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How nurses' work satisfaction and nurse engagement are associated with patient experience in adult acute inpatient care: A structural equation modelling analysis

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ABSTRACT

Background: Nurses' work satisfaction and nurse engagement have been reported to positively and significantly correlate with patient satisfaction or patient experience in hospital settings. However, the existing evidence remains fragmented. Structural equation modeling provides a way to examine these relationships together, allowing both direct and indirect links between the concepts to be analyzed within a single model.

Objective: To describe the associations of nurses' work satisfaction and nurse engagement with patient experience in adult acute inpatient care in Finland based on national nursing-sensitive benchmarking data.

Methods: This retrospective registry study used a sample of national benchmarking data from the years 2021 and 2022, focusing on acute inpatient care in unit types which had produced both patient-experience data (adult patients) and nurses' work satisfaction and nurse-engagement data. Of the latter, only the responses of staff nurses, midwives, and assistant nurse managers were included in order to focus on bedside nursing personnel. The data were collected from four university hospitals and six central hospitals in Finland using the Nursing-Sensitive Patient-Reported Experience Measure and modified Nurse Engagement Survey. The data included 1490 nurses and 3785 patients.

Descriptive statistics were used to summarize the data on patient experience and nurses' work satisfaction. The hypothesized associations between the dimensions of the two instruments were examined using observed-variable path analysis within the structural equation modeling framework. This study is reported in accordance with the Strengthening the Reporting of Observational Studies in Epidemiology Statement for cross-sectional studies.

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Results: Nurses reported relatively high levels of work satisfaction across all measured dimensions, with mean values above the midpoint of the six-point Likert scale. Patient experiences were also generally positive, as all dimensions of the instrument exceeded the value of four on a five-point scale. The established SEM model demonstrated an excellent fit to the data and revealed that six out of eight dimensions of nurses' work satisfaction were positively associated with their personal engagement. Several associations were also found between dimensions of nurses' work satisfaction and patient experience. A few of the associations were positive, while dimensions relating to collaboration and resourcing were negatively associated with multiple patient experience dimensions.
Conclusions: Intra- and inter-professional collaboration are key factors in nurses' work satisfaction but not necessarily associated with their engagement. Nurses' work satisfaction is not positively reflected in all dimensions of patient experience. Nurse engagement is only partially positively associated with patient experience.
Registration: Not registered.

What is already known

- Work satisfaction is an antecedent of work engagement.
- Nurses' work satisfaction relates positively with patient experience.
- Structural equation modeling may reveal links between multidimensional concepts.

What this paper adds

- Nurses' work satisfaction dimensions varied in associations with patient experience.
- Not all dimensions of nurses' work satisfaction were linked to their engagement.
- Good teamwork and resourcing were not reflected in patient experience.

1. Background

Nurses' work satisfaction and work engagement are interrelated staff-reported factors that may influence the quality of nursing care and, consequently, patient experience (Bragge et al., 2025). Work satisfaction refers to nurses' overall evaluation of or attitude toward their work, whereas work engagement denotes a positive and fulfilling work-related state characterized by vigor, dedication, and absorption (Altaf and Bhat, 2024). Although the concepts are distinct, work satisfaction can function as an antecedent of engagement. The literature has, however, used the terms work engagement and employee engagement inconsistently. (Shuck, Kim and Chai, 2021). In nursing, engagement is especially relevant because demanding work requires sustained professional commitment and investment (Keyko *et al.*, 2016; Aungsuroch *et al.*, 2024).

Employee engagement, on the other hand, includes the aspect of commitment to the organization and its goals. Research shows that higher work satisfaction may be associated with stronger affective and organizational commitment, supporting nurse retention and sustained motivation. (Yildiz and Yildiz, 2022) In this paper, we use the concept of nurse engagement, which includes elements of both work engagement and employee engagement. Nurse engagement has been defined as being inspired by one's organization, willing to invest discretionary effort, likely to recommend the employer, and planning to remain with the organization for the foreseeable future (Nursing Executive Center, 2007, p. 15). Meaning and belonging within the profession and the organization are considered important foundations for nurse engagement, which plays a key role in patient experience, quality of care, patient and organizational outcomes, and teamwork (Dempsey and Reilly, 2016). The work environment can enhance nurse engagement by providing supportive leadership, adequate staffing, and collaborative professional relationships that fulfill basic psychological needs. This may increase their organizational commitment and contributes to improved performance. At the same time, both a good work environment and high engagement are associated with lower intention to leave one's job. (Ni *et al.*, 2023; Figueiredo, Baixinho and Lucas, 2026.)

Factors that influence nurse engagement in hospital settings have been categorized as: 1) individual-related, 2) organization-related, 3) job- and role-related, 4) work-life balance-related, and 5) work environmental factors (Aungsuroch *et al.*, 2024). Among the organization-related factors are recognition and regular feedback, the organization's readiness to implement nurse suggestions for performance improvement, managers' responsiveness, workplace support, professional development opportunities, and nurses' perception of autonomy (Junttila *et al.*, 2023; Altaf and Bhat, 2024). Work environmental factors, meanwhile, include elements like collaboration (Aungsuroch *et al.*, 2024).

Concepts of patient satisfaction and patient experience are constantly used interchangeably although they have different meaning. Patient satisfaction is a subjective measure of how well patient's expectations were met during the care, and it can be influenced by previous health care encounters. Patient experience, on the other hand, describes "what" happened to patient during a care episode, and "how" it happened from the patient perspective. (Bull et al., 2019, a systematic review of the validity and reliability of

patient-reported experience measures). Patient-reported experience measures are tools used to understand how patients perceive the care they receive, with attention to factors such as communication, staff interactions, responsiveness, and the organization of services (Guan *et al.*, 2024). Unlike measures that focus solely on clinical outcomes or overall satisfaction, patient-reported experience measures examine the patient's own experience of care processes and the degree to which care is delivered in a patient-centered manner (Attar, Shukla and Mulay, 2024). In acute inpatient settings, these measures provide insight into how individuals interpret their encounters throughout the care journey and how these experiences influence their views on quality and safety (Attar, Shukla and Mulay, 2024; Guan *et al.*, 2024).

