Research Article

Psychometric Properties of Korean Version of Self-Efficacy of Evidence-Based Practice Scale

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S U M M A R Y

Purpose: This study is to evaluate the psychometric properties of the Korean version of the Self-Efficacy of Evidence-Based Practice (SE-EBP) scale, which was originally developed by Chang and Crowe. The beta-version of the SE-EBP is a modified version of the original SE-EBP, which measures the clinical nurses' confidence in finding, appraising, and implementing evidence into practice. Although the original SE-EBP has been validated, no study has been conducted to validate the Korean version of SE-EBP.
Methods: The original scale was translated into Korean through a process of forward and back translation of the original scale. After getting confirmation of the equivalence of the Korean forward translation by the original author, exploratory factor analysis and confirmatory factor analysis of data from 212 clinical nurses were used to test construct validity. Internal consistency was examined using Cronbach α coefficients. For the statistical analysis, STATA version 13.0 software program was used.
Results: Exploratory factor analysis of the 28 items revealed three factors with eigenvalues above 1, accounting for 60.2% of the total variance. Confirmatory factor analysis showed good fit of the three-factor structure which was statistically significant ($\chi^2 = 718.61$, $df = 330$, $p < .01$). For internal consistency, Cronbach α coefficient for the total scale was .95, and it was greater than .80 for each of the three subscales.
Conclusions: The Korean version of SE-EBP scale showed evidence of adequate construct validity and reliability. This study might have contributed to a wider application of the SE-EBP scale, but further studies are needed to provide more evidence on the structure of the scale.

Introduction

Evidence-based practice (EBP) is an essential capability and a valuable skill for clinical nurses in the delivery of quality healthcare all over the world [1]. Achieving better patient outcomes, requires that new knowledge must be transformed into clinically useful forms, in order to be effectively implemented across the entire care team [2]. By adopting EBP in clinical settings, nurses are enabled to communicate effectively with their patients and the healthcare team about the rationale for decision making and care plans.

Furthermore, adopting EBP empowers nurses to become confident professionals, feel assured that they are providing care supported by facts rather than habits, thereby enabling nurses to take legal accountability for their practice [3].

Effective EBP implementation in clinical practice requires accessible and available evidence for clinical nurses, and nurses must cultivate the ability to assess or criticize the evidence they are using in order to invigorate the acceptance of EBP. In clinical for practice, however, there is insufficient use of EBP in caring for patients or in management of patient care due to the lack of relevant research, time, and the ability to translate the research into practice [4]. In addition, some studies indicate that nurses rated their level of knowledge and skill related to EBP as low [5]. Reports by many clinicians that they are not equipped to implement EBP in the clinical setting suggested that they do not feel competent in using

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EBP skills needed in their decision-making process as a professional [6]. And nurses also have to value EBP as positive and must feel confident in using it [7−9]. Nevertheless, a number of studies investigating nurses' perceptions of EBP have shown that nurses generally take a positive view of EBP and consider it important for quality in patient care [10].

The effective adoption of EBP requires basic skills in the EBP process as well as feeling confident in (a) identifying knowledge gaps, (b) formulating relevant questions, (c) conducting an efficient literature search, (d) applying rules of evidence to determine the validity of studies, (e) applying the literature findings appropriately to the patient's problem, and (f) involving the patient appropriately in clinical decision making [11]. Self-efficacy in implementing EBP as well as the belief that practicing in an evidence-based way will improve outcomes has been highlighted in the literature as important attitude or beliefs to ensure success [12]. Therefore, in order to promote adoption of EBP in clinical practice it is necessary to identify the level of EBP confidence among clinical nurses, and when necessary formulate strategies to enhance self-efficacy.

