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EMPIRICAL RESEARCH QUANTITATIVE

# Development and psychometric testing of the actualisation of evidence-based nursing instrument

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## Abstract

**Aim:** To describe the development of the Actualisation of Evidence-Based Nursing instrument targeted at nurses working in clinical practice (ActEBN-nurses), meant for evaluating the actualisation of individual and organisational-level support structures for evidence-based nursing within social and healthcare organisations, and to test its validity and reliability.

**Design:** Cross-sectional survey.

**Methods:** The FinYHKÄ model was used as the theoretical background of the instrument development and supplemented with the JBI Model of Evidence-Based Healthcare, previous literature and items from a previous instrument, the Evidence-Based Practice Process Assessment Scale, with permission of the copyright holders. After two rounds of expert panel and piloting, a national survey was conducted with the instrument in 2021. The target group consisted of nurses working in clinical practice. Psychometric testing included internal consistency (Omega, item analysis) confirmatory factor analysis and *t*-test for comparison of two groups' differences (sensitivity).

**Results:** A new instrument, ActEBN-nurses was developed, comprising two parts: Individual-level (32 items, 5-point Likert-scale) and Organisational-level support structures for evidence-based nursing (37 items, 5-point Likert-scale). In total, 1289 nurses participated in the survey. The ActEBN-nurses proved to have good internal consistency in both parts (Omega ω .931 and .966), structural validity and sensitivity based on the two educational levels within the sample. The structure of both parts was slightly modified, based on the CFA modification indices, considering the impact of the reverse worded items in part Individual and redundant items within both parts.

Statistics statement: There is a statistician on the author team (MP).

**Conclusion:** The ActEBN-nurses has promising psychometrics, and it can be used for evaluating individual and organisational-level support structures for evidence-based nursing within social and healthcare organisations.

**Implications for the profession and/or patient care:** Evaluation of the support structures within social and healthcare organisations is needed to recognise shortcomings in current structures and advance evidence-based nursing across different contexts.

**Reporting Method:** The authors state that they have adhered to relevant EQUATOR guidelines: STROBE statement for cross-sectional studies.

**Patient or Public Contribution:** No patient or public contribution.

**KEYWORDS**
evidence-based practice, instrument, measurement, nursing, psychometrics

## 1 | INTRODUCTION

Evidence-based nursing (EBN) refers to basing nursing practices and clinical decisions on the best available evidence, which increase the use of effective, cost-effective, meaningful, appropriate and feasible interventions and practices within healthcare services (Jordan et al., 2019). The purpose of EBN is to promote the quality and safety of care by reducing the use of inefficient and harmful practices and diminishing unjustified variation in patients' care (Jylhä et al., 2017). Thus, the purpose is to ensure the best possible care for patients, based on up-to-date evidence and guaranteed in legislation and strategies (see e.g. Health Care Act, 1326/2010; Institute of Medicine, 2001).

Despite positive attitudes towards EBN, there are shortcomings in its implementation. Previous studies have identified different obstacles for EBN implementation, for example, poor understanding of EBN, what it means and how the evidence can be implemented into practice (Cleary-Holdforth et al., 2022; Stavor et al., 2017). In addition, lack of time, resources and support from managers have been recognised as hindrances to EBN implementation (Clarke et al., 2021; Li et al., 2019). Moreover, nurses themselves have identified lack of competence regarding research and the process of evidence utilisation (Hines et al., 2021; Stavor et al., 2017).

Previously the main focus of evidence-based practice (EBP) implementation research and measurement in general has been on healthcare professional's characteristics that are considered as preconditions for EBP (da Silva et al., 2023). However, it has been critised that EBP implementation cannot solely rely on individuals' competence and actions. For example, it is unrealistic to expect that nurses working in clinical practice have time to search for the best available evidence for clinical questions, in other words conduct systematic searches of research databases, evaluate the methodological quality of the included studies, synthesise and evaluate the quality of the evidence and draw conclusions based on it (Warren et al., 2016).

To support EBN implementation, national and organisational support structures that are independent of individuals' competence and actions are also needed. These support structures should enable easy access to synthesised evidence (Warren et al., 2016), such as clinical practice guidelines and systematic reviews. In addition, support structures that enable the dissemination and implementation of evidence as well as monitoring and evaluating current practices and outcomes within the organisation are needed (Jordan et al., 2019; Jylhä et al., 2017). Furthermore, these structures should promote nurses' competence and enable adequate resources, for example, time and equipment which are preconditions for EBN (Holopainen et al., 2010). Development of these support structures requires cooperation within and between international, national, regional and local stakeholders. In addition to this cooperation each level has its specific tasks and responsibilities (Holopainen et al., 2010).