In summary, previous literature suggests that work satisfaction is an antecedent of work engagement (Shuck, Kim and Chai, 2021). Work engagement, in turn, has been linked to patient experience and other quality-related outcomes in healthcare (Dempsey and Reilly, 2016). More recent review-level evidence indicates that positive staff experiences and higher engagement are generally associated with better patient outcomes and patient experience (Bragge *et al.*, 2025), and that strategies aimed at strengthening nurse engagement may improve patient experiences (Li *et al.*, 2025). However, contrasting findings have also been reported, with higher nurse engagement found to be associated with worse patient experience (Parr, Teo and Koziol-McLain, 2020).

Although previous studies have demonstrated associations between nurses' work satisfaction, engagement, and patient satisfaction or patient experience, existing evidence remains fragmented. Prior research has often examined these constructs separately or focused on single dimensions at a time, limiting understanding of their simultaneous and potentially interrelated effects on patient experience (Parr, Teo and Koziol-McLain, 2020). Moreover, few studies have applied analytical approaches capable of capturing both direct and indirect relationships between work satisfaction, engagement, and multi-dimensional patient-reported experience measures, leaving the underlying structural pathways largely unexplored (Wee and Lai, 2022). Structural equation modeling provides a way to examine these relationships together, allowing both direct and indirect links between nurses' work satisfaction, nurse engagement, and patient experience to be analyzed within a single model. In this study, based on previous literature, the dimensions of nurses' work satisfaction were specified as predictors of nurse engagement. Nurse engagement was hypothesized to act as a mediator of patient experience. Finally, nurses' work satisfaction was specified as the proximal determinant of patient experience, reflecting the theoretical assumption that nurses' higher work satisfaction contributes to more positive patient experiences.

The aim of this study is to describe, utilizing structural equation modeling analysis, the associations of nurses' work satisfaction and nurse engagement with patient experience in adult acute inpatient care in Finland based on national nursing-sensitive benchmarking data. The following research questions will be addressed:

- How are the dimensions of nurses' work satisfaction associated with nurse engagement?
- What associations exist between the dimensions of nurses' work satisfaction and patient experience?
- How is nurse engagement associated with patient experience?

2. Methods

2.1. Study design and setting

A retrospective registry study utilizing national benchmarking data collected from four (out of five) university hospitals and six (out of 16) central hospitals in Finland.

2.2. Sampling

Initial national benchmarking data on nurses' work satisfaction and nurse engagement are collected annually via electronic survey. Data collection follows a census method, with RNs at all levels invited to respond to the survey. To be included in the benchmarking data, a respondent must answer at least half of the statements. Data on patient experiences are collected either constantly or during one week per month via electronic or paper surveys. Data are collected voluntarily and anonymously from all adult patients in various clinical settings, as well as pediatric patients and their parents.

In this registry study, the sample of national benchmarking data was limited to the years 2021 and 2022, acute inpatient care, and unit types which had produced both patient-experience data (adult patients, n = 3785) and nurses' work satisfaction and nurse-engagement data. From the latter, only the responses of staff nurses, midwives, and assistant nurse managers (hereinafter nurses, n = 1490) were included in order to focus on clinical (bedside) nursing personnel. As this study involves the secondary use of existing data, a priori power calculations specific to the SEM analyzes were not performed during the study planning phase. Since power analysis should not be used as a post hoc tool (see, e.g., Christogiannis *et al.*, 2022), post hoc power calculations are not presented. However, the sample size meets the commonly recommended requirements for SEM analyzes (e.g., Kline, 2023).

2.3. Instruments

The modified Nurse Engagement Survey (mNES) was used to study nurses' work satisfaction and nurse engagement. The original Nurse Engagement Survey (NES, 48 items) was developed specifically to measure the engagement of nurses (Nursing Executive Centre, 2007). Later, as some Finnish hospitals sought Magnet status accreditation, the survey was modified to include all relevant accreditation requirements (Heikkilä *et al.*, 2025). The survey modification was conducted under the supervision of the American Nurses Credentialing Center. Initially, the copyright of the survey belonged to the Advisory Board Company in the U.S., but it was later

transferred to Press Ganey, the recognized body responsible for administering the National Database of Nursing Quality Indicators (https://www.pressganey.com/platform/ndnqi/). Subsequently, Press Ganey ceased the administration and use of the Nurse Engagement Survey on their platform. Now the copyright of the modified Nurse Engagement Survey belongs to the Hoiverke Consortium.

The modified Nurse Engagement Survey consists of 53 items rated on a 6-point Likert scale (1 = totally disagree to 6 = totally agree), with higher scores indicating higher agreement. The survey covers eight work-related dimensions (49 items), which are seen as drivers of nurse engagement: *fundamentals of quality nursing care* (11 items); *leadership access and responsiveness* (9 items); *autonomy* (4 items); *interprofessional collaboration* (4 items); *RN-to-RN collaboration* (5 items); *professional development* (5 items); *adequacy of resources and staffing* (5 items), and *professional relevance* (6 items). Furthermore, the four items in the dimension of *personal engagement* are used to calculate the respondent's personal engagement level, an independent primary outcome. In this study, the mean value of *personal engagement* was utilized instead of the calculated engagement level (engaged, content, ambivalent or disengaged; see Junttila et al., 2023). The survey dimensions are described in Results section, Table 2.

Demographic variables include highest level of education (master's degree or higher from university, master's degree from university of applied sciences, degree e.g. BSc or diploma, vocational education), main working hours (daytime, two-shift, three-shift, night-shift), job title (e.g. staff nurse, midwife), type of employment (permanent, temporary), length of work experience at current hospital (< 3 months, 3–11 months, 1–3 years, 4–6 years, 7–15 years, > 15 years), type of hospital (university hospital, central hospital), and type of unit (e.g. surgical ward, emergency room, intensive care unit).