The Self-Efficacy of EBP (SE-EBP) Scale was originally developed and evaluated by Chang and Crowe [13] in Australia for measuring the nurses' confidence in each step in the EBP process based on the concept of self-efficacy in Bandura's social cognitive theory [7,13]. The development of the instrument was motivated by the recognition that education programs needed to address more than knowledge of the EBP process, because confidence in basing practice on evidence is also essential [9]. The beta version of the Self-Efficacy of EBP (SE-EBP-β, 28 items) is a revision of the original 26-item scale to ensure the recommended minimum number of items per subscale is met, as specified by Chang and Crowe. The evaluation of the instrument indicated high internal consistency and resulted in a version with 28 items and a three-factor model: (a) identifying the clinical problem, (b) searching for evidence, and (c) implementing evidence into practice [9]. However, most studies on EBP tools have been carried out in English-speaking countries. When a tool is translated into another language, it is important to determine the validity of the translated version in the other cultural situation. Therefore, the purpose of this study was to evaluate psychometric properties of the Korean version of the SE-EBP scale and to determine the level of EBP competence in Korean nursing professionals.

Methods

Study design

This is a methodological study to test validity and reliability of the translated Korean version of the SE-EBP using the self-questionnaire survey.

Instruments

The beta version of the Self-Efficacy of EBP (SE-EBP-β)

The instrument SE-EBP-β [13] was used to measure the level of confidence held by nurses about EBP. The SE-EBP-β was found to have three factors from an exploratory factor analysis in 2011: identifying the clinical problem (5 items; e.g., "Identify a clinical problem needing evidence to guide nursing care"), searching for evidence (9 items; e.g., "Use computers to search for evidence-based information"), and implementing evidence into practice (14 items; e.g., "Determine the levels of evidence"). The SE-EBP-β contains a total of 28 Likert-type items rated with a score of 0−10, where 0 indicates *no confidence at all* and 10 indicates *extremely confident*. Possible SE-EBP-β scores range from 0 to 280 with higher scores indicating stronger confidence (self-efficacy) on EBP.

There were no redundant item categories in all 28 items. The original SE-EBP scale showed an adequate internal consistency with a Cronbach α of .97.

Translation procedures

A forward translation and back translation process was used [14]. The first translation was performed independently from English to Korean by the three bilingual translators who majored in nursing, lived in an English speaking country for more than 10 years, graduated from a nursing university program in the United States and had more than 3 years of clinical experience. Next, one of bilingual nursing professor reviewed the first version of the Korean translation and determined if it was relevant to Korean situations, both semantically and culturally. Minor revisions, such as changes in verbs, adjectives, or adverbs, were performed in this step. Then, the Korean translation was translated back to English independently by two other bilingual translators who have lived in the US for over 10 years and majored in nursing. The back-translated version was then reviewed directly by the original authors and most of the questions were assessed as similar to the original, with a few minor changes in wording recommended by the original author were made to the questionnaire. Lastly, two doctoral students and a nursing professor with experience of instrument translation and implementation projects, examined the Korean version as part of the expert validation, to identify whether the meaning of the items could be clearly understood.

Evaluation of psychometric properties of the Korean version of the instrument

Samples and data collection

Total of 214 newly registered nurses from three hospitals, located in Seoul and Gyeonggi-do in Korea, were recruited to participate in this study by convenience sampling approach. Excluding questionnaires with missing data, a total of 212 (99.0%) questionnaires were completed. The Korean version of the SE-EBP (K-SE-EBP) questionnaire was distributed at the education program for newly graduate nurses in 2014. Before the survey, researchers explained the purpose of the study, that there was no requirement to participate, and that their decision to participate or not would have no influence on their career or unit assignment. Also, we explained nurses who agreed to participate in the study should read and sign the informed consent form located at the cover of the questionnaire. Furthermore nurses were assured that their responses were anonymous. The questionnaire return box was placed at the back of the lecture room, and completed questionnaires were retrieved the following day.

Demographic data

The study participants' demographic data included sex, age, nursing educational background and previous education experience of EBP were collected.