The Finnish model for the development of consistent evidence-based practices, FinYHKÄ, is an example of a model that guides the

### What does this paper contribute to the wider global community?

- Strengthening evidence-based nursing requires recognising shortcomings in current support structures, but no instruments that allow examination of the actualisation of evidence-based nursing support structures from both individual and organisational levels were available.
- The paper presents a new instrument for evaluating the actualisation of both individual and organisational-level support structures for evidence-based nursing.
- The developed instrument is shown to be promising and can assist in recognising development needs in evidence-based nursing support structures in social and healthcare organisations, and thus, support the actualisation of evidence-based nursing across different contexts.

implementation of evidence into practice and that recognises the different roles and importance of the different level stakeholders and support structures (Holopainen et al., 2010). The core of the FinYHKÄ model is the development of consistent EBPs (e.g. to minimise unjustified variation between nurses' practices) and how this is supported both at national and organisational levels. Based on the FinYHKÄ model, organisations should have structures for monitoring and evaluating their practices to recognise possible unjustified variation between different units and healthcare professionals, differences between evidence and current practices and direction of outcomes after the implementation of EBP (for example whether prevalence of pressure ulcers is increasing or decreasing). (Holopainen et al., 2010; Jylhä et al., 2017; Suhonen et al., 2019.) Organisations should also ensure sufficient time and personnel resources, such as clinical nursing specialist resources, dedicated to the development and implementation of consistent EBP. In addition, methods that ensure the competence of healthcare professionals, support positive organisational culture shifting towards EBP and enable support from managers are needed (Jylhä et al., 2017).

The existence of these support structures may vary between different healthcare organisations. Evaluating the actualisation of these structures would allow identification of development needs and development of targeted interventions that support EBP actualisation across different healthcare organisations. Therefore, a new instrument called Actualisation of Evidence-Based Nursing (ActEBN) was developed with the main focus on the organisation-level support structures for EBN. The FinYHKÄ model (Jylhä et al., 2017) was used as the theoretical background of the instrument. In addition, the individual and organisational-level preconditions for evidence implementation, presented in the JBI (Joanna Briggs Institute) model of evidence-based healthcare (Jordan et al., 2019) and recognised from previous literature, were considered in the instrument development as well. The purpose of this paper is to evaluate the validity and reliability of the ActEBN instrument version targeted at nurses working in clinical practice (called ActEBN-nurses).

## 2 | AIM

The aim of the study was to describe the development of ActEBN-nurses instrument and test its validity and reliability. The overall goal was to produce an instrument with a comprehensive, organisational-level approach to EBN support structures to enable the recognition of development needs in current structures within social and healthcare organisations, and thus, the actualisation of EBN.

## 3 | METHODS

### 3.1 | Development of the instrument

The ActEBN-nurses instrument is developed in collaboration with Nursing Research Foundation (NRF) and the University of Turku. The NRF is a national research and development organisation that promotes EBN at the national level in Finland by, for example, producing clinical guidelines for nursing and developing national support structures for evidence implementation. The foundation also evaluates the current state of EBN in Finland. The NRF operates partly with state funding, and it is an independent entity with an autonomous research-oriented purpose.

The ActEBN-nurses instrument was developed for evaluating the actualisation of individual and organisational-level support structures for EBN based on the evaluations of nursing professionals working in clinical practice. In other words, 'actualisation' refers to how well the individual (e.g. positive attitudes towards EBN) and organisational (e.g. positive organisational culture towards EBN) structures supporting evidence-based practices are realised. The development process of ActEBN-nurses (Figure 1) followed a systematic instrument development process (DeVellis & Thorpe, 2021).

First, a scoping review mapping the existing instruments evaluating EBN actualisation was conducted in 2019. In addition, a literature search covering the barriers and enablers of EBN was executed.

Second, the preliminary draft of the instrument was formed based on the literature and theoretical FinYHKÄ model (Holopainen et al., 2010) and supplemented with the JBI model of evidence-based healthcare (Jordan et al., 2019) and barriers and enablers of EBP implementation recognised in previous literature (Table 1). A questionnaire used in a previous national survey (Holopainen et al., 2019) evaluating the current state of EBN in Finland was reviewed and utilised as one of the background materials. In addition, items from a previously validated instrument, the Evidence-Based Practice Process Assessment Scale (EBPPAS; Rubin & Parrish, 2010, 2011), were used as part of the newly developed instrument with the permission of the copyright holders (permission originally received 9th June 2017, and re-confirmed 24th August 2021). Two versions of the instrument were developed at the same time; a version targeted at nurses working in clinical practice and another targeted at nursing managers and clinical nurse specialists. With these two versions, the

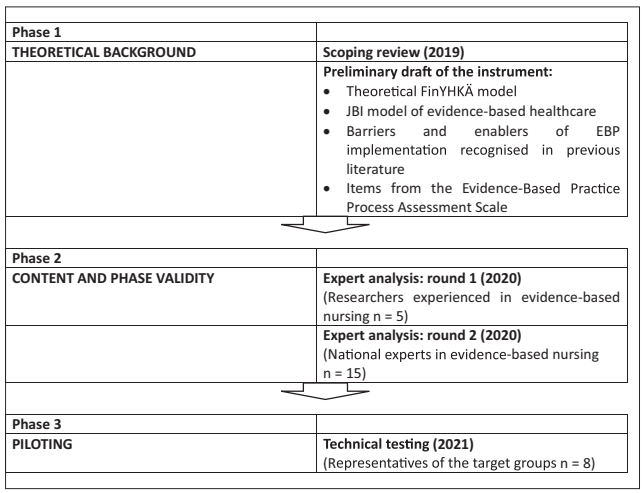


**FIGURE 1** Development process of the ActEBN-nurses instrument.

TABLE 1 Structure of the ActEBN-nurses instrument.

