





Development of a novel instrument to measure Japanese psychiatric nurses' technological competency as caring in nursing

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Abstract

Background: To effectively advance person-centered care (PCC) practice, it is important to equip healthcare providers with person-centered values and beliefs while simultaneously transforming their work environment to align with PCC. Thus, instruments to measure caring practice status in nursing competency for psychiatric-specific behavioral limitations, ethico-moral behavior, technology use, and PCC need to be developed.

Objective: This study developed the Technological Competency as Caring in Psychiatric Nursing Instrument (TCCNPNI) to measure practice status and test its content and construct validity.

Methods: Five different phases were followed: 1) Literature Review; 2) Operational definition of the construct and development of items; 3) Two-round Delphi method; 4) Validity measure; and 5) Reliability measure. The online survey was conducted in 2024.

Results: The developed instrument comprises 22 items with a 4-factor structure: competency to practice caring and person-centered care (Factor 1); competency to recognize and respond to ethical issues in psychiatry (Factor 2); competency to utilize technology in psychiatry (Factor 3); and competence to practice care for the preservation of human dignity and shared decision making (Factor 4). Cronbach's alpha for the entire scale was 0.864, while that for factors 1-4 was 0.911, 0.814, 0.773, and 0.64, respectively. Cumulatively, these four factors contributed 49.6% and explained nearly 50% of the total data. Item-total correlation values were 0.6 or higher among factors 1-3. However, factor 4, for which items were Q30, Q33, Q34, and Q35 ($r = 0.03, 0.04, 0.21, 0.11$, respectively), were inverted items and had low I-T correlation values. These low correlations suggest that these items capture different concepts. The developed TCCNPNI allows for the measurement of the practice of nursing as caring in psychiatry, the state of ethico-moral behavior, and the practice status of technological competency as caring in psychiatric nursing.

Conclusion: This study demonstrated satisfactorily and efficiently evaluated the practice status of technological competency in psychiatric nurses' caring. Measuring technological competency as caring in psychiatric nursing can be an important adjunct for in-service education in psychiatric hospitals or formalized nursing education in nursing universities.

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Keywords

Delphi method; psychiatric nursing; shared decision making; person-centered care; ethics; reliability; instrument development; Japan

Background

According to the Making Mental Health Count report from the Organization for Economic Co-operation and Development (OECD), Japan's mental healthcare system lags behind other OECD countries in terms of deinstitutionalization. The OECD average number of psychiatric beds is 68 per 100,000 people, while Japan has the highest number, with 269 beds per

100,000 people (Hewlett & Moran, 2014). In 2021, the average length of stay (LOS) in psychiatric hospitals in Japan was 275.1 days, compared to an average LOS of 27.5 days for all beds (Ministry of Health Labour and Welfare, 2023a). This is significantly longer than in other countries (Ministry of Health Labour and Welfare, 2018).

It has been reported that the long LOS in Japan is related to the country's involuntary hospitalization system and various

hospital characteristics, including whether the hospital is public or private, the number of inpatients, the aging of patients, the density of local psychiatric hospitals, and the availability of medical personnel (Imai et al., 2005; Shinjo et al., 2017). For financial reasons, Japan did not establish enough public hospitals, leading to the proliferation of private psychiatric hospitals to fill the gap. In 1958, a special exception was issued for psychiatric hospitals, allowing them to operate with fewer doctors and nurses than general hospitals (Setoya, 2012). As a result, the number of psychiatric hospitals and inpatients increased.

Japan's aging population and declining workforce are expected to lead to a shortage of nurses (Ministry of Health Labour and Welfare, 2023b). This shortage, combined with long-term hospitalization, contributes to difficulties in patient discharge, reduced opportunities for social participation, and increasing care needs due to the aging of patients (Ministry of Health Labour and Welfare, 2021). Consequently, challenges such as the need for increased physical treatment and decision-making for end-of-life care are anticipated to grow as patients who have been hospitalized for extended periods continue to age (Imaizumi, 2022).

To address these challenges, healthcare technology is gaining attention as a means to improve the quality of psychiatric care and mitigate the effects of the shortage of healthcare professionals (Dang et al., 2023; Mahara et al., 2023). Advances in medical technology have led to the development of various tools for clinical use (Hosseini et al., 2021; Pailaha, 2023; Zhang et al., 2024). When used appropriately, these technologies can reduce the effort required by healthcare providers and enhance the quality of patient care.

Medical technology is particularly helpful in psychiatry, supporting nurses in delivering higher-quality care (Zwijzen et al., 2012). However, some technologies, such as cameras used to monitor patients who are secluded or restrained as part of their treatment, can restrict patient behavior and raise concerns about privacy violations (Appenzeller et al., 2020). In light of these concerns, the World Psychiatric Association has issued a statement calling for the development of alternatives to restrictive practices to improve mental healthcare (Rodrigues et al., 2020).