Data analysis

Descriptive statistics were used to summarize sample characteristics. In addition, independent *t* test was used to identify significant differences of the mean score of self-efficacy among subgroups. Exploratory factor analysis (EFA) was conducted using varimax rotation to estimate the total variance explained by the specific items. Confirmatory Factor Analysis (CFA) was conducted in order to examine whether the K-SE-EBP factor structure was similar to the original SE-EBP. We tested two models: model 1 assessed the presence of three latent variables according to the

conceptual structure of the original study. Items included in each factor of model were, identifying the clinical problem (items 1−5), searching for evidence (items 6−14), implementing evidence into practice (items 15−28). Model 2 examined a one-factor model, in which the 28 items were assumed to be the indicator of a single latent factor.

The goodness fit of the model was evaluated by using multiple indices for CFA including chi-square statistic, comparative fit index (CFI $\geq$ .90 as a good fit), Tucker-Lewis Index (TLI .90−.94 as an adequate fit, and $\geq$ .95 as an excellent fit), and the root-mean-square error of approximation (RMSEA $\leq$ .05 as a good fit, .05−.08 as an acceptable fit) [15,16]. Moreover, Akaike information criteria (AIC) was also reported to compare the two models; the model with the smaller AIC is more likely to be replicated, has fewer parameter, and fits better [17].

The internal consistency of the total scale and the domains were ascertained by calculating the Cronbach α coefficient. A Cronbach α of .8 or higher was adopted as the criteria for evaluating acceptable internal consistency [18]. In CFA, minimum criterion of sample size is more than 200. Thus, our study sample size was sufficient ($n = 212$) [19]. For all the statistical analysis, the Stata Statistical Software version 13 of StataCorp., College Station, TX, USA was used.

Ethical considerations

Ethical approval was obtained from the Institutional Review Board of College of Nursing, Yonsei University (Nursing IRB 2013-0055). Study participants were provided written information concerning the purpose of the study; those who returned the anonymously completed questionnaire were considered as consenting participants.

Results

General characteristics of study participants

Among the 212 participants involved in the study, 92.9% ($n = 197$) of the participants were female. The mean age of the study participants were 23.52 years ($SD = 1.51$), while 10.8% ($n = 23$) had graduated from the 3-year nursing college program, and 52.8% ($n = 112$) of the participants had previous EBP education experience (Table 1).

CFA

Model 1, which tested the three-factor structure model, was demonstrated by the multiple indices of CFA. The CFI (.91) and TLI (.90) reached the criteria (CFI $\geq$ .90 and TLI .90−.94 as an adequate fit). Also, RMSEA was .08 which was acceptable. However, model 2, which tested the one-factor structure model, showed unsatisfactory fit on all indices. The standardized factor weight and residuals

Table 1 General Characteristics of Study Participants (N = 212).

Variables (Mean ± SD)	Categories	n	Percentage (%)
Gender	Male	15	7.1
	Female	197	92.9
Age (yr) (23.52 ± 1.51)	≤ 25	194	91.5
	> 25	18	8.5
Educational background	3-yr college	23	10.8
	4-yr university	189	89.2
Previous education of EBP	Yes	112	52.8
	No	100	47.2

of model 1 is shown in Figure 1, and the goodness fit of the two models is in Table 2.

Internal consistency reliability

Cronbach α coefficients were used to assess the internal consistency of each of the three factors. The Cronbach α for the total scale was high (.95), and for each of the factors were above .80 (Factor 1: .89; Factor 2: .90; Factor 3: .93), indicating high internal consistency, particularly in the context of exploratory research [20,21].

Level of K-SE-EBP among study participants

The mean and standard deviation of the total scores of SE-EBP are reported for the sample now that the internal consistency and factor structure of the K-SE-EBP scale has been confirmed. The mean total score of the K-SE-EBP for the whole sample was 174.95 (SD = 35.61) out of a possible score of 280.