| | Instrument parts | Subscale | Short name | Description | Number of items[a] |
|---|---|---|---|---|---|
| ActEBN-nurses | Individual-level support structures for EBN (short name: Individual) | Nurse's attitudes towards EBN (self-evaluation) | Attitudes | Evaluation of one's own attitudes towards the EBP process (Rubin & Parrish, 2010, 2011). | 14 (14 from EBPPAS) |
| | | Nurse's EBN competence (self-evaluation) | Competence | Evaluation of one's perceived familiarity with the EBP process (Rubin & Parrish, 2010, 2011), development, implementation and evaluation of consistent evidence-based practices (Holopainen et al., 2010). | 8 (5 from EBPPAS) |
| | | Nurse's own evidence-based practices (self-evaluation) | Own practices | Evaluation of one's own actions and commitment to the development, implementation and evaluation of consistent evidence-based practices (Holopainen et al., 2010). | 10 |
| | Organisational-level support structures for EBN (short name: Organisational) | Methods in the organisation for monitoring and evaluating current nursing practices | Evaluation | Utilisation of methods in the organisation used for monitoring and evaluating consistency of current nursing practices with clinical guidelines and between different units, commitment of nursing staff and outcomes of nursing care (Holopainen et al., 2010, 2019; Li et al., 2018). | 7 |
| | | Methods in the organisation to disseminate evidence | Dissemination | Utilisation of methods in the organisation used for disseminating up-to-date evidence for nursing professionals and evidence-based practices between units (Jylhä et al., 2017; Munn et al., 2018). | 2 |
| | | Organisation's resources to develop and implement consistent evidence-based nursing practices | Resources | Availability of resources within the organisation that support nursing professionals' engagement in the development, implementation and evaluation of consistent evidence-based practices (Holopainen et al., 2010; Li et al., 2018). | 6 (2 from EBPPAS) |
| | | Methods in the organisation to ensure nursing professionals' EBN competence | Ensuring competence | Utilisation of methods in the organisation used to evaluate, maintain and update nursing professionals' competence in current, evidence-based nursing practices (Holopainen et al., 2010; Li et al., 2018). | 4 |
| | | Organisational culture towards EBN | Culture | Atmosphere within the organisation towards EBN and implementation of strategic directions that support EBN (Holopainen et al., 2010; Li et al., 2018). | 6 |
| | | Support from organisation's nursing managers for EBN | Support (from managers) | Perceived support received from frontline, middle and senior nursing managers to develop, implement and evaluate consistent evidence-based practices (Holopainen et al., 2010; Warren et al., 2016; Li et al., 2018; Bianchi et al., 2018). | 8 |
| | | Evidence base of nursing practices and instructions | Evidence base | Evaluation of evidence base of current nursing practices, instructions and patient education materials used in the organisation (Graham et al., 2006; Holopainen et al., 2010) | 4 |

[a]Likert-scaled items, scale 1 = Strongly disagree, 2 = Disagree, 3 = Neutral, 4 = Agree and 5 = Strongly agree.

purpose was to target the instrument items meeting the different roles of nursing professionals in EBN. Both versions were structured similarly and included two parts: (1) Individual-level support structures for EBN and (2) Organisational-level support structures for EBN.

Third, to support the face and content validity of the instrument, the first round of an expert analysis was conducted in August 2020. This round included researchers experienced in evidence-based nursing and working in NRF with the topic ($n=5$). The experts provided written feedback on the instrument items. Changes to the items (wording and tense) were made based on the comments received. The comments focused mainly on the concept of EBN and its clarity.

Fourthly, the second round of expert analysis was conducted with the updated drafts of the instrument in October 2020. A broader group of national experts ($n=15$) in EBN were invited to review the clarity and relevancy of instrument items. The national experts included experts working both in academia, clinical practice and government administration. At this point, the two instrument versions were separated into three versions based on the feedback received: one for nurses working in clinical practice (ActEBN-nurses), the second for nursing managers (ActEBN-managers) and the third for clinical nurse specialists (ActEBN-specialists). This was done to highlight their different roles (e.g. related to the support from managers). Other smaller changes to the clarity of the items were also made.

Finally, piloting of the instruments was conducted in spring 2021. Representatives ($n=8$) of all the three target populations tested the three instrument versions. Piloting focused mainly on technical testing of the instrument in an electronic format to correct possible errors before conducting the national survey. Minor linguistic changes were made to several items to improve their clarity. In this study, the focus is on the psychometrics of the ActEBN-nurses instrument.

## 3.2 | Design, setting and sampling

A national survey using cross-sectional design and an electronic questionnaire were given to qualified nursing professionals in September–October 2021. The target group including registered nurses, public health nurses, midwifes, paramedics and licensed practical nurses working in Finnish social and healthcare organisations were contacted via the registers of nursing unions and associations (the Finnish Union of Practical Nurses, the Union of Health and Social Care Professionals in Finland, the Finnish Nurses Association, the Federation of Finnish Midwives, the Finnish Association of Public Health Nurses, Sjuksköterskeföreningen i Finland (the Swedish-speaking Nurses' Association in Finland) and Akavan sairaanhoitajat ja Taja (the National Professional Association for Experts and Managers in Health Care)). A contact person from the unions and associations shared the invitation letter, including written information about the study and the link to the online survey to the nurses in their registers. No personal contact information of the participants was shared with the researchers. Study approvals were obtained from the nursing unions and associations according to their protocols.

