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A Latent Profile Analysis of Clinical Nurses' Evidence-Based Decision-Making Capacity and Its Influencing Factors in Public Hospitals of Henan Province

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Abstract

Aims

To identify latent subgroups of clinical nurses based on their evidence-based decision-making capacity(EBDMC) and analyze the influencing factors associated with each subgroup.

Design

A cross-sectional study

Methods

A total of 518 clinical nurses from three tertiary Class A hospitals in Henan Province were recruited via convenience sampling between May and August 2025. The Nurse Evidence-Based Decision-Making Capacity Scale, the Nursing Organizational Climate Scale, the Information Literacy Scale were adopted. Latent profile analysis and multinomial logistic regression were applied to explore nurses' EBDMC latent subgroups and their predictors.

Results

A total of 498 valid questionnaires were collected, with an effective response rate of 96.1%. Three latent subgroups of nurses with distinct EBDMC capacity levels were identified: low (17.1%), moderate (54.8%), and high (28.1%). Multivariate analysis revealed multiple significant predictors of EBDMC subgroups (all $P < 0.05$): educational attainment, occupational passion, recognition of the value of evidence-based practice (EBP), understanding of EBP implementation timing, perceived clinical benefits of EBP, prior EBP experience, managerial attention to EBN, and monthly literature retrieval habits.

Conclusion

Clinical nurses presented significant heterogeneity in EBDMC capacity. Targeted, systematic and standardized evidence-based nursing training programs can be developed according to the characteristics and predictive factors of each latent subgroup.

Clinical trial number

Not applicable.

Introduction

The National Nursing Development Plan (2021–2025) issued by China's National Health Commission emphasizes the continuous improvement of nursing quality and the construction of EBP-centered nursing norms and technical standards aligned with clinical demands, which prioritizes evidence-based practice in national nursing development strategies[1]. Nevertheless, EBP implementation in China remains in the initial stage[2]. As EBP advances within the nursing discipline, its clinical value has gained increasing recognition[3]. Evidence-based decision-making capacity (EBDMC), defined as the ability to systematically retrieve, appraise and apply clinical evidence to optimize patient care, is a core competency for healthcare practitioners.For nurses, EBDMC describes the translation of scientific research evidence into clinical nursing decisions to guarantee rational, effective and evidence-based care delivery.The core of EBDMC lies in the ability to

systematically identify high-quality research evidence and successfully translate it into practical clinical nursing applications.Improving nurses' EBDMC can boost nurse job satisfaction, elevate nursing service quality and facilitate the advancement of the nursing discipline[4]. However, Chinese nurses currently exhibit prominent deficits in both EBDMC and its clinical translation[5]. Globally, nurses' overall EBDMC competency levels are widely reported to be suboptimal[6]. A recent systematic review concluded that nurses demonstrate widespread deficits in core EBDMC domains: knowledge, practical skills and clinical behavioral performance[7]. Additional research further indicates that nurses lack adequate EBDMC knowledge and skills to complete evidence translation and clinical implementation[8]. Accordingly, standardized competency assessment is critical to sustaining and scaling up EBDMC practice among frontline nurses.

Jiranee et al. reported that individual nurse characteristics accounted for 68% of the variance in EBDMC capacity, whereas organizational factors explained the remaining 32%[9]. Significant interactions exist between individual-level and organizational-level variables. A thorough review of existing literature categorizes predictors of nurses' EBDMC capacity into three dimensions: individual nurse factors, organizational factors, and practice environment factors. A thorough review of existing literature categorizes predictors of nurses' EBDMC into three dimensions: individual nurse factors, organizational factors, and practice environment factors[10–11].At present, most academic research—both within China and globally—tends to evaluate nurses' evidence-based practice competencies in broad, aggregate terms, often neglecting individual differences. As a result, nursing administrators struggle to design and deliver targeted interventions, thereby diminishing the overall impact of such initiatives[12].Latent Profile Analysis (LPA) is an individual-centered statistical analytical technique[13].This approach identifies unobserved latent subgroups by analyzing participants' response patterns across observed variables and quantifies their distinct latent traits [14]. This study adopted LPA to identify latent subgroups of clinical nurses based on EBDMC capacity, and further examined their predictors alongside the associations between EBDMC subgroups, organizational climate and information literacy. This study aimed to provide empirical evidence for improving nurses' EBDMC capacity and guide hospitals to develop differentiated EBP training schemes tailored to nurses' latent subgroup characteristics.