Comparisons were made in the total K-SE-EBP according to whether participants had previously undertaken EBP-related education or not. Independent t test was conducted on total scores of K-SE-EBP from each group. Those who had previously received education on EBP had significantly higher K-SE-EBP scores than those who had not. Furthermore, there was a statistically significant difference between participants who had education of EBP previously ($n = 112$; mean = 179.71, SD = 35.43), and those who had not ($n = 100$, mean = 168.88, SD = 35.02; $t = 2.12$, $p = .028$).

Discussion

The Institute of Medicine in US set up a goal of reinforcing the caregiver's EBP capability by introducing EBP in all healthcare settings by 2020 [1]. It is very important to clearly identify the status quo of clinical nurses implementing evidence into practice. For example, identifying the extent to which clinical nurses' are implementing evidence when developing intervention programs for promoting self-care potential. This study has demonstrated the benefits of using a rigorous approach to the translation and verification of a previously developed English language instrument for measuring EBP confidence in newly graduated Korean nurses. In consequence, this study is the first attempt in Korea to test the psychometric properties of the K-SE-EBP, which demonstrated a high level of reliability and validity.

The total score of EBP self-efficacy was above average, higher than that of original article. More than half of the study participants had previous EBP education, a higher rate compared to that of the original article, which might have influenced their confidence of EBP. On the other hand, the findings of this study show that the newly registered nurses' scores were relatively low on applying EBP into practice. This implies constant education on EBP through workshop opportunities or supplementary education is needed. According to the Advancing Research and Clinical practice through close Collaboration (ARCC) model, finding out the challenging and facilitating factors in implementing EBP is also needed, to make both an individual and institutional effort to address the challenge, and to strengthen one's values and confidence in EBP in order to revitalize nursing practice [5].

The positive association between previous experience of EBP education and the SE-EBP score indicates the exposure to EBP may increase confidence of EBP for clinical nurses. This finding is consistent with that of a study which also found a relationship between EBP knowledge, confidence, and attitude [22]. Such findings indicate the importance of EBP education to enable nurses to actively adopt EBP into clinical settings [22]. The items in the EBP
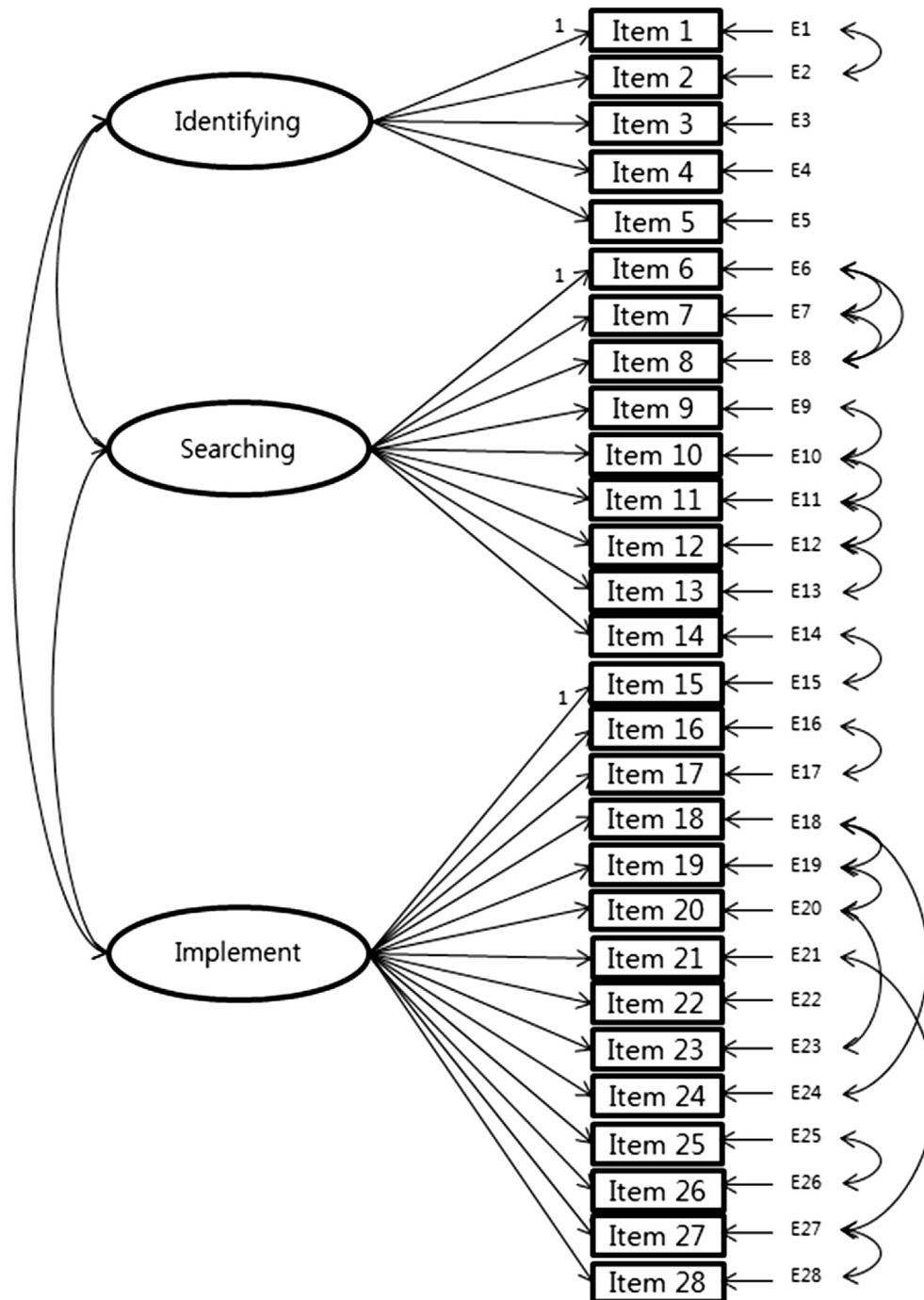
Figure 1. Three factor structure of the Korean version of the Self-Efficacy of Evidence-Based Practice scale. *Note.* E1–E28 refer to residual errors of observed scores of each items.

