colleagues, each of the factor I, II, III and IV are comparable with each of the Behavioral/Severity, Cognitive/Mood, Affective Meaning, and Sensory subscales.

The final Korean version of the revised PFS consists of a total of 19 items, measuring four dimensions of subjective fatigue: Behavioral/Severity (6 items), Affective Meaning(4 items), Sensory(4 items), and Cognitive/Mood(5 items). Alpha internal consistencies for the total scale(19 items) and for the four factors that emerged were all above the minimum of .70, as recommended by Nunnally(1978) (see Table 3).

Table 4 displays a factor correlation matrix. If factors are correlated .40 or above, the possibility of

collapsing the factors may be considered. However, the decision to collapsing any of the factors is based upon the levels of reliability of the uncollapsed factors and the conceptual meaningfulness of such collapsing. That is, if the factors are reliable and clearly meaningful, the collapsing is optional(Gable 1986). In the present study, the alpha reliability of

Table 3. Cronbach's Alpha for the Total Scale and Four Factors of the 19-Item Korean Version of the Revised PFS

Factors	Number of Items	Cronbach's Alpha
Behavioral/Severity	6	.91
Affective Meaning	4	.89
Sensory	4	.88
Cognitive/Mood	5	.84
Total Fatigue Scale	19	.93

Table 4. Factor Correlation Matrix

Factor	Behavioral/Severity	Cognitive/Mood	Affective Meaning	Sensory
Behavioral/Severity				
Cognitive/Mood	.30			
Affective meaning	-.54	-.38		
Sensory	-.59	-.39	.55	

the four factors were high. Each factor made conceptual sense in light of the clustered item content. Thus, factor collapsing was not performed.

DISCUSSION

The findings of the present study revealed that the 19-item Korean version of the revised PFS is valid and reliable in Korean women with breast cancer. The items clustered together in the present study were almost identical with those reported by Piper et al (1998) in American patients with breast cancer.

However, three items "Pleasant/Unpleasant," "Weak/Strong," and "Exhilarated/Depressed" were eliminated. Of the items, "Weak" should be carefully reviewed whether it is appropriate as a defining attribute of cancer related fatigue. Gordon (1986) noted that weakness may be different from fatigue; there is a voluntary component to fatigue i. e., an individual can still push himself/herself to perform, whereas weakness is symptom of a neurological syndrome with no voluntary component. Nail and Winningham(1995) emphasized that research is needed to differentiate between weakness and fatigue although the term "Weak" is frequently used to describe fatigue.

Associated with the eliminated items, one must consider a possible language difference. When the revised PFS was translated into the Korean language, a back translation technique was used to validity the translation. In spite of the translation technique, the equivalency between the English and Korean versions might not be completely established because of a language difference. According to E. Lee(personal communication, 1998), the word "Exhilarated" presented a translation difficulty,

which may be an indication that the word lacks language equivalence.

Cronbach's alpha for the total scale in the present study was high enough, but slightly lower than the alpha(.95) computed with 22-item Korean version of the revised PFS in the Lee's study(1998). It may be partly due to the reduced number of items(a total of 19 items) by parsimonious statistics used in the present study(Nunnally, 1978).

In practice, measuring cancer related fatigue is difficult because fatigue is described by patients using various words(i. e., exhaustion, low energy, worn out, lethargic, or sleepy)(Lee, 1998; Piper et al., 1989; Varricchio, 1995). Also, fatigue is described in an intertwined manner with emotional experience or lack of desire related to activity or work(Messias, Yeager, Dibble, & Dodd). However, with the findings of the present study, the 19-item Korean version of the revised PFS can be used in practice as a reliable and valid instrument measuring cancer related fatigue of Koreans.

For further research, subsequent tests of the instrument's psychometric properties are recommended to increase confidence in the findings. Increased confidence will lead to clearer understanding of cancer related fatigue. Also, further research needs to be conducted for this type of psychometric test in other kinds of cancer patients to gain more credit of the scale.

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-국문초록-

주요개념 : 피로, 도구, 구성타당도

Revised Piper Fatigue Scale의 구성타당도 : 한국여성 유방암 환자를 중심으로

이 은 현*

Revised Piper Fatigue Scale(Piper et al., 1998)은 미국에서 개발된 암환자의 피로를 측정하는 자가보고서 형식의 도구이다. 이 도구는 총 22문항으로 네 개의 구성요소로 이루어져 있으며, 미국인 유방암 환자를 대상으로 신뢰도와 타당도가 검증되었다. 본 연구의 목적은

한국 유방암 환자를 대상으로 Revised Piper Fatigue Scale의 구성타당도를 재평가하기 위함이다.

총 122명의 유방암 환자가 번역-역번역 과정을 거쳐 한국어로 번역된 Revised Piper Fatigue Scale에 응답을 하였고 그 자료는 요인분석(principal axis analysis with oblique rotation)에 의해 분석되었다. 요인분석 결과, 총 19문항으로 이루어진 네 개의 구성요소가 도출되었다. 총문항의 Cronbach's alpha는 .93이었고, 도출된 네 요인들의 alpha는 .84에서 .91이었다.

한국어로 번역된 총 19문항의 Revised Piper Fatigue Scale(revised PFS-K)은 한국인 유방암 환자에게도 적용될 수 있는 신뢰도와 타당도가 검증된 도구라 할 수 있다. 앞으로 다양한 한국인 암환자를 대상으로 계속해서 도구 검증이 이루어지기를 제언한다.

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