Methods

Sample

Participants were recruited via convenience sampling from three tertiary Class A hospitals in Henan Province between May and August 2025. Inclusion criteria: 1) Frontline clinical nurses, nursing managers and nursing administrative staff; 2) Educational attainment: junior college or higher; 3) Clinical working experience ≥ 1 year. Exclusion criteria: Staff with continuous leave exceeding one month during the investigation period. The required sample size was set at 5–10 times the total number of scale items (27 items). After accounting for a 20% expected invalid response rate, the minimum target sample size was calculated as 169–338 participants. This research protocol was approved by the Hospital Ethics Committee (Approval No. HUSOM 2021 – 265). All participants provided written informed consent before voluntary enrollment.

Measures

General Information Questionnaire

This self-designed demographic questionnaire collected data on participants' gender, age, educational attainment, professional title, years of clinical service, alongside their perceptions regarding the importance of EBP, timing of EBP implementation, completion of standardized EBP training, and perceived clinical benefits of EBP.

The Nurse Evidence-Based Decision-making Ability Scale Cross-culturally adapted into Chinese by Wei et al. [15] in 2025. The scale contains 25 items across three dimensions: knowledge and skills, attitudes and beliefs, and clinical behaviors.

Each item was rated on a 7-point Likert scale ranging from 1 = “strongly disagree” to 7 = “strongly agree”, with all items scored positively.Total scale scores ranged from 25 to 175, with higher scores indicating stronger EBDMC capacity. Psychometric tests showed excellent reliability: Cronbach’s α = 0.992, split-half reliability = 0.930, test-retest reliability = 0.927.

The Information Literacy Scale developed by Shu [16] in 2009. This 20-item scale covers four dimensions: information awareness, information capability, information knowledge, and information ethics. All items adopted a 5-point Likert scale (1 = completely disagree to 5 = completely agree), and total scores ranged from 20 to 100..Higher scores represented superior information literacy. The scale demonstrated good internal consistency (Cronbach’s α = 0.904) and construct validity of 0.895.

Nursing Organization Atmosphere Scale Developed by He et al. [17], this scale measures nurses’ perceived workplace organizational climate. It includes 24 items distributed across four dimensions: equitable supportive behaviors, peer interaction behaviors, interpersonal climate, and affiliative and confrontational behaviors (5 items). Responses were scored on a 5-point Likert scale: 1 = strongly disagree, 2 = somewhat disagree, 3 = neutral, 4 = somewhat agree, 5 = strongly agree. Higher scores reflected more positive perceived organizational climate.

Data collection

The research team included three trained investigators who received standardized training prior to questionnaire distribution. Online questionnaires were distributed via the Wenjuanxing platform. Researchers contacted ward head nurses in advance to obtain ward access permission. After obtaining written approval from head nurses, eligible participants were screened based on predefined inclusion criteria and invited to complete the online survey. All participants provided individual informed consent before filling out the questionnaire. Upon survey closure, two independent researchers screened all responses for completeness and validity. Questionnaires completed in under 2 minutes or with straight-lined repetitive responses were excluded.

Statistical Methods

Latent profile models were estimated using Mplus 8.3.We sequentially fitted models with 1 to 5 latent subgroups based on participants’ EBDMC scale scores and evaluated model fit using three sets of statistical indicators [18]. Fit information indices adotoped Akaike Information Criterion (AIC), Bayesian Information Criterion (BIC), and sample-adjusted BIC (aBIC). Lower values indicate superior model fit. Entropy values range from 0 to 1, with values closer to 1 indicating more precise subgroup classification. Lo–Mendell–Rubin adjusted likelihood ratio test (LMR-LRT) and Bootstrap likelihood ratio test (BLRT) were applied to compare fit between models with k and k − 1 subgroups. A $P < 0.05$ was defined as the threshold for concluding that the k-subgroup model exhibited significantly better fit than the (k − 1)-subgroup model.