Coercive measures in psychiatry are widely used despite a lack of clear evidence supporting their practicality, clinical benefits, or effectiveness (Huber et al., 2016; Kalisova et al., 2014). In Japan's psychiatric hospitals, unethical incidents, such as abuse by nurses, have occurred repeatedly (Imaizumi & Katsuki, 2023). In response, Japan's Mental Health Welfare Law was revised in April 2024. The updated law requires all personnel, not just medical staff such as doctors and nurses, working in psychiatric hospitals to report any suspected abuse of individuals with mental disabilities to the prefectural government (Ministry of Health Labour and Welfare, 2024a). Eren (2014) emphasized the need for additional training on psychiatric ethics for nurses, noting that factors such as inadequate staffing, excessive workloads, poor working environments, lack of supervision, and insufficient on-the-job training can contribute to unethical behavior. Starfield (2011) argued that both patients and healthcare providers must recognize health issues to support meaningful lives.

Patient-centered care (PCC) involves considering the characteristics of clinicians, clinician-patient relationships, and communication. It views the patient as a unique individual, adopting a biopsychosocial perspective, sharing patient information, involving patients and their families in care, empowering patients, and providing both physical and emotional support. It also integrates medical and non-medical care, promotes teamwork, ensures access to care, and emphasizes care coordination and continuity (Scholl et al., 2014). PCC focuses on respecting patients' dignity, values, and psychosocial context when making diagnostic and treatment decisions. However, PCC goes further by considering a patient's history, strengths, values, and beliefs not only for diagnosis and treatment decisions but to help patients live the life they desire. This emphasis on "personhood" has significant clinical implications (Dave & Boardman, 2018).

To advance PCC, healthcare providers must adopt person-centered values and beliefs and transform the work culture to reflect this approach (Balqis-Ali et al., 2022). While PCC is valued and operationalized through outcomes, it remains conceptual, leading to disparities in its interpretation and implementation across different healthcare systems (Byrne et al., 2020).

Given the above, instruments are needed to measure nursing competency in areas such as psychiatric-specific behavioral limitations, ethical and moral behavior, the use of technology, and patient- and person-centered care.

This study is significant because it aims to develop an instrument to measure technological competency in psychiatric nursing care in Japan. By assessing nurses' competence, the instrument can help provide more effective support for patients in psychiatric hospitals, where discharge is often complicated by various factors.

This study aimed to develop the Technological Competency in Caring in Psychiatric Nursing Instrument (TCCNPNI) to measure practice status and evaluate its content and construct validity.

Literature Review

Philosopher Mayeroff's (1971) caring theory, which focused on how caring affects others, influenced the development of the caring theory in nursing. Additionally, Roach (1987) concentrated on the caring practiced by nurses, emphasizing that caring is an intrinsic part of human life and that nursing involves a comprehensive understanding of the individual. Roach further identified the attributes of professional care as compassion, competence, confidence (trustworthiness), conscience (adherence to ethical standards), commitment, and comportment (thoughtful involvement and responsible action).

Mayeroff's (1971) ideas also influenced Boykin and Schoenhofer's (2001) Nursing As Caring theory, which emphasizes that nursing knowledge is embedded in specific nursing contexts and that significant experiences shared between nurses and recipients of care are integral to nursing practice. Carper's (1978) concepts support both the Nursing As Caring theory and the Technological Competency as Caring in Nursing (TCCN) theory. Carper identified four fundamental patterns of knowledge in nursing: (1) empirical, (2) aesthetic, (3) personal, and (4) moral and ethical.

[Locsin \(2005\)](#) developed the TCCN theory, also referred to as a “middle-range theory,” building upon Boykin and Schoenhofer’s foundational work. Locsin highlighted the importance of preserving humanity in technology-intensive healthcare environments to prevent the dehumanization of care recipients. Furthermore, [Locsin and Purnell \(2015\)](#) argued that competent nurses uphold personhood by thoroughly assessing and engaging patients as active participants rather than passive recipients of care.

According to [Locsin’s \(2005\)](#) Technological Competency as Caring in Nursing (TCCN) theory, technological competence is regarded as a critical skill for providing care. Therefore, it is essential to assess whether expert nurses demonstrate competence when utilizing care technologies. The five assumptions of Locsin’s theory ([Locsin & Purnell, 2015](#)) are as follows: (1) persons are caring by virtue of their humanness ([Boykin & Schoenhofer, 2001](#)); (2) the ideal of wholeness represents a perspective of unity ([Locsin, 2005](#)); (3) knowing persons as caring is a multidimensional process ([Locsin, 2005](#)); (4) health and nursing technologies are vital components of caring ([Locsin, 2005](#)); and (5) nursing is both a discipline and a professional practice ([Boykin & Schoenhofer, 2001](#)).

[Locsin and Purnell \(2015\)](#) also emphasize the importance of a technology-based empirical scientific understanding. They introduced the concept of the Universal Technological Domain, which situates nursing encounters within the context of nursing processes. These nursing encounters and caring processes create new environments for nurses and patients, fostering shared experiences where caring takes place. Such processes can promote environments conducive to person-centered care (PCC). Practicing person-centeredness is essential for building therapeutic relationships among professionals, patients, and significant others ([McCormack & McCance, 2006](#)). This concept aligns with established nursing literature that places the “person” at the core of therapeutic care.