Table 2 *Confirmatory Factor Analysis Fit Index of the K-SE-EBP.*

	χ^2	df	p	CFI	TLI	AIC	RMSEA
Model 1[a]	718.61	330	<.001	.91[c]	.90[c]	20,471.58[c]	.075[c]
Model 2[b]	4,689.20	378	<.001	.62	.59	21,688.54	.148

Note. AIC = Akaike information criterion; CFI = comparative fit index; K-SE-EBP = Korean verison of Self-Efficacy of Evidence-Based Practice; RMSEA = root-mean-square error of approximation; TLI = Tucker-Lewis Index.
 [a] Construct of three factors K-SE-EBP;
 [b] Construct of one factor K-SE-EBP;
 [c] Acceptable fit indices.

self-efficacy tool could provide a guide for education programs as well as providing a specific tool for educators to test the effectiveness of education programs aimed at promoting health professionals' confidence of EBP [9].

In this study, the translation process was systematically conducted to ensure the equivalence between English and Korean versions of SE-EBP tools. The Korean version of the SE-EBP (K-SE-EBP) with the underlying three-factor-structure (identifying, searching, and implementing) was distributed to newly registered nurses. The study data and findings are similar to those reported by the original authors of the SE-EBP, indicating that the instrument is

a valid measures of EBP self-efficacy or confidence of nurses. In addition, results from CFA indicated marginal model fit for the three-factor structure model 1. CFI and TLI were high, and RMSEA values also suggested an acceptable fit to the data. Some items of SE-EBP had been understood as having similar meanings by study participants, but the model structure was necessary to control covariates for the acceptance of model fit. For example, item 9, "Conduct a literature search on my own using bibliographic data bases (e.g., MEDLINE, CINAHAL)" and item 10, "Conduct a literature search on my own using other sources of important evidence-based information (e.g., Cochrane Library, Joanna Briggs Institute)" were correlated. These items were controlled statistically to satisfy the reliability and data-model fit.