SPSS 25.0 was used for all supplementary statistical analyses. Non-normally distributed continuous data were presented as median (interquartile range, IQR). Between-group comparisons were performed via Kruskal–Wallis H tests.Categorical and ordinal variables were summarized as frequencies and percentages [n (%)].Chi-square (χ^2) tests or Kruskal–Wallis H tests were adopted for intergroup comparisons as appropriate. Multinomial logistic regression was performed to identify predictors of latent subgroup membership, with the significance level set at α = 0.05.

Results

Potential Profile Analysis Results of Nurses' evidence-based Decision-making Ability

Six latent profile models with 1–6 subgroups were fitted sequentially, with fit indices summarized in Table 2. AIC, BIC and aBIC values declined as the number of subgroups increased. Models with 2, 3 and 4 subgroups yielded significant LMR-LRT

and BLRT test results (all P < 0.05). Model 3 produced an entropy value of 0.925, higher than Model 2 (entropy = 0.851). After comprehensive comparison of all fit statistics, the 3-subgroup model (Model 3) was selected as the optimal solution.Subgroup profiles were interpreted and named based on item mean scores plotted in the profile line graph (Figure 1). Subgroup 1 (C1, n=85): Participants in this subgroup demonstrated uniformly low EBDMC scores across all three dimensions. Item 10 ("I can use critical appraisal tools such as AGREE II and CASP to rigorously assess research evidence quality") received the lowest average score, reflecting insufficient EBP knowledge reserves among these nursesThis subgroup was labelled "Low EBDMC Capacity – Unfamiliar Profile", accounting for 17.1% of all participants (n=85). Subgroup 2 (C2, n=273): Participants presented moderate EBDMC capacity, with all item mean scores falling between Subgroup 1 and Subgroup 3. Item 16 ("I regard rigorous critical appraisal of evidence as a core step in EBDMC") achieved the highest score within this subgroup, showing that these nurses could follow standardized EBP implementation procedures. This subgroup was labelled "Moderate EBDMC Capacity – Standardized Profile", accounting for 54.8% of participants (n=273). Subgroup 3 (C3, n=140): Nurses in this subgroup exhibited high overall EBDMC capacity, with all item mean scores exceeding those of the other two subgroups. Item 15 ("I believe EBDMC implementation improves nursing care and optimizes clinical interventions") had the highest score in this subgroup, reflecting strong positive attitudes toward EBP translation. This subgroup was labelled "High EBDMC Capacity – Supportive Profile", accounting for 28.1% of participants (n=140).

Table 2 Fitting Indicators of the potential Profile Model of Nurses' evidence-based Decision-making Ability (n=498)

Model	AIC	BIC	aBIC	Entropy	LMR (*P*)	BLRT (*P*)	Category probability
1	11574.107	11599.370	11580.326	-	-	-	-
2	10836.345	10878.451	10846.711	0.851	< 0.001	< 0.001	0.391/0.609
3	10356.166	10415.114	10370.677	0.925	< 0.001	< 0.001	0.165/0.554/0.281
4	10151.855	10227.646	10170.513	0.910	< 0.001	< 0.001	0.241/0.084/0.446/0.229
5	10049.529	10142.162	10072.333	0.911	0.042	< 0.001	0.065/0.125/0.283/0.380/0.147
6	9912.431	10021.906	9939.381	0.934	0.350	< 0.001	0.066/0.132/0.334/0.026/0.064/0.145

Univariate Differences Across EBDMC Latent Subgroups

The latent profiles of clinical nurses differed significantly in educational attainment, occupational passion, monthly literature retrieval habits, managerial prioritization of EBP, perceived clinical benefits of EBP, completion of standardized EBP training, comprehension of EBP implementation timing, and recognition of the essential role of EBP (P < 0.05).(Table 1)