Nurses’ competency in supporting patient self-determination is particularly important in psychiatric care. For example, shared decision-making enhances self-determination. Achieving shared decision-making requires effective information-sharing and establishing a strong therapeutic relationship in clinical settings. This enables patients to consider and articulate their preferences and opinions during the decision-making process ([Elwyn et al., 2012](#)).

A positive organizational climate enhances employee productivity and job satisfaction, leading to a culture of effective communication ([Hardjana, 2006](#)). Conversely, organizational abuse is a serious issue with significant repercussions for both individuals and organizations ([Salter & Richters, 2012](#)). In psychiatric units, behavioral restrictions are often necessary to ensure the safety of patients and staff when patients pose a risk of harm to themselves or others. However, inappropriate or excessive behavioral restrictions can lead to human rights violations and are associated with psychological burdens and conflicts for nurses working in psychiatric settings ([Bigwood & Crowe, 2008](#)).

[Madhiwalla et al. \(2018\)](#), in their study on contempt and abuse during childbirth, described how healthcare providers in public hospitals may exercise power over vulnerable patients

who are susceptible to violence and external influences. Similar structural patterns of abuse have been observed historically in psychiatric care ([Driever et al., 2022](#); [Jenkin et al., 2022](#)). This underlines the importance of both individual ethics and organizational culture in preventing abuse.

This discussion shifts to the status of existing scales informed by the Technological Competency as Caring in Nursing (TCCN) theory. Locsin’s Technological Caring Instrument (TCI), published in 1999, contains two factors with eight and two items, respectively. The Technological Competency as Caring in Nursing Instrument (TCCNI), consisting of 25 statements reflecting the theory’s five assumptions, was translated into Japanese and revised by [Tanioka \(2018\)](#), resulting in the TCCNI-Revised.

Kato and colleagues ([Kato et al., 2017a](#); [Kato et al., 2017b](#)) developed the Perceived Inventory of Technological Competency as Caring in Nursing (PITCCN) for intensive care unit nurses. [Ito et al. \(2019\)](#) confirmed that the instrument was reliable and valid for a sample of Japanese nurses who provided acute care. The PITCCN consists of four factors: training nurses to provide optimal care (Factor 1); intentional and ethical nursing of a person (Factor 2); utilization of information obtained from technology and continuously developing knowledge (Factor 3); and empirical knowledge and knowing the wholeness of patients (Factor 4).

The Japanese version of the TCCNI-R, developed by [Yokotani et al. \(2021b\)](#), includes four factors: nursing expressions as caring (Factor 1), technological competency as caring (Factor 2), technology and caring (Factor 3), and technological knowledge (Factor 4). In addition, [Yokotani et al. \(2021a\)](#) confirmed the construct validity and reliability of its English version and are developing the TCCNI Revised with Practice (TCCNI-RePract), which consists of four factors: (1) knowing the person (8 items); (2) technological competency as caring (6 items); (3) technology and caring (4 items); and (4) expression of nursing as caring (3 items).

Methods

In order to create a new instrument to assess the TCCN theory-based practice status of psychiatric nurses, we followed a procedure adapted from [Spector \(1992\)](#) and [DeVellis \(2017\)](#): (1) defining the construct, (2) generating an item pool, (3) designing the instrument, and (4) conducting a psychometric evaluation.

Phase 1: Construct Definition

After comparing and analyzing the structures, four significant constructs that overlapped with many instruments were found to be relevant for further investigation. Consequently, these were defined operationally and were employed in the study.

The operational definitions of these constructs are as follows:

Competency to Practice Caring and Person-Centered Care: Psychiatric nurses must provide consistent care based on individuals’ needs, preferences, and values. This competency entails particular actions and procedures that guarantee the patient takes an active role in their care and that every step of the care process considers their unique situation.

Competency to Recognize and Respond to Ethical Issues in Psychiatry: The ability of a psychiatric nurse to carefully recognize, evaluate, and handle moral dilemmas that come up in clinical settings. This skill entails using ethical concepts consistently to ensure that decisions about patient care respect patient autonomy, promote justice, and put the patient's welfare first while also taking professional and regulatory standards into account.

Competency to Use Technology in Psychiatry: The ability of a psychiatric nurse to effectively incorporate technology into healthcare settings to improve clinical outcomes and patient care and guarantee the safe and ethical handling of patient data. Adequate use of digital assessment tools and other pertinent technology in the psychiatric field is a component of this competency.

Competence to Practice Care for the Preservation of Human Dignity and Shared Decision-Making: This is the ability of a psychiatric nurse to integrate a collaborative, patient-centered decision-making process with ethically sound and compassionate care that preserves the patient's inherent dignity. This policy also guarantees that a psychiatric nurse actively engages the patient in treatment decisions while simultaneously respecting their autonomy, uniqueness, and rights.

After establishing and defining each construct operationally, items were developed for each construct. Some items were adapted from the previous instruments (Kato et al., 2017a; Miyamoto et al., 2017; Parcels & Locsin, 2011; Yokotani et al., 2021a; Yokotani et al., 2021b), while the rest of the items were created by the researchers based on the operational definition of the constructs.