Patient experience of nursing care was measured using the *Nursing-Sensitive Patient-Reported Experience Measure (NsPREM)*. The survey was developed at Helsinki University Hospital in cooperation with the Consortium. The survey items and dimensions were created based on the Magnet Model (American Nurses Credentialing Center, 2026). The survey (targeted at adult patients) includes nine dimensions and a total of 22 items: *careful listening* (2 items); *responsiveness* (2 items); *safety* (4 items); *service recovery* (2 items); *patient education* (4 items); *patient engagement/patient-centered care* (1 item); *care coordination* (2 items); *courtesy and respect* (3 items), and *pain* (2 items). The survey dimensions are described in Results section, Table 2. Demographic information is not included. Patients respond on a 5-point Likert scale (5 = strongly agree to 1 = strongly disagree) or select the option "Does not concern me". In analysis, this response was interpreted as a missing value.

The Nursing-Sensitive Patient-Reported Experience Measure instrument is relatively new, whereas the modified Nurse Engagement Survey has some supporting evidence of reliability. In previous studies, the Cronbach's alpha value for the total modified Nurse Engagement Survey has varied between 0.91 and 0.96 (Junttila *et al.*, 2023; Heikkilä *et al.*, 2025). In present study, the Cronbach alpha value for both instruments was 0.96. Dimension-specific alpha values are presented in Table 2. Both instruments have previously undergone psychometric evaluation; however, further instrument development and validation work continues.

2.4. Data collection procedure

In Finland, there is no national quality register for nursing-sensitive indicators. For this reason, all five university hospitals initiated a network called 'The Consortium for the National Benchmarking of Nursing-Sensitive Outcomes' (www.hoiverke.fi/en/, hereinafter the Consortium) in 2016. Since then, 13 other organizations have joined the Consortium, covering 78% of current wellbeing services counties (the regional social and healthcare authorities) in Finland. The Consortium collects and benchmarks, among other nursing-sensitive quality indicators, information regarding patient experience of nursing care and nurses' work satisfaction and nurse engagement. The data are collected in various nursing environments including inpatient wards and outpatient clinics.

The data on nurses' work satisfaction and nurse engagement were collected in March 2021 and September 2022, and patient-experience data from the corresponding quartiles were included in the study. Each Consortium member organization has at least one named coordinator responsible for collecting and combining the data according to a preset structure and content guidelines and forwarding it to the national benchmarking body. Following the Material Transfer Agreement, the benchmarking data are masked, i.e., the single unit behind the data is not identified. Instead, each unit is given a unit type label (e.g., Cardiac Medical Unit).

2.5. Statistical analysis

To combine the nurse and patient datasets, the datasets were linked according to both unit type and survey period. Unit type represented broad categories of hospital units rather than individual wards. Nurses' work satisfaction and nurse engagement survey was conducted during quarter one in 2021 (March) and quarter three in 2022 (September). Patient-experience data from the corresponding quarter were used. Patient data were available at the unit-type level and was therefore aggregated separately for each unit type and quarter by calculating the mean patient-experience score. Patient-experience means were calculated as unweighted arithmetic means, with each patient response contributing equally to the aggregate score. These unit type × survey period-specific patient-experience means were then assigned to individual nurses according to their unit type and survey period. Thus, nurses were assigned a patient-experience value corresponding to the same unit type and survey period as their work satisfaction and engagement survey. Because patient-experience measures were available only at the aggregated unit-type level, multilevel modeling separating nurse-level and unit-type-level variance was not feasible. Consequently, the results should be interpreted as associations between individual nurse characteristics and unit-type-level patient-experience measures.

The final analytical dataset comprised 1490 nurses.

Descriptive statistics were used to summarize both survey results. In the modified Nurse Engagement Survey results, mean values of the dimensions over 3.5 were interpreted as positive (midpoint of a 6-point scale is 3.5). In relation to Nursing-Sensitive Patient-

Reported Experience Measure, patient experience was defined as excellent if the mean score was over four on a scale from 1 to 5, higher scores indicating more positive experience. Structural equation modeling (SEM; Kline, 2023) was used to examine the hypothesized relationships between the dimensions of the two instruments. The analysis was conducted as an observed-variable path model, in which the subscale scores of the Nursing-Sensitive Patient-Reported Experience Measure and modified Nurse Engagement survey were treated as observed variables. The objective was to evaluate the hypothesized structural relationships between the subscale scores rather than to re-estimate the measurement models of the instruments. Accordingly, the initial structural model was specified *a priori* based on theoretical considerations and previous empirical evidence. Therefore, a latent variable SEM including all questionnaire items was not considered appropriate given the available sample size. The SEM analysis followed five key steps: model specification, identification, estimation, evaluation, and modification. Model estimation was conducted using maximum likelihood estimation, which assumes multivariate normality but is generally robust to moderate departures from this assumption. The amount of missing data was negligible, and cases with missing values were excluded using listwise deletion. During model evaluation, parameter estimates and model diagnostics, including modification indices (MI), were examined. Any model modifications were considered only when supported by both theoretical rationale and empirical evidence and were implemented sparingly to preserve the theoretically specified structure of the model. Total, direct, and indirect effects were computed. Indirect effects were estimated within the SEM framework as the products of the relevant structural path coefficients. Their statistical significance was assessed using bias-corrected 95% bootstrap confidence intervals based on 1000 usable bootstrap samples. Two-tailed bootstrap significance values were also obtained from AMOS. An indirect effect was considered statistically significant when its bias-corrected 95% confidence interval did not include zero. Direct effects represent associations between two variables without necessarily implying causality, whereas indirect effects represent associations transmitted through one or more mediating variables. Path-specific indirect effects were reported for the patient-experience dimensions for which a mediated pathway was specified in the final model.

Model fit was assessed using the root mean square error of approximation (RMSEA), the normed fit index (NFI), the relative fit index (RFI), the incremental fit index (IFI), the Tucker–Lewis index (TLI), and the comparative fit index (CFI). Model fit was considered acceptable if RMSEA was < 0.1 and NFI, RFI, IFI, TLI and CFI were > 0.9 (Kline, 2023). All statistical analyzes were conducted using SPSS Statistics 29.0.2.0 for Windows and SPSS AMOS 29.0 (SPSS Inc., Chicago, IL).