Multivariate analysis results of the potential profile of Nurses' evidence-based decision-making ability

Multinomial logistic regression was performed, with the three EBDMC latent subgroups set as the nominal dependent variable. The "Low EBDMC Capacity – Unfamiliar Profile" subgroup was designated as the reference group, and all variables showing significant between-group differences in univariate analyses were entered as independent predictors. Variable coding was defined as follows: age (years): ≤25 = 0, 26–30 = 1, 31–35 = 2, ≥36 = 3. Educational attainment: junior college = 0, bachelor's degree = 1, master's degree = 2, doctoral degree or higher = 3. Occupational passion: neutral = 0, passionate about nursing = 1.Monthly literature retrieval habit: yes = 0, no = 1. Managerial prioritization of EBP: high priority = 0, neutral attention = 1. Completion of standardized EBP training: yes = 0, no = 1. Prior EBP practical experience: yes = 0, no = 1.Perceived clinical benefits of EBP: no benefit = 0, minor benefit = 1, moderate benefit = 2, substantial benefit =

3.Comprehension of EBP implementation timing: no comprehension = 0, limited comprehension = 1, moderate comprehension = 2, full comprehension = 3. Total continuous scores of information literacy and organizational climate scales were directly entered as raw predictors without categorical coding. Multinomial logistic regression results identified four significant predictors of EBDMC subgroup membership: nurses' total information literacy score, total organizational climate score, managerial prioritization of EBP, and prior EBP experience (Table 4).

Table 4 Multivariate Logistic Regression Analysis of

Variable	*C2*					
	β	***SE***	**Wald χ^2**	***P***	***OR***	***95%CI***
Total score of information literacy	0.104	0.017	36.074	< 0.001	1.110	1.073-1.148
Total score of organizational atmosphere	-0.024	0.012	3.942	0.047	0.976	0.954-1.000
The degree to which leaders attach importance to evidence-based nursing	1.797	0.372	23.391	< 0.001	6.033	2.912~12.499
Have evidence-based practical experience	0.548	0.572	0.918	0.338	1.730	0.564-5.307

Variable	*C3*					
	β	***SE***	**Wald χ^2**	***P***	***OR***	***95%CI***
Total score of information literacy	0.282	0.029	93.694	< 0.001	1.343	1.286-1.402
Total score of organizational atmosphere	-0.028	0.020	1.878	0.171	0.973	0.935-1.012
The degree to which leaders attach importance to evidence-based nursing	1.930	0.533	13.095	< 0.001	6.893	2.423-19.611
Have evidence-based practical experience	1.450	0.653	4.930	0.026	4.262	1.185-15.328

Note: Subgroup C1 (Low EBDMC Capacity) served as the reference category.

Discussion

Potential categorical characteristics of evidence-based Decision-making Ability of Clinical Nurses

The median total EBDMC score of the 498 frontline nurses was 104 (IQR: 93–141), reflecting an overall moderate competency level, consistent with findings reported by Belita et al. [19]. These results indicate that frontline nurses working in public tertiary hospitals across Henan Province still possess suboptimal EBDMC. Hospital administrators and clinical nursing staff should prioritize EBDMC development and design standardized training interventions to elevate nurses' overall EBP competency. LPA further revealed three distinct latent subgroups with divergent EBDMC competency levels among participants. 1) The Low EBDMC– Unfamiliar Profile subgroup accounted for 17.1% of all participants. Nurses within this subgroup demonstrated severe deficits in both EBP knowledge reserves and EBDMC implementation awareness, leading to overall poor competency. 2) The Moderate EBDMC – Standardized Profile subgroup made up 54.8% of the total sample.