Phase 2: Generating an Item Pool

A comprehensive literature review was conducted to develop an item pool for the instrument. The review revealed that there are many components or constructs. It is crucial for this study to assess the TCCN among psychiatric nurses; hence, open-ended items might not be appropriate for use in this context. Similarly, it was decided that the tools intended to be completed by an external observer to assess the competencies of psychiatric nurses were inappropriate. This is because an instrument requiring psychiatric nurses to evaluate their TCCN is being sought. However, no instrument was found to measure practice status based on the TCCN theory, including the perspectives of PCC, shared decision-making, ethical and moral aspects, and organizational climate in psychiatry; thus, the researchers decided to develop one.

Phase 3: Designing the Scale

The initial 67 items were subjected to a two-round Delphi method to assess the suitability of the items. Five experts were employed, including three researchers with previous experience in scale development and doctoral degrees, one nursing administrator with a master's degree, and one graduate student engaged in research on the TCCN theory in a master's program, were requested to review the questionnaire items and provide their opinions on the questions and their content. The wording was modified based on the aforementioned researchers' opinions, and additional questions were added. The wording of the 67-item questionnaire was reviewed and reduced to 61 items. The

purpose of inserting the inverted items into the survey questions was to exclude those who answered dishonestly and provide better coverage of the measured construct. In particular, we included the use of the inverted questions (of the 67 items, 7 were inverted items) for "competency to practice care for the preservation of human dignity and shared decision making" to determine whether or not respondents were acting ethically and morally in this survey.

Phase 4: Psychometric Evaluation

Psychometric evaluation was performed by conducting validity measures, such as content and construct validity, and reliability measures, using Cronbach's alpha and item-total correlations. For content validity, the questionnaire contents were examined by 13 individuals, including five researchers with doctoral degrees, three specialized psychiatric nurses, and five certified nurses working in psychiatric departments. In addition, the item-level content validity index (I-CVI), which indicates the validity of individual questions in the instrument, and the scale-level content validity index (S-CVI), which suggests the content validity of the entire instrument, were measured to verify content validity. Validity was evaluated on a 4-point Likert-type scale (1 = not relevant, 2 = somewhat relevant, 3 = quite relevant, and 4 = very relevant) (Yusoff, 2019). The evaluation was conducted twice by the 13 experts.

Exploratory factor analysis (EFA) was conducted to assess construct validity. The maximum likelihood method was used for factor extraction, and the Promax method with Kaiser normalization was used as the rotation method.

After factor analysis, Cronbach's alpha coefficients were calculated for the factors and the scale as a whole to assess its internal consistency. In item analysis, an item-total correlation was calculated for each item of a scale or test to diagnose the degree to which assessment items indicated the underlying trait.

Data Collection Procedure

Convenience sampling was used to conduct a cross-sectional survey. We selected 63 psychiatric hospitals in Osaka Prefecture from the Japan Psychiatric Hospitals Association website and asked them to participate in this study. Of these, 21 hospitals cooperated.

A survey subject request form was distributed by a head nurse to psychiatric nurses at facilities that cooperated in the study. The candidates for survey cooperation read the text and considered research cooperation. The participants accessed the web-based survey system using a QR code on the provided request form and provided consent by checking the appropriate box.

The survey instrument was divided into two parts: The first part is the face sheet, which includes questions regarding age, sex, highest education in nursing, position, years of nursing experience and experience in psychiatric nursing, and current department (psychiatric emergency ward, psychiatric acute care ward, psychiatric treatment ward, dementia treatment ward, and special disease treatment ward).

The second part involves the evaluation of TCCNPNI, wherein the practice status (37 items) regarding technological competency, such as caring in psychiatric nursing, was evaluated by the practice status using the following Likert scale (1: not at all, 2: almost not 3: not very much, 4: undecided

5: somewhat 6: fairly much, 7: always) (Tabachnick & Fidell, 2007). Statements (Q30, Q34, Q35, Q36) were negatively worded. The online survey was conducted from May 8 to June 30, 2024.

Data Analysis

IBM SPSS version 29 was used to analyze the data. Mean and standard deviations for each item were calculated to confirm ceiling effects (mean + SD >7) and floor effects (mean - SD <1), and 95% confidence intervals were calculated. The modification criteria for the preliminary question items were set as I-CVI > 0.70 (Lynn, 1986) and S-CVI > 0.90 (Polit & Beck, 2006). An I-CVI and S-CVI exceeding 90% indicated that 90% of the expert panel judged each question or all as valid.

Sampling adequacy was assessed using the Kaiser-Meyer-Olkin (KMO) test, with values less than 0.06 considered good (Li & Lopez, 2007). Bartlett’s sphericity test was used to examine the null hypothesis that the variables were uncorrelated in the population (p <0.05) (Tabachnick & Fidell, 2007). EFA with the maximum likelihood method was applied for factor extraction, and the Promax method with Kaiser normalization was used as the rotation method. Factor loading coefficients of 0.40 and higher were recognized as the criterion for retention.