2.6. Ethical considerations

According to Finnish legislation, a retrospective registry study does not require ethical approval (Finnish Advisory Board on Research Integrity, 2023). Instead, study permissions were acquired from all organizations which had produced data for national benchmarking.

The modified Nurse Engagement Survey data did not include direct personal data, and the participants' work units were coded. Thus, individual participants or their units cannot be identified in the reporting. By responding to the survey, the participants gave their consent for their responses to be used for research purposes. The Nursing-Sensitive Patient-Reported Experience Measure data were anonymous and did not contain any identifiable information of the patients who had responded to the survey.

The study was not registered.

3. Results

In the modified Nurse Engagement Survey results, the typical respondent worked in a three-shift system as a staff nurse on a

Table 1
Demographic backgrounds of respondents (N = 1490) to the modified Nurse Engagement Survey in 2021 and 2022.

		n	%
Work description (n = 1490)	Assistant nurse manager	56	3.8
	Midwife	160	10.7
	Staff nurse	1274	85.5
Employment status (n = 1477)	Permanent	1275	86.3
	Temporary	202	13.7
Education (n = 1485)	Master's level or higher (University)	38	2.6
	Master's level (University of Applied Sciences)	58	3.9
	Degree in nursing (e.g. BSc)	1085	72.8
	Diploma in nursing	287	19.3
	Vocational training	17	1.1
Work shift (n = 1487)	Daytime work (morning)	95	6.4
	Two shift work (morning-evening)	195	13.1
	Three shift work	1189	80.0
	Night-shift work	8	0.5
Length of employment (n = 1489)	<3 months	10	0.7
	3–11 months	118	7.9
	1–3 years	284	19.1
	4–6 years	260	17.5
	7–15 years	391	26.3
	> 15 years	426	28.6

permanent contract, held a bachelor's degree in nursing, and had >15 years of experience in their current organization (Table 1).

Of the survey dimensions, respondents (n = 1490) rated the dimension of *personal relevance* the highest; this includes organizational communication, teamwork among nurses, support services, scheduling flexibility, meaningful patient connections, and professional pride. *Interprofessional collaboration* and *RN-to-RN collaboration were* also rated highly. The lowest ratings were given for *personal engagement*. In addition, the dimensions of *leadership access and responsiveness* and *professional development* received comparatively low evaluations. (See Table 2.)

Overall, patients (n = 3785) rated their care at a high level across all dimensions of the Nursing-Sensitive Patient-Reported Experience Measure (means above 4.0). The highest ratings were given for *courtesy and respect* and *careful listening*. The lowest ratings, while still high, were for *safety* and *service recovery*. (See Table 2.)

The final model demonstrated very good fit according to conventional fit indices (NFI = 0.993, RFI = 0.981, IFI = 0.995, TLI = 0.986, CFI = 0.995, and RMSEA = 0.044) (see Fig. 1).

3.1. Associations between nurses' work satisfaction and nurse engagement

Seven work-related dimensions of the modified Nurse Engagement Survey exhibited significant associations with the dimension of *personal engagement* and showed acceptable model fit (Fig. 1). Positive predictors were *leadership access and responsiveness, autonomy, professional development, adequacy of resources and staffing, fundamentals of quality nursing care*, and *professional relevance*. In contrast, *RN-to-RN collaboration* was negatively associated with *personal engagement. Interprofessional collaboration* had neither a positive nor negative association with *personal engagement*. (See Table 3.)

Table 2
Dimensions of the modified Nurse Engagement Survey (mNES) and Nursing-Sensitive Patient-Reported Experience Measure (NsPREM) (Mean, Median, Standard Deviation, Min-Max, and Cronbach alpha values).

Dimensions of mNES	Description[1]	Mean	Median	SD[2]	Min-Max[3]	Cronbach alpha values
Fundamentals of quality nursing care	Vision and values of the organization, competence of co-workers, realization of evidence-based nursing practice, nursing quality, occupational safety and well-being	3.96	4.00	0.72	1.00–6.00	0.82
Leadership access and responsiveness	The role and actions of immediate supervisor, visibility of the highest nurse leader, recognition, feedback	3.60	3.67	1.03	1.00–6.00	0.90
Autonomy	Input into patients' medical care planning and treatment, level of independence, participation in decision-making affecting one's work, respect to nurses' contribution	3.88	4.00	0.89	1.00–6.00	0.72
Interprofessional collaboration	Collaboration with physicians, abuse behavior, ethical courage relating to physicians' actions	4.28	4.33	0.97	1.00–6.00	0.78
RN-to-RN collaboration	Ethical courage relating to nurses' actions, proactive help to others, access to clinical experts, resolving of conflicts, nurses' active role in improving patient care	4.35	4.40	0.85	1.00–6.00	0.76
Professional development	Career path, professional growth, support to further/additional education, knowledge of own role escalation	3.72	3.80	1.03	1.00–6.00	0.82
Adequacy of resources and staffing	Access to necessary equipment and supplies, new technology in supporting nursing, manageable workload, enough time with patients, compromised patient care	3.79	3.80	0.97	1.00–6.00	0.76
Professional relevance	Relationships with other nurses and support staff, flexibility in work shifts, meaningful connections with patients and/or their families, pride of one's profession	4.55	4.67	0.70	1.00–6.00	0.68
Personal engagement	Inspiration, motivation, commitment	3.34	3.25	1.24	1.00–6.00	0.88
mNES Total						0.96
Dimensions of NsPREM	**Description**	**Mean**	**Median**	**SD**	**Min-Max[4]**	**Cronbach alpha values**
Patient engagement / Patient-centered care	Patient participation in care planning and implementation	4.56	4.69	0.42	3.00–5.00	-
Care coordination	Collaboration between nurses and physicians in care planning and implementation	4.52	4.67	0.43	2.83–5.00	0.87
Service recovery	Apologizing for an error or oversight, correcting matters in question	4.39	4.50	0.47	3.20–5.00	0.84
Safety	Medication safety, safe moving around, confidentiality	4.25	4.38	0.46	3.06–5.00	0.85
Courtesy and respect	Courtesy, dignity, privacy	4.68	4.81	0.33	3.50–5.00	0.83
Responsiveness	Timely response to care needs	4.57	4.69	0.40	3.33–5.00	0.79
Patient education	Understandable information of care, examinations, discharge and recovery; assuring patient's comprehension	4.56	4.75	0.41	3.10–5.00	0.89
Pain	Pain assessment, pain relief	4.55	4.69	0.44	2.75–5.00	0.86
Careful listening	Careful listening, genuine presence	4.63	4.78	0.37	3.00–5.00	0.90
NsPREM Total		4.53	4.67	0.39	3.14–5.00	0.96

[1] Description of dimensions of the modified Nurse Engagement Survey first published in Heikkilä *et al.*, 2025.
[2] SD, Standard deviation.
[3] Min and max values by single respondents.
[4] Min and max values of the mean values.