Participants in this subgroup possessed sufficient EBP knowledge and were capable of following standardized procedures for translating research evidence into clinical practice, with overall competency ranging from moderate to moderately high. 3) The High EBDMC – Supportive Profile subgroup represented 28.1% of respondents. Nurses in this subgroup held strong positive attitudes toward EBDMC implementation, acknowledging its capacity to elevate nursing care quality, and exhibited consistently high overall EBDMC competency. Collectively, these subgroup differences confirm substantial heterogeneity in EBDMC competency among frontline clinical nurses.

Additional dimensional score analysis revealed median scores of 48 (IQR:41–69) for knowledge and skills, 18.5 (IQR:16–24) for attitudes and beliefs, and 39 (IQR:35–54) for clinical behaviors. These dimensional gaps provide clear guidance for targeted training content development. Consistent with Yost et al. [20], even when nurses master basic EBDMC knowledge, they often lack practical skills to translate research evidence and fail to fully grasp how EBDMC interventions improve clinical outcomes. As patient expectations for high-quality care continue to rise, frontline nurses have growing motivation to engage in EBDMC to optimize patients' clinical recovery and quality of life.

Analysis of Influencing Factors of the Potential Profile of Evidence-Based Decision-making Ability of Clinical Nurses

Nurses with higher information literacy had significantly greater odds of belonging to the High EBDMC – Supportive Profile. Conversely, participants who perceived a positive organizational climate were more likely to fall into the Low EBDMC – Unfamiliar Profile subgroup.

Regression results demonstrated that each one-unit increase in total information literacy score raised the odds of membership in the High EBDMC Supportive Profile by 34.3% (OR = 1.343). This aligns with Gonzalez-Garcia et al. [21], who reported that enhanced information literacy directly facilitates improvements in nurses' EBDMC competency. Information literacy encompasses the capacity to identify information demands, retrieve, appraise and apply credible clinical research data, and acts as a fundamental prerequisite for successful EBP implementation[22].Guo et al. [23] further illustrated that information literacy exerts both direct effects on nurses' clinical decision-making capacity and indirect effects mediated by EBP competency. Clinical nursing managers should therefore implement regular training to advance nurses' information literacy. Targeted knowledge expansion programs can substantially elevate overall clinical decision-making performance and standardize frontline nursing practice. Notably, favorable perceived organizational climate was associated with slightly reduced odds of entering higher EBDMC subgroups (OR = 0.976 for C2, OR = 0.973 for C3, relative to C1). A potential explanation for this counterintuitive finding is that a supportive workplace climate alone cannot compensate for deficits in nurses' practical EBP translation skills, which ultimately limits their overall EBDMC competency. A second plausible explanation relates to institutional barriers: many hospitals lack formal incentive systems or dedicated funding to reward EBP participation. Without tangible incentives, nurses perceive minimal personal benefits from EBDMC work and reduce voluntary implementation in daily care.These findings carry clear managerial implications: ward and hospital nursing leaders should build institutional support systems to foster nurses' EBDMC growth. Managers ought to motivate nurses to resolve complex clinical challenges via evidence-based approaches and cultivate a workplace culture that visibly rewards consistent EBP implementation.

Relative to nurses who reported neutral managerial attention to EBP, participants whose supervisors prioritized EBP had significantly higher odds of membership in both the Moderate Standardized Profile (OR = 6.033) and High Supportive Profile (OR = 6.893).

This positive association between managerial EBP prioritization and elevated EBDMC subgroup membership aligns with qualitative work by Hosseini-Moghaddam et al. [24], who identified leadership support as a core facilitator of hospital-wide EBP uptake.Lin et al. [25] similarly reported that proactive, supportive leadership from ward head nurses is a key predictor of positive EBP implementation climate among tertiary hospital nurses. As direct frontline supervisors, head nurses drive EBP uptake through role modeling and behavioral advocacy. They are also positioned to allocate educational resources, training

opportunities and material support to remove barriers to consistent EBDMC delivery. Frontline nurses receive nearly all daily workflow guidance and shift scheduling from their ward head nurses, who hold direct supervisory authority. This hierarchical dynamic explains why head nurse attitudes and support serve as a pivotal determinant of nurses' EBDMC engagement. Accordingly, institutional training frameworks for EBDMC competency must include dedicated modules targeting head nurses to strengthen their capacity to lead ward-level EBP transformation.