Ethical Considerations

The research’s aim was explained to the respondents, and their cooperation was voluntary. Those who consented by checking a box on the web-based questionnaire tool were considered research subjects. This study was approved by the Research Ethics Review Committee of the Baika Women’s University (Approval No. 2023-0253). All responses were kept confidential, and the data collected were used solely for the purposes of this research.

Results

Demographic Characteristics of the Participants

Of the data obtained from 502 respondents (25.2% response rate), missing values were excluded, and 425 responses (84.6% valid response rate) were analyzed. The participants’ demographics were: 282 (66.4%) women, 139 (32.7%) men, 339 (79.8%) staff nurses, and 338 (79.5%) vocational school graduates. The mean age was 41.1 years, with an average of 14.7 years in nursing and 11.5 years in psychiatric nursing.

Table 1 shows the descriptive statistics.

Table 1 Demographic characteristics of the participants (N = 425)

Demographic characteristics		n	%
Gender	Male	139	32.7
	Female	282	66.4
	No response	4	0.9
Assigned department	Psychiatric Emergency Inpatient Unit (Super Emergency Unit)	27	6.4
	Psychiatric Acute Care Unit	89	20.9
	Psychiatric Care Unit	80	18.8
	Dementia Care Unit	66	15.5
	Special Disease Unit	13	3.1
	General Psychiatric Unit	150	35.3
Position	Staff nurse	339	79.8
	Nurse Manager	36	8.5
	Chief Nurse	40	9.4
	Director of Nursing	4	0.9
	Other	6	1.4
Educational levels	Vocational school (Nursing)	338	79.5
	Junior college (Nursing)	22	5.2
	University (Nursing)	43	10.1
	Master of science of nursing	1	0.2
	High school nursing advanced	21	4.9
Experiences of the participants		Mean	SD
	Age (Years old)	41.1	11.5
	Number of years of nursing employment	14.7	11.0
	Number of years of psychiatric nursing experience	11.5	9.0

Validity Measure Results

Content Validity Results

Content validity was evaluated in two rounds. In the first round, 21 out of 61 items were removed due to an item-level content validity index (I-CVI) below 0.70. Additionally, four items were discarded because their mean difficulty and readability scores were below 3. In the second round, 36 items achieved an I-CVI of 0.70 or higher. However, one item with an I-CVI of 0.70 or lower was retained, as it was considered important for the assessment. As a result, 37 items were selected for inclusion.

Construct Validity Results

The KMO was 0.913, and Bartlett’s test showed p <0.001. No ceiling and floor effects were found. EFA revealed four factors in the 22-item TCCNPNI (Table 2). After sequentially excluding factors with factor loadings of 0.4 or higher, 15 items (Q3, Q9, Q10, Q11, Q12, Q14, Q17, Q22, Q24, Q25, Q26, Q27, Q28, Q29 and Q37) were excluded, resulting in 22 items. Factor 1 was the competency to practice caring and person-centered care (10 items), Factor 2 was the competency to recognize and respond to ethical issues in psychiatry (5 items), Factor 3 was the competency to utilize technology in psychiatry (3 items), and Factor 4 was the competence to

practice care for the preservation of human dignity and shared decision making (4 items). Factor 4 statements were worded negatively.

Reliability Measure Results

The Cronbach's alpha for the entire scale was 0.864, while that for Factors 1-4 was 0.911, 0.814, 0.773, and 0.64, respectively.

Table 2 Means, standard deviations, 95% confidence intervals, and factor loadings of the 22-item TCCNPNI (N = 425)

Item No.	Item Statement	Mean	SD	95% CI		Factor Loadings
				LL	UL	
Factor 1: Competency to practice caring and person-centered care						
4	I care for the person who needs care, not just the disability or illness.	5.46	0.93	5.38	5.56	0.857
6	I encourage patients who are suffering to express their thoughts and feelings.	5.42	0.94	5.33	5.51	0.781
1	I always care for patients with compassion, regardless of whether they are conscious or not.	5.85	0.91	5.77	5.94	0.773
5	I engage with the patient to build a deep relationship of trust.	5.26	1.07	5.16	5.35	0.755
7	I listen to the patient's complaints in nursing situations of behavioral restrictions.	5.42	0.97	5.32	5.50	0.641
23	I give the utmost consideration to the patient's human rights even in situations where the patient has difficulty making self-decisions due to psychiatric symptoms.	5.40	1.02	5.30	5.49	0.612
36	I carefully provide explanations to enable patients to make self-decisions.	5.50	0.96	5.40	5.59	0.595
8	I deal with my feelings toward the patient appropriately.	5.14	1.01	5.05	5.24	0.592
16	I pay attention to the patient's life problems as well as their psychiatric symptoms.	5.49	0.97	5.39	5.58	0.568
32	I represent the wishes of patients who cannot say what they want to say.	4.89	1.03	4.80	4.99	0.490
<i>Cronbach's alpha coefficient = 0.911</i>						
Factor 2: Competency to recognize and respond to ethical issues in psychiatry						
19	I encourage my colleagues in the workplace to speak their minds freely.	5.09	1.31	4.96	5.22	0.821
20	I prevent any kind of abuse in my organization and workplace.	5.17	1.22	5.06	5.29	0.780
18	I understand the ward's workplace culture against behavioral restrictions and works to improve it.	4.96	1.30	4.83	5.08	0.713
21	I warn my colleagues when they use abusive language toward patients.	4.44	1.48	4.30	4.58	0.673
31	I always report abuse when I see it.	4.28	1.60	4.14	4.44	0.417
<i>Cronbach's alpha coefficient = 0.814</i>						
Factor 3: Competency to utilize technology in psychiatry						
13	I use technology to correctly assess the patient's condition.	4.76	1.28	4.62	4.88	1.011
2	I use technology in nursing care to know my patients.	4.88	1.16	4.76	4.99	0.653
15	I adopt new technology into my nursing practice.	3.80	1.39	3.66	3.92	0.509
<i>Cronbach's alpha coefficient = 0.773</i>						
Factor 4: Competence to practice care for the preservation of human dignity and shared decision making						
*33	I intervene, even if I have to forcefully inject, with patients who refuse to take their medication.	4.87	1.44	4.73	5.02	0.589
*35	I prioritize the safety of nurses and limit the behavior of violent patients.	3.94	1.42	3.80	4.08	0.559
*34	I intervene with patients who refuse to take their medication to administer it by adding it to their food or drink in an unannounced manner.	4.76	1.66	4.61	4.92	0.550
*30	I encourage patients who are at high risk for falls to be physically restrained to ensure their safety and prevent recurrence.	4.75	1.58	4.61	4.91	0.527
<i>Cronbach's alpha coefficient = 0.64</i>						