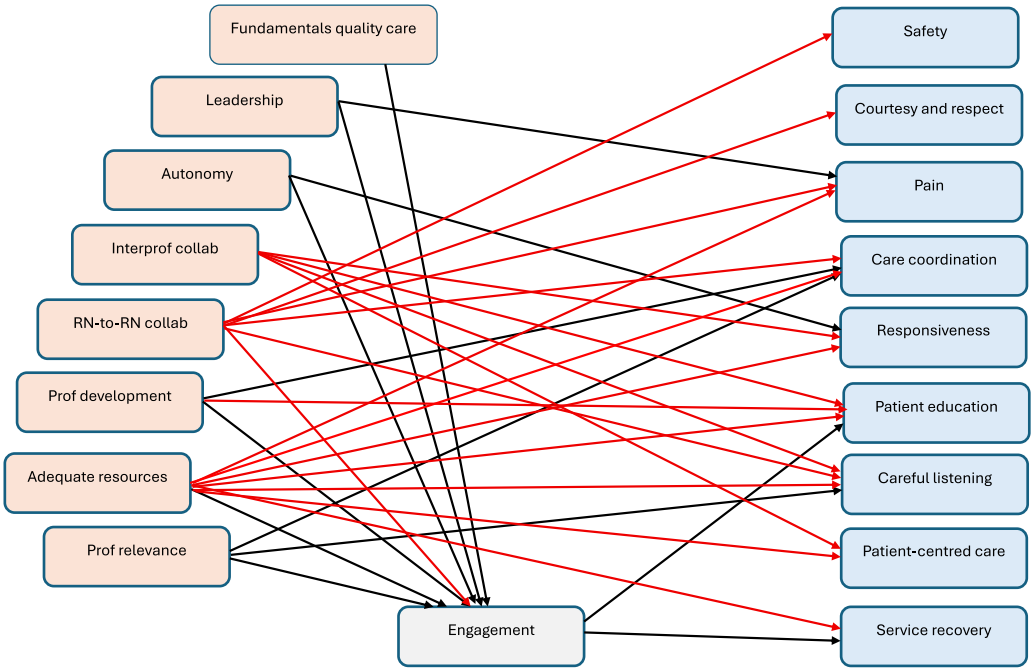


Fig. 1. Structural equation model of the dimensions of the modified Nurse Engagement Survey (mNES) and the Nursing-Sensitive Patient-Reported Experience Measure (NsPREM).
The figure shows dimensions of nurses' work satisfaction (left-hand side), dimension of personal engagement (bottom), and dimensions of patient experience (right-hand side). For full names of the dimensions, see Table 2. Positive associations presented with black and negative in red arrows.

3.2. Associations between nurses' work satisfaction and patient experience

Nurses' evaluations of *leadership access and responsiveness* were positively related to patients' experience of *pain*. The dimension of *professional relevance* was positively associated with patients' experiences of *careful listening* and *care coordination*. Nurses' *professional development* was positively associated with *care coordination* but negatively with *patient education. RN-to-RN collaboration* was negatively associated with patients' experiences of *courtesy and respect, safety, care coordination, pain*, and *careful listening*. Evaluations of *interprofessional collaboration* were also negatively associated with patients' experiences of *patient education, patient engagement/patient-centered care, responsiveness*, and *careful listening,* while the association with *patient engagement/patient-centered care* was not statistically significant. Finally, nurses' assessments of *adequacy of resources and staffing* were negatively related to seven patient experience dimensions: *care coordination, patient education, patient engagement/patient-centered care, careful listening, responsiveness, service recovery*, and *pain. Autonomy* was negatively but not statistically significantly associated with *responsiveness. Fundamentals of quality nursing care* was not associated with any of the dimensions of patient experience. (See Table 4.) The SEM analysis also identified small indirect effects for *patient education* and *service recovery*. The corresponding indirect effects were statistically significant based on the bias-corrected bootstrap confidence intervals, although their magnitudes were small. (See Supplementary file.)

3.3. Associations between nurse engagement and patient experience

Furthermore, in the established model the dimension of *personal engagement* was positively related to patients' experiences of

Table 3
Regression weights and standardized regression weights for the dimensions of nurses' work satisfaction and personal engagement.

		Dimensions of nurses' work satisfaction	Est.(β)	S.E.	St. Est.	P
Personal engagement	<—	RN-to-RN collaboration	−0.241	0.034	−0.165	***
Personal engagement	<—	Leadership access and responsiveness	0.224	0.031	0.186	***
Personal engagement	<—	Autonomy	0.178	0.035	0.128	***
Personal engagement	<—	Professional development	0.186	0.031	0.154	***
Personal engagement	<—	Professional relevance	0.368	0.046	0.207	***
Personal engagement	<—	Adequacy of resources and staffing	0.222	0.028	0.174	***
Personal engagement	<—	Fundamentals of quality nursing care	0.343	0.051	0.197	***

Notes: β = Regression Weight; S.E. = Standard Error; St. Est. = Standardized Regression Weight; p = probability value.
*** < 0.001.

Table 4
Regression weights and standardized regression weights for the dimensions of patient experience and nurses' work satisfaction.