Nurses with prior hands-on EBP experience demonstrated greater odds of belonging to the Moderate Standardized Profile (OR = 1.730) and High Supportive Profile (OR = 4.262) compared to participants with no prior EBP exposure.

Multivariate regression confirmed that prior EBP experience independently predicted elevated EBDMC subgroup membership, with a stronger effect observed for the high-competency subgroup (OR = 4.262 vs. OR = 1.730 for the moderate subgroup). High-quality EBP implementation requires three core components: alignment with patient preferences, rigorous research evidence, and integration of nurses' accumulated clinical expertise. Nurses with direct EBP experience regularly integrate up-to-date research evidence into routine care, an action linked to improved patient satisfaction and higher treatment adherence. In turn, patients receive standardized, evidence-aligned nursing care, which elevates overall service quality, validates nurses' professional expertise, and advances the broader nursing discipline[26]. EBDMC relies on interdisciplinary teamwork, fostering collective professional cohesion. Group-based evidence evaluation also mitigates clinical risks associated with isolated individual clinical judgment.

Limitation

Several limitations of this study warrant acknowledgment. First, data were collected via a cross-sectional design limited to three tertiary Class A hospitals within Henan Province. Future research should adopt multi-center, large-sample longitudinal designs and latent trajectory analysis to track dynamic shifts in nurses' EBDMC subgroup membership over time. Such longitudinal evidence can inform the development of sustained, targeted clinical interventions for EBDMC improvement.Second, this study employed a cross-sectional design only; future research should incorporate qualitative approaches and longitudinal follow-up surveys to more comprehensively identify underlying determinants and inform the development of targeted interventions for nurses.

Conclusion

This study demonstrated that frontline clinical nurses across Henan's tertiary hospitals have substantial room for improvement in overall EBDMC competency. LPA results verified significant latent subgroup heterogeneity in nurses' EBDMC Four key predictors of EBDMC subgroup membership were identified: nurses' information literacy, perceived organizational climate, managerial prioritization of EBP, and prior hands-on EBP experience. Hospital nursing administrators are recommended to design differentiated, standardized EBP training interventions tailored to the distinct characteristics and predictive factors of each EBDMC latent subgroup to elevate overall nurse EBDMC competency.

Declarations

Funding Declaration

This study was funded by the Henan Science and Technology Department under Grant No. CKQ20240030. The funding body had no involvement in the study design, data collection, analysis and interpretation, manuscript writing, or the decision to submit the article for publication.

Ethics Approval and Consent to Participate

This study was conducted in full accordance with the ethical principles laid out in the Declaration of Helsinki (World Medical Association) and the requirements of the Measures for Ethical Review of Biomedical Research Involving Human Subjects issued by the National Health Commission of China. The research protocol was reviewed and approved by Ethics

Committee of People's Hospital of Henan University , with the approval reference number HUSOM2021-265. All participating clinical nurses provided voluntary written informed consent before completing the anonymous survey. No identifiable personal information of any participant was collected during the whole process, and all research data were stored and processed strictly following national health data confidentiality regulations to minimize potential ethical risks.

Author Contribution

Conceptualization: J. Lu and C. Chen;Methodology: K. Wei and L. Fu;Formal analysis: J. Lu and Z. Li;Investigation: S. Chang and X. Chen;Data curation: K. Wei and Z. Li;Resources: C. Chen;Writing – Original Draft: J. Lu;Writing – Review & Editing: C. Chen and L. Fu;Visualization: S. Chang;Supervision: X. Chen;Project administration: L. Fu.All authors have read and approved the final version of the manuscript, and agreed to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.