Cronbach's alpha for the entire scale = 0.864.

*Negatively worded statements.

SD = Standard Deviation, CI = confidence interval; LL= lower limit; UL = upper limit.

Item-total correlation values of 0.6 or higher were used, but Q30 (r = 0.03), Q33 (r = 0.04), Q34 (r = 0.21), and Q35 (r = 0.11) were inverted items and had low item-total correlation values.

The questionnaire is a 7-point Likert scale value (1: not at all, 2: almost not 3: not very much, 4: undecided 5: somewhat 6: fairly much, 7: always).

Factor extraction method: Maximum likelihood method.

Rotation method: Promax with Kaiser normalization.

Promax rotation is an oblique rotation. This allows factors to be correlated. Factors 1, 2, and 3 show correlations. However, Factor 4 was not correlated with the other factors.

The contribution rates for factors 1 to 4 were 31.7%, 7.2%, 5.3%, and 5.5%, respectively, with a cumulative contribution rate of 49.6% (Table 3).

Table 3 Factor correlation matrix and summary of factor statistics

Factor Correlation Matrix	F1	F2	F3	F4	% of Variance	Cumulative Contribution Rate %
1. Competency to practice caring and person-centered care	1	0.657	0.587	0.049	31.674	31.674
2. Competency to recognize and respond to ethical issues in psychiatry	0.657	1	0.481	-0.027	7.212	38.885
3. Competency to utilize technology in psychiatry	0.587	0.481	1	-0.029	5.271	44.156
4. Competence to practice care for the preservation of human dignity and shared decision making	0.049	-0.027	-0.029	1	5.477	49.633

Discussion

The sample size was sufficient to perform EFA based on KMO and Bartlett's results. For Item 13, the third factor's loading was greater than 1. This may be due to the Promax method (Finch, 2011).

The developed TCCNPNI comprised 22 items across four factors. The cumulative contribution of these four factors was 49.6%, explaining almost 50% of the total data. Item-total correlation is the correlation between an item and the item total. A high correlation for each item indicates good alignment with the overall scale (WorldSupporter, n.d.). I-T correlation values were 0.6 or higher among Factors 1-3. However, Factor 4, for which items were Q30 ($r = 0.03$), Q33 ($r = 0.04$), Q34 ($r = 0.21$), and Q35 ($r = 0.11$), were inverted items and had low I-T correlation values.

The first factor is "competency to practice caring and person-centered care." Psychiatric nurses are responsible for providing consistent care specific to individuals' needs, preferences, and values. This competency entails particular actions and procedures that guarantee the patient takes an active role in their care and that every step of the care process considers their unique situation.

PCC is an approach that focuses on treating individuals holistically and respecting their values, preferences, and needs (American Geriatrics Society Expert Panel on Person Centered Care et al., 2016). Byrne et al. (2020) describe its components, such as values, respect, compassion, empathy, communication, and non-judgmental behavior. In addition, holistic caring includes elements such as compassion, faith, hope, trust, relationships, teaching, learning, and listening. The connection between the concept of PCC and caring in nursing has been reported (McCormack & McCance, 2006), and it is essential for improving mental health care.

PCC reduces agitation, depression, and neuropsychiatric symptoms and improves the quality of life for patients with dementia (Kim & Park, 2017). The number of patients who are hospitalized with psychiatric disorders has decreased compared with 15 years ago (from approximately 345,000 in 2002 to 302,000 in 2017 (Ministry of Health Labour and Welfare, 2024b); in contrast, dementia (such as Alzheimer's disease) has increased approximately 2.6 times across the same period. Competency to practice PCC is critical for patients with dementia as well as for those with other psychiatric disorders. The second factor, "competency to recognize and respond to ethical issues in psychiatry," includes items that carefully recognize, evaluate, and handle moral dilemmas that arise in clinical settings.