The 28-items of K-SE-EBP had acceptable reliability for the total scale with Cronbach α coefficient at .95, which was similar to that of the original version (.97). The change in Cronbach α if any item was deleted did not exceed the Cronbach α for the whole scale, indicating all items were pertinent and necessary.

For the active EBP implication into clinical settings, current studies developed and validated various kinds of measurement of nurses' EBP competencies or self-efficacy beliefs [8–10,13,23]. Tucker, Olson, and Frusti [23] developed the Evidence-Based Practice Self-Efficacy scale, which included research evidence and available resources for access, organizational context and culture, and facilitation skills required of unit champions or EBP leaders. Nevertheless, it was not validated with regard to the ethnic diversity of the participants, which was a limitation [23].

This study identified reliability and validation of Korean version SE-EBP scale by using forward and back translation method and CFA. Therefore, diversity of validity should be secured, and construct validity should also be identified using multitrait—multimethod matrix approach. Multiple traits can be used to examine convergent validity by testing the same construct (self-efficacy of EBP) and using similar tools (e.g., the Evidence-Based Practice Self-Efficacy scale). Multimethod can be used to examine the differential effects caused by method-specific variance [24], for example, one test by self-reports (questionnaire) and the other test by interviewing clinical nurses.

In terms of reliability, methods other than Cronbach α are needed to maintain the stability of the scale. For example, test-retest reliability can be used to assess the consistency of a measure from one time to another. Additionally, Rasch analysis can be used to measure the properties of attitude scales, as it is a far superior measurement [25,26].

Moreover, since this study collected data from newly registered nurses working in three general hospitals in two main cities in Korea, which are acute care hospital settings, generalization of the study's outcome is limited. Also, the translated questionnaire was read by two doctoral students and a professor. However, the questionnaire was developed for the clinical nurses. Thus, it might be necessary to ask several potential target participants to go through the translated version as well.

In this study, only one expert who developed the original version of SE-EBP gave feedback on the equivalence between the English back translation of the K-SE-EBP and the original English version of the SE-EBP. However, for the cultural adaptation of the measurement, a heterogeneous group including different experts and nonexperts should be involved in the translating process. Additionally, the best back-translators would be native English speakers.

Consequently, future research is recommended to reconfirm the validity and reliability of the measurement with the target of all nurses and newly registered nurses in the country to increase the generalizability of the K-SE-EBP. This study, however, enabled measurement of nurses' confidence in performing EBP by testing the validity and reliability of a Korean version of the English SE-EBP tool, in the absence of a unique tool regarding EBP self-efficacy in Korea. Accordingly the K-SE-EBP will enable the measurement of EBP confidence in Korean nurses and can facilitate establishing plans for promoting EBP, and evaluating the outcomes of such plans. Furthermore, the need which education for reinforcing EBP confidence was identified by the levels measuring newly registered nurses' EBP self-efficacy.

Conclusions

To our knowledge, this is the first study involving CFA of the SE-EBP, albeit the Korean version (K-SE-EBP). Differences existing in the setting of items translated into Korean and cultural differences such as introspective nature of Korean people may have impacted participants' confidence in EBP and influenced loadings on different factors compared to the original study sample. Therefore, findings from the confirmatory analysis provided preliminary results that the K-SE-EBP had adequate construct validity, similar to the English version SE-EBP, and reliability. Moreover, the study supports the cultural relevance of the instrument for Korean clinical nurses. Our findings will encourage Korean nursing researchers to use the instrument in assessing the EBP-related confidence, and to promote the implementation of EBP in Korea.

Conflicts of Interest

The authors declare no potential conflicts of interest.

Acknowledgments

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