Dimensions of patient experience		Dimensions of nurses' work satisfaction	Est.(β)	S.E.	St. Est.	p
Pain	<—	Leadership access and responsiveness	0.008	0.004	0.018	0.047
Responsiveness	<—	Autonomy	0.009	0.005	0.020	0.100
Patient education	<—	Interprofessional collaboration	−0.015	0.004	−0.034	0.001
Patient engagement / Patient-centered care	<—	Interprofessional collaboration	−0.010	0.005	−0.022	0.065
Responsiveness	<—	Interprofessional collaboration	−0.011	0.005	−0.027	0.027
Careful listening	<—	Interprofessional collaboration	−0.008	0.004	−0.020	0.040
Courtesy and respect	<—	RN-to-RN collaboration	−0.013	0.004	−0.034	0.002
Safety	<—	RN-to-RN collaboration	−0.020	0.007	−0.037	0.005
Care coordination	<—	RN-to-RN collaboration	−0.020	0.006	−0.040	***
Pain	<—	RN-to-RN collaboration	−0.017	0.006	−0.033	0.006
Careful listening	<—	RN-to-RN collaboration	−0.013	0.006	−0.031	0.021
Care coordination	<—	Professional development	0.012	0.004	0.029	0.005
Patient education	<—	Professional development	−0.013	0.004	−0.034	***
Care coordination	<—	Adequacy of resources and staffing	−0.029	0.005	−0.066	***
Patient education	<—	Adequacy of resources and staffing	−0.024	0.006	−0.056	***
Patient engagement / Patient-centered care	<—	Adequacy of resources and staffing	−0.033	0.006	−0.077	***
Careful listening	<—	Adequacy of resources and staffing	−0.033	0.005	−0.088	***
Responsiveness	<—	Adequacy of resources and staffing	−0.023	0.005	−0.056	***
Service recovery	<—	Adequacy of resources and staffing	−0.038	0.008	−0.081	***
Pain	<—	Adequacy of resources and staffing	−0.029	0.005	−0.064	***
Care coordination	<—	Professional relevance	0.019	0.007	0.031	0.005
Careful listening	<—	Professional relevance	0.023	0.006	0.043	***

Notes: β = Regression Weight; S.E. = Standard Error; St. Est. = Standardized Regression Weight; p = probability value.
*** < 0.001.

patient education (β = 0.014, p < .001) and *service recovery* (β = 0.012, p = 0.036) (see Fig. 1).

4. Discussion

The aim of this study was to examine associations between nurses' work satisfaction, nurse engagement, and patient experience in adult acute inpatient care using national benchmarking data from multiple Finnish university and central hospitals 2021 and 2022. Structural equation modeling (SEM) was used because it enables the simultaneous examination of multiple interrelated relationships between latent constructs and observed variables within a single analytical model, which is particularly suitable when exploring complex associations between work environment factors, engagement, and patient outcomes (Kline, 2023).

Overall, nurses reported relatively high levels of work satisfaction across all measured dimensions, with mean values above the midpoint of the six-point Likert scale. Patient experience was also generally positive, as all dimensions of the Nursing-Sensitive Patient-Reported Experience Measure exceeded the value of four on a five-point scale. Direct comparison with previous studies is challenging because patient experience has been measured using different instruments and scoring systems across studies. Several factors may explain the consistently high patient-experience scores observed in this study. First, the findings may indicate a high quality of nursing care in the participating hospitals. Second, patients may have particularly valued effective communication, respectful treatment, and the information and support provided during their care, as these are key components of patient experience. Although the overall ratings were high, the lower scores for the dimensions of *safety* and *service recovery* suggest that these areas may offer opportunities for quality improvement.

These findings suggest that both nurses and patients evaluated the care process positively. However, the main contribution of this study is its simultaneous examination of the multidimensional associations between nurses' work satisfaction, nurse engagement, and patient experience using structural equation modeling. This approach extends beyond describing the levels of these variables by evaluating their interrelationships within a single analytical framework.

4.1. Associations between nurses' work satisfaction and nurse engagement

The findings show that several dimensions of nurses' work satisfaction were positively associated with their *personal engagement*. This is consistent with theoretical work indicating that job satisfaction reflects an attitudinal state, whereas engagement represents a motivational state (Keyko *et al.*, 2016; Altaf and Bhat, 2024; Aungsuroch et al., 2024). Thus, nurses may be satisfied with their work without necessarily being engaged. This interpretation also aligns with recent nursing research showing that motivational mechanisms—such as intrinsic motivation—play a central role in fostering nurse engagement (Kohnen *et al.*, 2024).

In the present study, factors such as professional relevance, leadership-related factors, and perceptions of autonomy—which Aungsuroch *et al.* (2024) call organization-related factors—were positively related to *personal engagement*. These results are consistent with earlier research indicating that meaningful work, supportive leadership, and professional autonomy strengthen nurse engagement and organizational commitment (Shuck, Kim and Chai, 2021; Yildiz and Yildiz, 2022; Junttila *et al.*, 2023; Ni *et al.*, 2023). Work engagement has been conceptualized as a motivational state characterized by vigor, dedication, and absorption (Schaufeli *et al.*, 2002;

Kato, Chiba and Schimazu, 2021). Previous studies have also shown that supportive work environments and the satisfaction of psychological needs are important determinants of nurse engagement (Ni *et al.*, 2023).

Interestingly, *RN-to-RN collaboration* was negatively associated with *personal engagement* despite being rated highly in the descriptive results. This finding suggests that satisfaction with work environment-related factors, such as teamwork, does not necessarily translate into engagement (Aungsuroch *et al.*, 2024). Work engagement has been presented as a distinct psychological state rather than merely a positive evaluation of working conditions (Keyko *et al.*, 2016; Yildiz and Yildiz, 2022). It is therefore possible that strong peer collaboration functions primarily as a collective coping mechanism in demanding work environments rather than as a driver of individual vigor or work dedication. *Interprofessional collaboration*, in contrast, showed no significant association with *personal engagement*, which may indicate that interprofessional collaboration is experienced more as a factor relating to work environment than an individual-related motivational factor (Aungsuroch *et al.*, 2024).