The current psychiatry situation in Japan needs to address ethical issues (Sato & Takimoto, 2023), improve organizational culture, provide caregiving through shared decision-making rather than forced treatment, and enhance PCC. This competence entails consistently using ethical concepts to ensure that decisions about patient care respect patient autonomy, promote justice, and prioritize patient welfare while also considering professional and regulatory standards. Nurses working in psychiatric wards should have a deep understanding of the technology used in psychiatric hospitals and high ethical sensitivity and moral sensibility (Chieze et al., 2021). The ethical dimension governs the moral rationality from which care actions are chosen and performed in nursing practice. Moral rationality is based on holistic

understanding, truthfulness, and compassion as normative principles that address nurses' obligations to serve human vulnerability and the global population (Kim, 2012). Ethical standards provide a sense of what is good, desirable, and right and what must be done to preserve life, mitigate suffering, and promote health based on the professional's personal, institutional, and humanistic values of the profession (Varkey, 2021).

Current approaches to nursing knowledge will inevitably continue to change over time as society's values and resources change (Chinn & Kramer, 2014). In modern society, the role of nurses is complex and challenging. Limited resources, regulations, technology, and professional and personal integrity frequently lead to ethical dilemmas and difficult decisions. As a result of developments in healthcare, the nursing profession is facing more significant challenges, and the changes in societal values that have influenced it are evident (Mazuecos et al., 2023; Scanlon & Fleming, 1987).

The third factor, "competency to utilize technology in psychiatry," pertains to effectively incorporating technology into healthcare settings to improve clinical outcomes and patient care and guarantee the safe and ethical handling of patient data. The content validity reviews by the psychiatric experts excluded technology-related items. Although a great deal of technology is used in healthcare, professionals have little awareness regarding its definition. Therefore, awareness about the benefits of nursing technology and its usefulness needs to be raised.

Adequate use of digital assessment tools and other pertinent technology is a component of this competency. Using technology enables nurses to improve care and make patients feel more comfortable (Altmiller & Pepe, 2022). It is also essential to improve the quality of nursing care and the quality of life of patients. Several studies on technology in nursing have investigated Information and Communication Technology, robotics, sensor technology, and e-learning (Krick et al., 2019). However, in technology-intensive environments, a risk of dehumanizing care recipients exists (Byrne et al., 2020). Therefore, the results of the responses to the scale may provide insights into the effective use of technology. The TCCN theory (Locsin, 2005) addresses three phenomena: "being cared for," "caring for," and "technology." Being cared for refers to the patient's experience. Caring is based on the nurse's experience. Technology can bring the patient closer to the nurse, which allows the nurse to know the patient as a whole and compete as a person living caring uniquely and capable of growing in caring.

Nurses need to focus on caring as a shared lived experience between nurses and the person being cared for rather than fixing the person or filling in missing parts of the person (Locsin & Kongsuwan, 2013). The universal domain of what it means to be human is influenced by the existence of technology as a significant aspect of the domain (Locsin & Purnell, 2015). In addition, nurses can come to know the person by knowing indicators of physical status by using technologies such as blood pressure monitors, thermometers, electrocardiograms, x-rays, computed tomography, blood test results, and infusion pumps (Petiprin, 2023). Those indicators help us understand how the person is in relation to the environment. Additionally, technology in psychiatry, such as cameras to monitor seclusion and restraints, is used by providers to improve the in-depth understanding of patients

and ensure patient safety (Dewa et al., 2023; Shetty et al., 2024).

Factor 4, "competence to practice care for the preservation of human dignity and shared decision making," includes items that refer to the ability to actively involve patients in decision-making while providing care informed by a thorough understanding of moral and ethical concepts. This competency guarantees that decisions about patient care conform to the patient's beliefs and preferences as well as the ethical norms of the professional.

Participation is defined as the degree to which the healthcare team respects and facilitates the involvement of patients and those close to them in their healthcare. These interpersonal behaviors include providing the person with understandable information and exploring expectations and concerns for health and well-being. It includes sharing decisions, agreeing, and implementing a care plan together to meet patients' health status and care needs (Strachan et al., 2020). Achieving shared decision-making depends on building rapport in the clinical encounter to facilitate information sharing; in this process, patients are supported to consider and express their preferences and views (Elwyn et al., 2012). When psychiatric nurses prioritize the emotional aspects of decision-making alongside mental health conditions, patients are empowered in their recovery journey (Okumura & Katsuki, 2024).

Moral responsibility and the values that guide moral responsibility and professional behavior promote the well-being of patients with psychiatric illness through indicators that measure, contribute to, and ensure warmth and humanized quality of care (Suazo et al., 2020). The developed TCCNPNI was used to measure items intended by the conceptual framework. Based on the above, it was considered that the developed TCCNPNI could measure psychiatry-specific practice situations, which is not possible with the existing TCCN theory-based scale.