The questionnaire included background questions, the ActEBN-nurses instrument items and additional questions regarding organisations' resources, the NRF's materials and open-ended questions about EBN development needs. Informed consent was required before continuing the questionnaire.

## 3.3 | Instrument

The ActEBN-nurses instrument consists of two parts: Individual-level support structures for EBN (including three subscales producing the sum-variables Attitudes, Competence and Own practices) and Organisational-level support structures for EBN (seven subscales producing the sum-variables Evaluation, Dissemination, Resources, Ensuring competence, Culture, Support from managers and Evidence base). The subscales include various number items. All of them use a 5-point Likert-scale (scale 1 = strongly disagree – 5 = strongly agree, see Table 1).

## 3.4 | Analysis methods

Data were analysed using the R statistical software (4.0.2 version), lavaan .6–7. First, descriptive statistics were calculated for the study variable and sample characteristics. The sum-variables were formed according to the theoretical constructs, adding the item responses divided by the number of the items in the subscales to obtain scores within the level or response options (scales). Second, internal consistency reliability using McDonald's Omega $\omega$ coefficient (possible range 0–1, .80 acceptable level; Peters, 2014), an accurate estimate of a scale's internal structure, was calculated for all subscales. Third, item analysis was used in two ways: to examine item-to-total correlations (average correlation) and inter-item correlations using the SPSS 27 version, and linear correlations. The former describes the item in relation to its theoretical construct ($r>.30$) and the latter between-item correlations within the subscales ($.30<r<.70$) (McGahee & Ball, 2009). Fourth, confirmatory factor analysis was conducted to test the construct validity, the underlying structure of the observed measures, of the instrument (CFA with Maximum-Likelihood Method with robust standard errors, MLR). Model fit was assessed using chi-square statistics with $p$-value and degrees of freedom (df), Comparative Fit Index (CFI) and Tucker-Lewis Index (TLI). Chi-square statistic evaluates the fitted model by comparing the $\chi^2$ value of the model to the $\chi^2$ of the null model (Kline, 2005), especially the 'magnitude of discrepancy between the sample and fitted covariance matrices' (Hu & Bentler, 1999) supported by not statistically significant $p$-value (Kline, 2005). However, chi-square is influenced by large sample size and therefore, normed chi-square was also reported ($\chi^2$/df),

with the criteria usually used <5 (Hooper et al., 2008). CFI and TLI values >.90 can be considered to represent proper model fit, followed by the Root-Mean Square Error of Approximation (RMSEA) < .06, and a cut-off value close to .08 for standardised root mean squared residual (SRMR) (Hu & Bentler, 1999). Akaike's Information Criterion (AIC) was used to assess the suitability of any proposed model indicating the most parsimonious, then selecting the model with the lowest index. Finally, a *t*-test (with degrees of freedom and p-value) was used to compare the two groups of nurses, registered qualified nurses (RNs with higher education) and licensed practical nurses (vocational education). A *p*-value ≤.05 was considered as statistically significant.

### 3.5 | Ethical considerations

This study adhered to ethical standards with regards the research integrity (ALLEA, 2023) and research ethics of online survey research (Convery & Cox, 2012). The respondents were recruited via the nursing professionals' unions and associations with their permissions and the necessary study approvals were obtained in accordance with their practices. According to the Ethics committee guidelines, a separate ethical committee review was not needed (Finnish National Board on Research Integrity, 2019). Responding to the online survey questionnaire was voluntary and anonymous. Informed consent was asked with the first question of the survey and was required before continuing to further parts of the survey. GDPR information was provided in the cover letter. The STROBE (Strengthening the Reporting of Observational Studies in Epidemiology) statement checklist for cross-sectional studies (von Elm et al., 2008) was followed in the reporting of this study to ensure comprehensive and transparent reporting (Appendix S1).

## 4 | RESULTS

### 4.1 | Respondents

In total, 1289 nurses working in clinical practice participated in the survey. The background information of the respondents is presented in Table 2.

### 4.2 | Descriptive statistics

The mean score for Individual-level support structures for EBN was 3.84 (SD .42) out of 5. On the subscale level, the mean was highest on 'Competence' (3.87, SD .49), followed by 'Attitudes' (3.85, SD .58) and 'Own practices' (3.80, SD .58). The mean score for Organisational-level support structures for EBN was 3.02 (SD .77) out of 5. In subscales, the highest mean values were on 'Evaluation' (3.46, SD 1.04), and lowest in 'Dissemination' (2.77, SD 1.17) and 'Resources' (2.77, SD 1.06).