4.2. Associations between nurses' work satisfaction and patient experience

The results also revealed several associations between nurses' work satisfaction and patient experience. *Leadership access and responsiveness, autonomy*, and *professional relevance* were positively associated with certain patient-experience dimensions, suggesting that supportive leadership and professional empowerment may be related to more responsive and patient-centered care environments. Previous research has similarly demonstrated that favorable nursing work environments may be associated with improved patient outcomes and care quality (Lake *et al.*, 2019; Aungsuroch *et al.*, 2024).

The findings suggest that the association between nurses' work satisfaction and patient experience vary across different dimensions of work satisfaction. Several structural and collaborative dimensions of work satisfaction—*interprofessional collaboration, RN-to-RN collaboration*, and *adequacy of resources and staffing*—were negatively associated with multiple dimensions of patient experience.

Adequacy of resources and staffing was associated with seven of the nine patient-experience dimensions, and all associations were statistically significant and negative. This pattern appears counterintuitive, as collaboration and adequate staffing are generally considered prerequisites for high-quality care (Lake *et al.*, 2019; Aungsuroch *et al.*, 2024). One explanation may relate to the visibility of care processes. Collaborative work often involves internal coordination, documentation, and team discussions that improve clinical reasoning and patient safety but remain largely invisible to patients. Consequently, patients may perceive less direct interaction time with nurses, which may influence their perceptions of responsiveness, listening, or coordination.

Another possible explanation relates to what may be described as a coordination paradox. When several professionals are involved in care processes, communication with the patient may become fragmented or inconsistent. Communication clarity, role transparency, and consistency of information have been identified as key determinants of patient experience (Guan *et al.*, 2024). Thus, even well-functioning internal collaboration does not necessarily lead to coordinated care from the patient's perspective.

The dimension of *adequacy of resources and staffing* was particularly noteworthy because it was negatively associated with several dimensions of patient experience and simultaneously positively associated with *personal engagement*. Adequate staffing may be related to nurses' internal perceptions of workflow stability, professional control, and organizational support, which may enhance nurse engagement. However, work environment-related engagement factors such as adequate resources do not automatically guarantee smooth patient flow, continuity of communication, or coordinated care processes, which are central elements shaping patient experience (Lake *et al.*, 2019; Nurmeksela *et al.*, 2021).

Several statistically supported associations between dimensions of nurses' work satisfaction and patient-experience dimensions were small in magnitude. Standardized effects were generally below 0.10, indicating modest relationships despite the large sample size. Consequently, emphasis was placed on effect estimates and their 95% bootstrap confidence intervals rather than on statistical significance alone. Associations for which the confidence interval included zero were considered to provide limited statistical evidence and interpreted cautiously.

Given the cross-sectional registry-based study design, the observed associations do not allow conclusions about causality. Moreover, the present data do not permit determination of the reasons for the negative associations between collaboration, adequacy of resources and staffing, and patient experience. The explanations presented above should therefore be regarded as possible interpretations of the observed associations rather than as conclusions that can be confirmed by the present data.

4.3. Associations between nurse engagement and patient experience

Nurses' *personal engagement* was positively associated with *patient education* and *service recovery*. These aspects of patient experience require active communication, emotional investment, and proactive interaction with patients. Earlier research has similarly shown that engaged nurses are more likely to demonstrate discretionary effort and patient-centered behaviors in clinical practice (Keyko *et al.*, 2016). However, *personal engagement* was not associated with all dimensions of patient experience. This selective pattern is consistent with meta-analytic findings suggesting that the relationship between work engagement and quality of care depends on how quality is measured. Associations tend to be stronger when quality is assessed through healthcare professionals' self-reports and weaker when measured using patient-reported outcomes (Wee and Lai, 2022). The measurement perspective therefore appears to be an important factor when interpreting the relationship between nurse engagement and patient experience.

Overall, the findings suggest that improving nurses' work environments and strengthening nurse engagement may be associated with better patient experiences, but the relationship is not necessarily direct. Work environment-related nurse engagement factors such as teamwork and staffing do not automatically translate into improved patient experience unless they are accompanied by visible communication, coordinated care processes, and meaningful nurse–patient interactions. Leadership practices that support professional

autonomy, nurse engagement, and patient-centered communication may therefore play an important role in aligning work environments with patients' perceptions of care.

4.4. Limitations

This study has several limitations. First, the registry data design allowed us to identify robust associations, but it does not enable conclusions to be drawn regarding causality. Second, all data from acute inpatient units were analyzed as a single dataset using structural equation modeling. Thus, differences between individual unit types were not examined. Future research would benefit from longitudinal follow-up studies and analyzes conducted at the individual unit level, which could reveal variations that remain undetected in aggregated analyzes. Furthermore, care settings other than acute inpatient care units were excluded from the study, which may have introduced bias and limits the generalizability of the results. The patient-experience data were fully anonymous and collected for benchmarking purposes, meaning data on background variables were not included; collecting such information in future studies would deepen understanding of observed patterns. Finally, external or confounding factors were not included in the analysis, which may have influenced the observed associations.

The Nursing-Sensitive Patient-Reported Experience Measure instrument is relatively new, whereas the modified Nurse Engagement Survey has some supporting evidence of reliability (Junttila *et al.*, 2023; Heikkilä *et al.*, 2025). Both instruments have previously undergone psychometric evaluation (unpublished results); however, further instrument development and validation work continues. Patient-experience scores were generally high, resulting in limited between-unit-type variation for some dimensions. Consequently, ceiling effects may have attenuated the magnitude of associations observed in the SEM analyzes.

Although the use of SEM is a methodological strength of this study because it enables a more comprehensive and accurate examination of complex relationships between variables than traditional statistical methods, the multidimensional nature of the concepts may complicate interpretation. The analyzes were conducted using observed dimension scores rather than latent variables. Consequently, measurement error was not modeled explicitly and may have influenced the estimated path coefficients. Moreover, one patient-experience dimension was represented by a single item, for which internal consistency reliability could not be evaluated. The model identified several associations, but the observed effect sizes were small (absolute path coefficients approximately 0.018–0.040). Consequently, the findings should be interpreted cautiously, and further research is needed to determine the robustness and practical significance of these relationships.