The high correlation between the factors of Factor 1 (Competency to practice caring and person-centered care), Factor 2 (Competency to recognize and respond to ethical issues in psychiatry), and Factor 3 (Competency to utilize technology in psychiatry) can be interpreted as the commonality of these factors in terms of content. Only Factor 4 (competence to practice care for the preservation of human dignity and shared decision-making) was interpreted as a factor with a completely different concept because no correlation was observed.

A previous study by Kato and colleagues (Kato et al., 2017a; Kato et al., 2017b) reported that the PITCCN aimed to measure intensive care unit nurses' perceptions of TCCN, and its fourth factor (Q12, Q13, Q14, Q15, and Q22) were all inverted scales (Miyamoto et al., 2017). Miyamoto et al. (2017) analyzed the PITCCN in ICUs, where many patients have lost part of their bodily functions or are unconscious. Kato et al. (2017a) focused on developing and validating the perceptions and behaviors status of TCCN among acute care nurses using the PITCCN.

For this reason, the content of the TCCNPNI was prepared in such a way that it can confirm whether patients are understood as irreducible and unforeseen persons and whether their dignity is protected and ethically valued.

The fourth factor of the TCCNPNI in this study is the ability to avoid impersonal interactions with subjects who have difficulty in self-determination due to psychiatric symptoms and to practice human rights protection by recognizing them as irreplaceable persons. As a basic idea of the TCCN theory (Locsin, 2005; Locsin & Purnell, 2015), knowing persons as caring is appreciated as a process of caring in nursing, and human beings are complete and integrated beings at every moment. The PITCCN and TCCNPNI, which were developed based on Locsin (2005) theory of TCCN, were found to have some similarities.

It is particularly important to note that Factor 4 is an essential technical skill in psychiatric nursing. We included inverted items in this factor to better understand whether psychiatric nurses practice these skills. Although Factor 4 showed low contribution rates and Cronbach's alpha coefficient, we considered retaining it to gain insights into psychiatric nurses' actual practice.

The reason for this is that reverse-worded (RW) items are very common in Likert scales, but they have a serious drawback: RW items may contaminate the factor structure of the instrument. When both negative RW items are included, some participants may give inconsistent responses owing to the ambiguity of the reversal of positive items, while others may provide inconsistent responses because of judgment difficulties or careless responses to negative items (Kam, 2023; Zhang et al., 2016). Therefore, it will be necessary to repeat the survey in the future using a questionnaire that does not include RW items to assess its impact. Future research is necessary to validate the theoretical framework further using confirmatory factor analysis.

Limitations of the Study

This study included nurses from psychiatric hospitals in Osaka Prefecture, Japan. It is necessary to increase the population size further and conduct confirmatory factor analyses in the future. Additionally, this study successfully developed an instrument, but the problems with reverse wording items and the relatively low Cronbach's alpha for Factor 4 may reduce the reliability of the instrument.

Implications

TCCN in psychiatry involves knowing the person, knowing the person as caring and practicing caring in nursing. The importance of this study is to increase the number of nurses who can practice psychiatric nursing as caring based on ethical and moral understanding and judgment through the development of the TCCNPNI. Developed TCCNPNI could contribute to the design and testing of contents of a person-centered in-service education program that incorporates the understanding of technological competence as an expression of caring in nursing. In in-service education, incorporating TCCNPNI items into educational content allows the testing and development of education based on TCCN theory. The developed TCCNPNI enables us to examine the contents of in-service education and evaluate its effectiveness. Increasing the number of nurses who act ethically and morally and minimize behavioral restrictions can lead to more effective psychiatric nursing care. This will lead to the development of psychiatric nurses' skills, making them capable of advanced nursing practices based on high ethical standards; as a whole,

this will contribute to the improvement of the quality of patient care services.

Conclusion

The developed TCCNPNI comprises 22 items with a 4-factor structure. This study demonstrated satisfactory validity and efficiently evaluated the state of practice of technological competency in psychiatric nurses' caring. Nurses must have the expertise to use innovative technology. Simultaneously, nurses must develop the competency to manage technology and to know persons as caring. Without a proper understanding of technology in psychiatry, there is a risk of dehumanizing patients. In this sense, it is important to foster the ability to feel empathy with the patient, respect the patient's experience, and provide care that helps to fulfill the patient's hopes and dreams. The developed TCCNPNI allows for the measurement of the practice of nursing as caring in psychiatry, the state of ethical and moral behavior, and the practice of technological competency as caring in psychiatric nursing. The measured technological competency in psychiatric nursing may be useful for in-service education in general and psychiatric hospitals and formal education in nursing universities.

Declaration of Conflicting Interest

All authors have declared no actual or potential conflict of interest.

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Authors' Contributions

All authors made substantial contributions to conceptualization, data collection, and data interpretation. They read and approved the final version of the manuscript, agreeing to be accountable for all aspects of the work and ensuring that any concerns about the accuracy or integrity of any part of the work are appropriately addressed. All authors drafted the manuscript and critically revised it for intellectual content.

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Data Availability

The data presented in this study are available on request from the corresponding author. The data are not publicly available due to privacy and ethical restrictions.

Declaration of Use of AI in Scientific Writing

Nothing to disclose.

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