**TABLE 2** Sample characteristics, nurses working in clinical practice *n* = 1289.

| Background factors | Mean (SD) |
|---|---|
| Age in years | 45.6 (10.9) |
| Working experience in years, mean (SD) | 17.8 (10.7) |
| | ***n* (%)** |
| Language | |
| Finnish | 1213 (94.1) |
| Swedish | 76 (5.9) |
| Gender | |
| Female | 1179 (91.5) |
| Male | 105 (8.1) |
| Other | 5 (.4) |
| Highest education | |
| Upper secondary vocational education | 203 (15.7) |
| Post-secondary education | 230 (17.8) |
| Bachelor's degree at a university of applied sciences | 656 (50.9) |
| Master's degree at a university of applied sciences | 117 (9.1) |
| Bachelor's degree at a (scientific) university | 30 (2.3) |
| Master's degree at a (scientific) university | 33 (2.6) |
| Licentiate or doctoral degree at a (scientific) university | 4 (.3) |
| Other education | 16 (1.2) |
| Current position | |
| Practical nurse | 217 (16.8) |
| Registered nurse | 843 (65.4) |
| Public health nurse | 140 (10.9) |
| Midwife | 43 (3.3) |
| Paramedic | 30 (2.3) |
| Other | 16 (1.2) |
| | ***n*** |
| Nursing practice setting where working | |
| University hospital, somatic | 228 |
| University hospital, psychiatric | 41 |
| Other hospital, somatic | 228 |
| Other hospital, psychiatric | 63 |
| Health centre[a] | 244 |
| Preventive healthcare[b] | 108 |
| Institutional care setting (round-the-clock) | 218 |
| Home care or home hospital | 126 |
| Pre-hospital emergency care | 39 |
| Other setting[c] | 50 |

[a]Including both health centre in-patient wards and outpatient clinics.
[b]Covering for example child health clinics, maternity clinics and school healthcare.
[c]Including emergency and social care services, adult day care centres, laboratories, indeterminate hospitals or other.

### 4.3 | Internal consistency reliability

The Omega values for Individual and Organisational were .931 and .966, in subscales ranging .847–.899 and .567–.931, respectively. All item-to-total correlations in both Individual and Organisational were acceptable against the criteria of $r > .3$ (Nunnally & Bernstein, 1994). Average inter-item correlation in Individual was .255 (range .239–.275) and Organisational .411 (range .373–.469). However, there was much more variation in the individual inter-item correlations, particularly in Individual-level support structures for EBN (Table 3). Less than half of the inter-item correlations [27–47%] in the scale Individual were within the suggested level .3 and .7, especially in Own practices only 34/125 (27%).

### 4.4 | Construct validity

Confirmatory factor analysis was conducted for both parts of the instrument, Individual and Organisational. Regarding the Individual construct, the full model with all items was fitted. The statistical model parameters showed the model does not fit ($\chi^2$ 2250.30, $p < .001$, CFI = .864, TLI = .854). (Table 4). Thus, the modification indices suggested four problematic items, those being redundant with others, and were deleted from the analysis. The first modified model was then tested, and chi-square test and other model fit parameters improved ($\chi^2$ 1542.8, $p < .001$, CFI = .889, TLI = .879). RMSEA decreased from .060 to .057, similar to SRMR from .061 to .048. However, the modification indices still suggested some need for improvement. Second, the analysis went on by identification of the influence of the negative items within the items in the Individual part. Maximum likelihood estimation with robust Huber-White standard errors and the model fit slightly improved but was not still acceptable ($\chi^2$ 2099.68, $p < .001$, CFI = .877, TLI = .864). Finally, the model with both previous conditions, deleted items and added method factor for negative items was fitted, producing the acceptable model ($\chi^2$ 1398.5, $p < .001$, CFI = .903, TLI = .891, RMSEA .054, SRMR .045). (Table 4, Figure 2).

The analysis went on with the second part, the Organisational construct, with seven subconstructs (sum-variables). The full hypothesised model was fitted but did not provide an acceptable fit for the model statistics ($\chi^2$ 3864.79 $p < .001$, CFI = .882, TLI = .870) suggesting further specifications. Therefore, five redundant items were deleted which improved the model and provided an acceptable fit ($\chi^2$ 2672.3 $p < .001$, CFI = .908, TLI = .897, RMSEA = .068, SRMR = .046). (Table 4, Figure 3) However, the normed $\chi 2$ for the scale Organisation was 6.36 for the hypothesised model, and decreased to 6.03 in the revised model, but remained higher that usually suggested <5 (Hooper et al., 2008), implying not a good fit.

### 4.5 | Sensitivity

The sensitivity of the instrument was tested by analysing two groups of nurses based on their level of education (registered nurses,

TABLE 3 Support structures for EBN from nurses' point of view on the subscale level and reliability analysis of the two instrument parts.

| Variable | *n* | Mean (SD) | Items (*n*) | Range | Skewness | Omega | Item-to-total correlations | $r > .3$ (%) | Average inter-item correlations | Inter-item correlations $.30 < r < .70$ (%) |
|---|---|---|---|---|---|---|---|---|---|---|
| Individual-level support structures for EBN | 1289 | 3.84 (.42) | 32 | 1–5 | -.25 | .931 | | 100 | .255 | 183/496 (37) |
| Attitudes | 1289 | 3.85 (.58) | 14 | 1–5 | -.51 | .899 | .423–.571 | 100 | .275 | 93/199 (47) |
| Competence | 1289 | 3.87 (.49) | 8 | 1–5 | -.36 | .847 | .368–.596 | 100 | .244 | 56/172 (33) |
| Own practices | 1289 | 3.80 (.58) | 10 | 1–5 | -.52 | .854 | .340–.627 | 100 | .239 | 34/125 (27) |
| Organisational-level support structures for EBN | 1288 | 3.02 (.77) | 37 | 1–5 | -.09 | .966 | | 100 | .411 | 566/666 (85) |
| Evaluation | 1288 | 3.46 (1.04) | 7 | 1–5 | -.35 | .861 | .492–.683 | 100 | .373 | 188/231 (81) |
| Dissemination | 1288 | 2.77 (1.17) | 2 | 1–5 | .09 | .884 | .716–.717 | 100 | .460 | 54/57 (95) |
| Resources | 1288 | 2.77 (1.06) | 6 | 1–5 | .06 | .567 | .312–.630 | 100 | .385 | 92/103 (89) |
| Ensuring competence | 1288 | 2.89 (.87) | 4 | 1–5 | -.09 | .780 | .519–.693 | 100 | .396 | 74/86 (86) |
| Culture | 1289 | 3.00 (.81) | 6 | 1–5 | -.16 | .861 | .478–.770 | 100 | .462 | 92/99 (93) |
| Support (from managers) | 1289 | 2.79 (.97) | 8 | 1–5 | -.11 | .931 | .613–.767 | 100 | .469 | 61/76 (80) |
| Evidence base | 1288 | 3.43 (.82) | 4 | 1–5 | -.63 | .909 | .572–.701 | 100 | .446 | 5/14 (35) |