4.5. Implications for clinical practice and research

Leadership practices may plausibly help translate nurses' work satisfaction into positive patient experiences across aspects of care such as coordination and patient education. However, this should be regarded as a hypothesis requiring prospective evaluation, given the observational nature of the current findings and their very small effect sizes. In addition, it is reasonable to hypothesize that strengthening nurse–patient interactions should accompany the development of intra- and interprofessional collaboration in nursing, although this premise likewise requires prospective evaluation. Improvements in organization-, nurse-, and patient-related outcomes therefore require the parallel use of multiple quality indicators.

Future research is suggested to examine whether the associations between nurses' work satisfaction, nurse engagement, and patient experience identified in this study are also observed in other care environments and patient populations. Furthermore, further research is needed to link nurse engagement with patient outcomes such as pressure ulcer prevalence. Longitudinal and comprehensive studies may be particularly valuable to examine potential causal relationships between these factors and explore how organization- and work environment-related components of nurse engagement interact in shaping patient experience.

5. Conclusions

The results suggest that although nurses reported high levels of interprofessional collaboration, RN-to-RN collaboration, and overall work satisfaction, these factors were not consistently associated with higher nurse engagement or more positive patient experiences. However, patients reported a positive experience of their nursing care, especially in relation to nurses' courtesy, respect, and careful listening.

The results indicate that positive nurses' work satisfaction does not automatically translate into improved patient experiences and that nurses' and patients' perceptions of care quality may differ. These findings highlight the complexity of the relationships between nurses' work satisfaction, nurse engagement, and patient experience, suggesting that additional organizational, professional, and contextual factors may influence these outcomes. Further research is needed to clarify these relationships and their practical significance in different healthcare settings.

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CRediT authorship contribution statement

Kristiina Junttila: Writing – review & editing, Writing – original draft, Supervision, Investigation, Conceptualization. **Santtu Mikkonen:** Visualization, Methodology, Investigation, Formal analysis, Conceptualization. **Anu Nurmeksela:** Writing – review & editing, Writing – original draft, Investigation, Conceptualization. **Anniina Heikkilä:** Writing – review & editing, Writing – original draft, Investigation. **Terhi Lemetti:** Writing – review & editing, Writing – original draft, Investigation. **Susanne Salmela:** Writing – review & editing, Writing – original draft, Investigation. **Jaana Peltokoski:** Writing – review & editing, Writing – original draft, Investigation. **Tarja Tervo-Heikkinen:** Writing – review & editing, Writing – original draft, Project administration, Investigation, Funding acquisition, Conceptualization.

Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Supplementary materials

Supplementary material associated with this article can be found, in the online version, at doi:10.1016/j.ijnsa.2026.100725.

Appendix

Table A.

Table A
Path-specific total effects, direct effects and indirect effects with 95% bias-corrected bootstrap confidence intervals and two-tailed bootstrap significance values for outcomes with non-zero indirect effects.

Outcome	Predictor	Total effect (95% BC CI; p)	Direct effect (95% BC CI; p)	Indirect effect (95% BC CI; p)
Patient education	Fundamentals of quality nursing care	0.008 (0.004 to 0.013); p 0.002	0.000 (0.000 to 0.000); p —	0.008 (0.004 to 0.013); p 0.002
Patient education	Professional relevance	0.009 (0.004 to 0.014); p 0.002	0.000 (0.000 to 0.000); p —	0.009 (0.004 to 0.014); p 0.002
Patient education	Adequacy of resources and staffing	−0.049 (−0.076 to −0.022); p 0.003	−0.056 (−0.084 to −0.028); p 0.003	0.007 (0.004 to 0.012); p 0.001
Patient education	Professional development	−0.027 (−0.047 to −0.008); p 0.011	−0.034 (−0.054 to −0.013); p 0.006	0.006 (0.003 to 0.011); p 0.001
Patient education	RN-to-RN collaboration	−0.007 (−0.011 to −0.003); p 0.002	0.000 (0.000 to 0.000); p —	−0.007 (−0.011 to −0.003); p 0.002
Patient education	Autonomy	0.005 (0.002 to 0.009); p 0.002	0.000 (0.000 to 0.000); p —	0.005 (0.002 to 0.009); p 0.002
Patient education	Leadership access and responsiveness	0.008 (0.004 to 0.013); p 0.002	0.000 (0.000 to 0.000); p —	0.008 (0.004 to 0.013); p 0.002
Service recovery	Fundamentals of quality nursing care	0.006 (0.001 to 0.013); p 0.028	0.000 (0.000 to 0.000); p —	0.006 (0.001 to 0.013); p 0.028
Service recovery	Professional relevance	0.007 (0.001 to 0.014); p 0.031	0.000 (0.000 to 0.000); p —	0.007 (0.001 to 0.014); p 0.031
Service recovery	Adequacy of resources and staffing	−0.075 (−0.109 to −0.042); p 0.002	−0.081 (−0.119 to −0.047); p 0.002	0.006 (0.001 to 0.012); p 0.025
Service recovery	Professional development	0.005 (0.001 to 0.011); p 0.024	0.000 (0.000 to 0.000); p —	0.005 (0.001 to 0.011); p 0.024
Service recovery	RN-to-RN collaboration	−0.005 (−0.012 to −0.001); p 0.024	0.000 (0.000 to 0.000); p —	−0.005 (−0.012 to −0.001); p 0.024
Service recovery	Autonomy	0.004 (0.001 to 0.010); p 0.020	0.000 (0.000 to 0.000); p —	0.004 (0.001 to 0.010); p 0.020
Service recovery	Leadership access and responsiveness	0.006 (0.001 to 0.013); p 0.031	0.000 (0.000 to 0.000); p —	0.006 (0.001 to 0.013); p 0.031

Note:.
Estimates are standardized effects from the AMOS output.
Confidence intervals are 95% bias-corrected (BC) bootstrap intervals.
P-values are AMOS two-tailed bootstrap significance values.
The uploaded AMOS output reports 1000 usable bootstrap samples.
Only outcomes with non-zero indirect effects are included: Patient education and Service recovery.
An em dash indicates that AMOS did not report a p-value for a structurally zero effect.

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