Data Availability

The datasets generated and analysed during the current study are not publicly available due to the privacy protection requirements of the participating medical institutions and the signed informed consent of clinical nurse participants, but are available from the corresponding author on reasonable request

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Figures

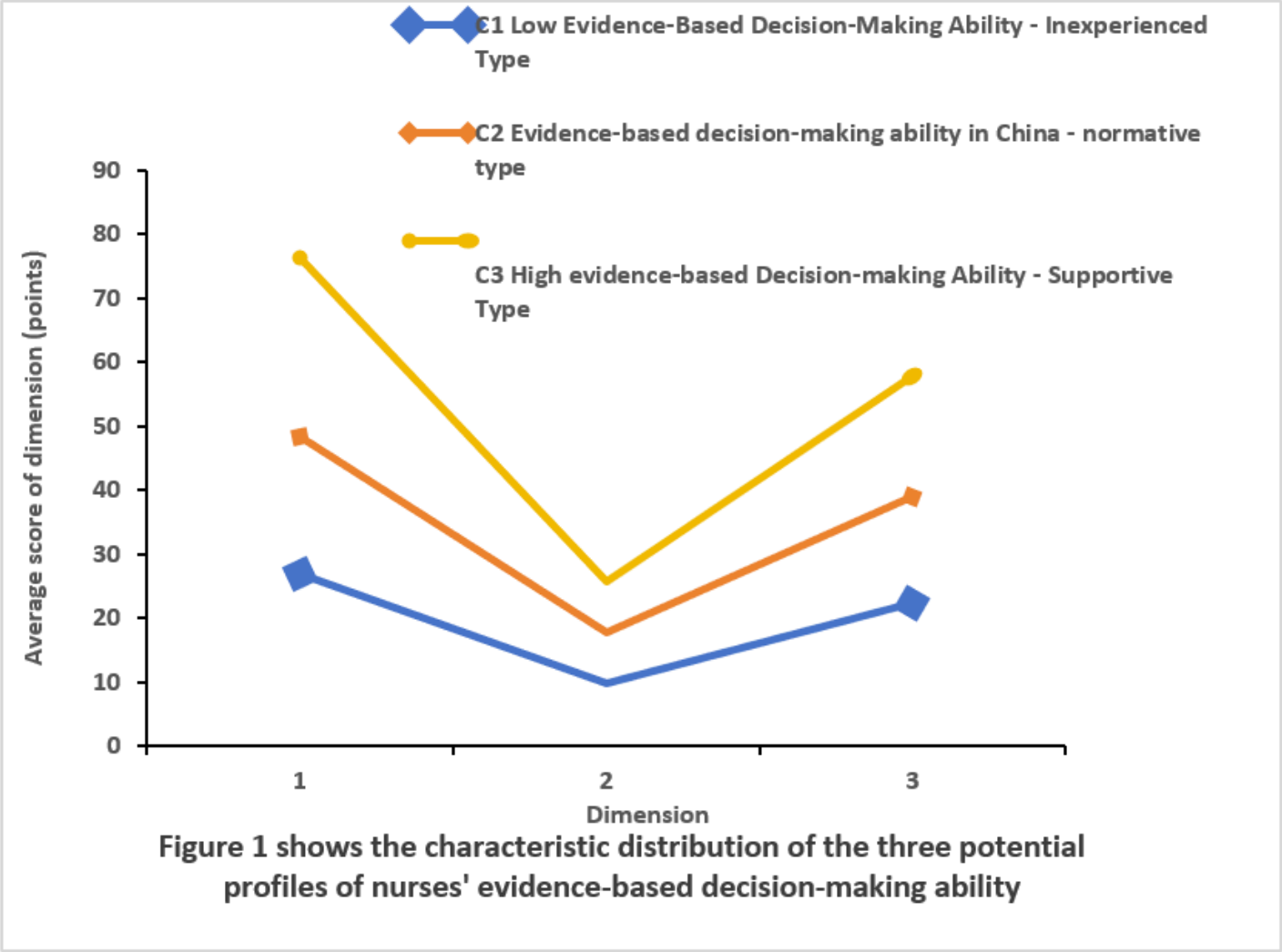


Figure 1

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