TABLE 4 Confirmatory factor analysis for both the individual and organisational constructs (R lavaan, Maximum likelihood).

| Model | $\chi^2$ | Df | $\chi^2$/df | *p*-Value | CFI | TLI | RMSEA (90% CI) | SRMR | Akaike |
|---|---|---|---|---|---|---|---|---|---|
| Individual | | | | | | | | | |
| Model 0, hypothesised model Individual | 2250.30 | 461 | 4.88 | <.001 | .864 | .854 | .060 (.058–.063) | .061 | 86825.8 |
| Model 1, redundant items deleted | 1542.8 | 347 | 4.44 | <.001 | .889 | .879 | .057 (.054–.060) | .048 | 76994.5 |
| Model 2, negative items[a], added method factor | 2099.68 | 451 | 4.66 | <.001 | .877 | .864 | .058 (.056–.061) | .059 | 86631.5 |
| Model 3[b] item deletion and added method factor | 1398.5 | 337 | 4.15 | <.001 | .903 | .891 | .054 (.051–.057) | .045 | 76810.1 |
| Organisational | | | | | | | | | |
| Model 0, hypothesised | 3864.79 | 608 | 6.36 | <.001 | .882 | .870 | .070 (.067–.072) | .065 | 120572.2 |
| Model 1, redundant items deleted | 2672.30 | 443 | 6.03 | <.001 | .908 | .897 | .068 (.065–.070 | .046 | 103395.6 |

Abbreviations: CFI, Comparative Fit Index; TLI, Tucker-Lewis Index.

[a]Added method factor for negative items.

[b]Deleted questions and added method factor for negative items.

public health nurses, midwifes and paramedics with higher education and licensed practical nurses with vocational education). This can be considered using contrasting group analysis for the sensitivity or discrimination ability of the instrument for educational background. In Individual-level support structures for EBN, nurses with higher education self-evaluated the variables higher compared to nurses with vocational education, in the whole instrument part (Mean 3.87 vs. 3.70, $p < .001$) and one subscale 'Attitudes' (Mean 3.94 vs. 3,48, $p < .001$) levels (Table 5). In the whole instrument part Organisational-level support structures for EBN and its subscales levels, nurses with vocational education were more positive in their rating regarding all variables except in the 'Evidence base' subscale. The differences in the mean scores by group were small, and may not imply clinically significant differences.

## 5 | DISCUSSION

Challenges within today's social and health services, for example, limited resources and capabilities of individual professionals in synthesising evidence and developing evidence-based practices, has shifted individual responsibility towards organisational responsibility to support EBN implementation (Warren et al., 2016). This sets requirements for new national and organisational support structures that are independent of individual professionals' actions and competences, and hence, respond to the need for providing care of the best possible quality regardless of the location of the healthcare organisations. In this study, a new instrument, ActEBN-nurses, was developed for measuring individual and organisational support structures for EBN within social and healthcare organisations. In addition, its reliability and validity were tested, suggesting promising validity and reliability.

Existing instruments focusing on measuring organisational-level support structures for EBN were not recognised in previous literature, and thus, the new instrument was developed. The FinYHKÄ model (Holopainen et al., 2010; Jylhä et al., 2017) along with the JBI Model of Evidence-Based Healthcare (Jordan et al., 2019) and barriers of EBN recognised in previous literature (e.g. Clarke et al., 2021; Li et al., 2019) were used as the theoretical basis of the ActEBN-nurses instrument items. The first drafts of the instruments were evaluated in expert analyses, and the updated version of the instrument was piloted before conducting the national survey in 2021. However, the well-known and much used Evidence-Based Practice Process Assessment Scale (Rubin & Parrish, 2010, 2011) provided a validated tool to build up from Individual to Organisational support structures. The two separate expert analyses supported the face and content validity of the instrument. Psychometric statistical analyses provided evidence for internal consistency and construct validity for both the parts (Individual and Organisational) of the ActEBN-nurses.

Based on our survey results, individual-level support structures for EBN were perceived to be moderate. Nurses' attitudes towards EBN were positive and they perceived familiarity with the EBP process. However, in future, organisations need to develop

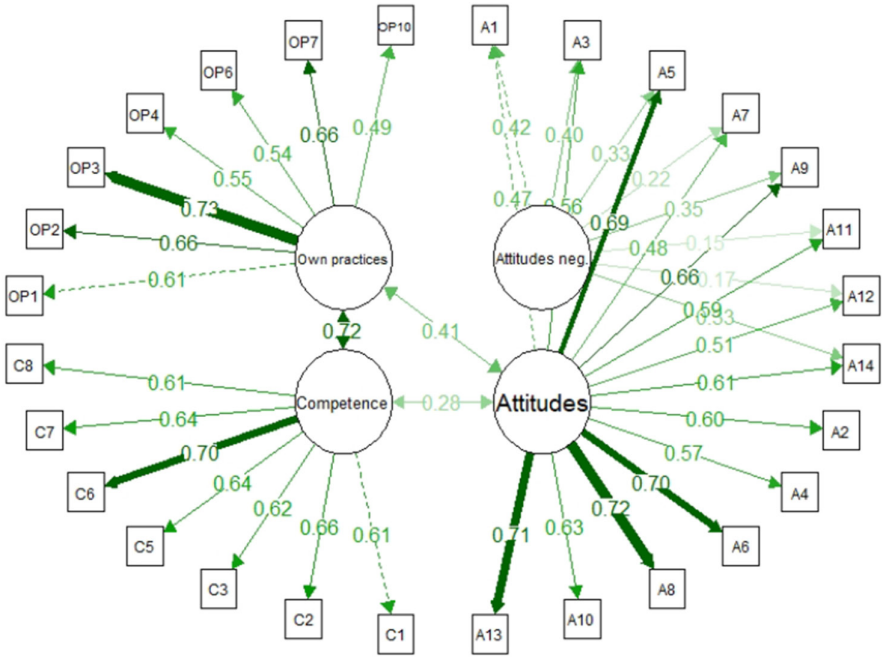


**FIGURE 2** Confirmatory factor analysis for the instrument part Individual-level support structures for EBN. Thickness of the lines refers to stronger loadings. Dashed line signifies that the item loading has been fixed to one (marker indicator).

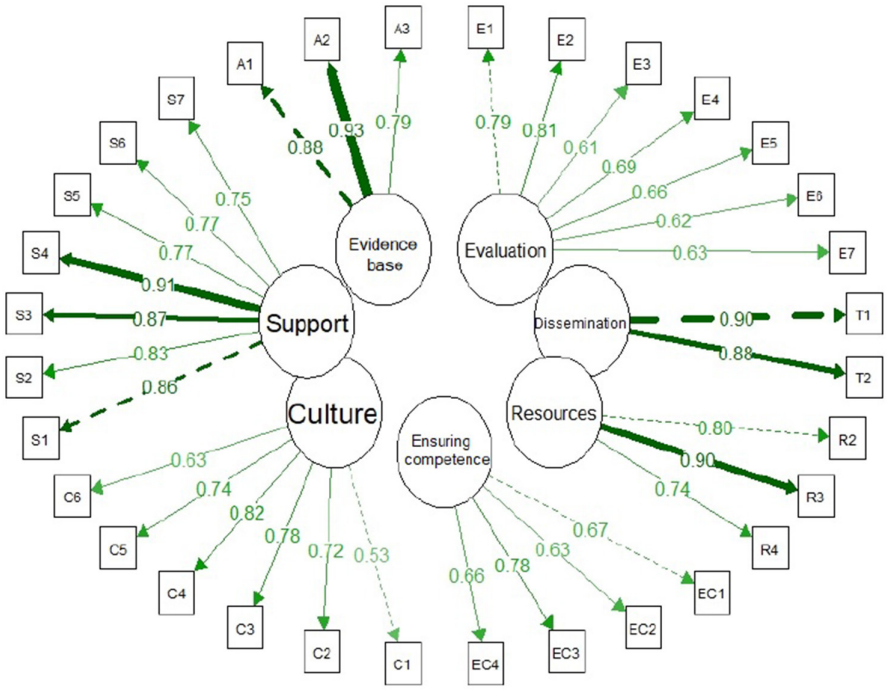


**FIGURE 3** Confirmatory factor analysis for the instrument part Organisational-level support structures for EBN. Correlations between factors not included in the figure. Thickness of the lines refers to stronger loadings. Dashed line signifies that the item loading has been fixed to one (marker indicator).

mechanisms to maintain this positive attitude towards EBN. Among organisational-level support structures for EBN, methods for monitoring and evaluating current nursing practices were considered the highest indicating intention towards EBN. However, methods to disseminate evidence, resources to develop evidence-based nursing practices and support from organisations' nursing managers were perceived as less actualised, in line with previous studies (Clarke et al., 2021; Cleary-Holdforth et al., 2022; Li et al., 2019; Stavor et al., 2017). This highlights the importance of generating organisational structures that allow the utilisation of different methods to effectively disseminate evidence. In addition, the allocation of resources to develop EBN is important to promote the constant integration of new evidence into clinical practice.

The instrument was shown to be sensitive based on its discrimination ability to provide different results according to nurses' educational background. The self-evaluation regarding individual-level variables was more positive in nurses with higher education than in licensed practical nurses with vocational education. This result was shown both at whole instrument (Individual) and subscale 'Attitudes' levels. Conversely, the practical nurses were more satisfied with organisational-level support structures than registered nurses, public health nurses, midwifes and paramedics. This may be explained

TABLE 5 Analysis of sensitivity based on the professional's level of education.

| Variable | Registered nurses | | Licensed practical nurses | | t-test parameter (df) | p-Value |
|---|---|---|---|---|---|---|
| | n | Mean (SD) | n | Mean (SD) | | |
| Individual-level support structures for EBN | 1056 | 3.87 (.42) | 217 | 3.70 (.40) | 5.351 (1271) | <.001 |
| Attitudes | 1056 | 3.93 (.49) | 217 | 3.48 (.60) | 10.806 (1271) | <.001 |
| Competence | 1056 | 3.88 (.49) | 217 | 3.82 (.49) | 1.656 (1271) | .1001 |
| Practices | 1056 | 3.80 (.42) | 217 | 3.81 (.57) | −.251 (1271) | .8016 |
| Organisational-level support structures for EBN | 1055 | 2.98 (.77) | 217 | 3.18 (.73) | 3.3989 (1270) | <.001 |
| Evaluation | 1055 | 3.39 (1.04) | 217 | 3.76 (1.01) | −4.8317 (1270) | <.001 |
| Dissemination | 1055 | 2.70 (1.19) | 217 | 3.11 (1.02) | −4.7358 (1270) | <.001 |
| Resources | 1055 | 2.74 (1.07) | 217 | 2.90 (.98) | −1.9603 (1270) | .050 |
| Ensuring competence | 1056 | 2.75 (.95) | 217 | 2.99 (.94) | −3.4004 (1271) | <.001 |
| Culture | 1056 | 2.98 (.82) | 217 | 3.08 (.76) | −1.6753 (1271) | .09412 |
| Support (from managers) | 1056 | 2.75 (.97) | 217 | 2.99 (.94) | −3.4004 (1271) | <.001 |
| Evidence base | 1056 | 3.45 (.81) | 217 | 3.33 (.85) | 1.9447 (1271) | .05 |

by the lower competence levels of practical nurses and which may be the reason why they were not as critical when assessing the organisational support structures. The result highlights the need for tailored educational interventions targeted at nurses with different educational backgrounds and organisational support-structures to evaluate, maintain and update nursing professionals' competence throughout their nursing careers.

### 5.1 | Methodological considerations and limitations

The sample size was large enough to comply with the analyses performed (Gray & Grove, 2020). Internal consistency assessed by Omega values was acceptable. However, one subscale (Resources) demonstrated low internal consistency (Ω=.567). All item-to-total correlations were acceptable, indicating consistency of the items. Instead, variation in inter-item correlations was noted which warrants future inspection of possible item redundancy. Construct validity was evaluated for the two scales in ActEBN-nurses. Hypothesised models were not acceptable based on the goodness-of fit statistics, and both needed some specifications. Chi-square statistics are sensitive to large sample sizes and may be the reason for nonacceptable chi-square indices. After three revisions for the scale Individual, and one for the scale Organisation, the model fit reached an accepted level with goodness-of fit statistics CFI and TLI (>.9), RMSEA (<.06) and SMSR (<.08) (Hu & Bentler, 1999). However, especially in the scale Organisation, the normed chi-square remained higher than the suggested level and raises need for further testing.

In the Finnish language, reverse-worded (negatively worded) items have been found problematic although they have been used to support validity in self-report measures (Chyung et al., 2018). It has been suggested that the inclusion of both 'reversed-worded' and 'non-reversed-worded' items may provide significant wording 'method effects', complicating the scoring procedures and factor structure or compromising the integrity of the factor, and thus construct evaluation (van Sonderen et al., 2013). Therefore, adding the method-factor for analysis was performed, as well as deleting some redundant items. Sensitivity was assessed to estimate whether there were between-group differences based on the level of education within these two groups. Whilst statistically significant differences were detected, these may not have clinical significance. Instead, the slight differences may be biased by sample or analysis.

In the future, further testing of the updated instrument is needed in different contexts to test its updated structure. This study focused on the ActEBN-nurses instrument version. Similar testing is also needed for the versions meant for nursing managers (ActEBN-managers) and nursing specialists (ActEBN-specialists).

## 6 | CONCLUSIONS

ActEBN-nurses is an instrument with promising psychometrics, and it can be used for evaluating individual and organisational-level support structures for EBN within social and healthcare organisations. These kinds of evaluations are needed to recognise shortcomings in current EBN support structures and advance the actualisation of EBN across different contexts. Further testing of the ActEBN-nurses instruments in different contexts is still needed internationally.

### AUTHOR CONTRIBUTIONS

HP, MS, AH, HS and RS were involved in conceptualisation. HP, HS and MP were involved in data curation. HP, HS, MP and RS were involved in formal analysis. HP, AH and HS were involved in funding acquisition. HP, AH and HS were involved in investigation. HP, MS, AH, HS, MP and RS were involved in methodology. HP and HS were involved in project administration. AH, RS and MS were involved in

supervision. HP, MS, AH, HS, MP and RS were involved in validation. MP was involved in visualisation. HP, MS, AH, HS and RS were involved in writing—original draft. HP, MS, AH, HS, MP and RS were involved in writing—review and editing.

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## CONFLICT OF INTEREST STATEMENT

The authors have no conflicts of interest to declare.

## DATA AVAILABILITY STATEMENT

The data that support the findings of this study are available on request from the corresponding author. The data are not publicly available due to privacy or ethical restrictions.

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## SUPPORTING INFORMATION

Additional supporting information can be found online in the Supporting Information section at the end of this article.

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