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Artificial Intelligence Adoption and its Influence on Professional Identity among Clinical Nurses in Riyadh: A Cross-sectional Survey

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Abstract

Background: The growing integration of artificial intelligence (AI) into clinical practice is reshaping the roles and responsibilities of nurses, raising questions about how this technological shift influences their professional identity. While prior research has largely examined technology acceptance or patient-level outcomes, less attention has been paid to how AI adoption relates to the professional dimension of nursing practice.

Aim: This study examined the artificial intelligence integration among clinical nurses in Riyadh and its association with their professional identity.

Methods: A quantitative, descriptive cross-sectional research design was employed using a structured, self-constructed, validated questionnaire (Cronbach's $\alpha = 0.751$) distributed via Google Forms. A total of 278 registered clinical nurses from four hospitals in Riyadh, Saudi Arabia were selected using convenience sampling technique. AI adoption was measured across four dimensions (frequency of use, perceived usefulness, ease of use, and integration into daily practice), and professional identity was measured across four dimensions (self-perception, role clarity, professional values, and perceived autonomy), each using 5-point Likert scales. Data were analyzed using descriptive statistics, Pearson r correlation, independent-samples t-tests, and one-way ANOVA.

Results: Findings have shown that clinical nurses demonstrated a moderate overall level of AI adoption ($M = 2.975$), with perceived usefulness rated highest and integration into daily practice rated lowest. Nurses reported a high overall level of professional identity ($M = 3.763$), driven most strongly by perceived autonomy, followed by self-perception and professional values, while role clarity was comparatively weaker. A moderately strong, positive correlation was found between AI adoption and professional identity ($r = 0.5168$, $p = 0.001$). Significant differences in AI adoption and professional identity emerged across age group, years of clinical experience, and unit of assignment, but not by gender or educational attainment.

Conclusion: AI adoption among clinical nurses does not appear to erode professional identity; rather, greater exposure to AI-driven technologies is associated with a stronger sense of professional identity, particularly through perceived usefulness and autonomy. Role clarity remains an area requiring institutional attention. Structured training, clear role communication, and AI literacy initiatives are recommended to support nurses' professional identity as AI integration in clinical settings continues to expand.

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Keywords: Artificial intelligence Integration, Professional identity, Clinical nurses, Perceived usefulness, perceived autonomy, role clarity

1. Introduction

The integration of AI driven technologies by healthcare services is becoming a widespread phenomenon in the current era where artificial intelligence poised to prominent part in the field of medicine. Artificial intelligence (AI) refers to the ability of the machines to imitate the human intelligence. It transforms technologies by giving powers on it through enabling computers to learn from the available data, create decisions or reasoning and solves the problems. It focuses on building smart machines which

has the ability to perform task naturally requiring human intelligence (Glover, 2026) ^[14]. In the context of nursing profession, artificial technologies have become increasingly used to provide better patient care. Primarily, the clinical application such as patient monitoring system, electronic medical records, and clinical decision supports (Jiang *et al.*, 2017) ^[18]. These AI driven technologies reshape the clinical nurse's traditional roles and responsibilities; hence, these innovations influence how clinical nurses engage with their practice and perceive their professional nurse identity. Professional identity is multifaceted phenomenon that involves acquiring professional values, competencies, beliefs, and roles that defines nursing practice. It is developed through a constant interplay between education and clinical experience. According to Omar (2025) ^[27], professional identity is the image being built in the workplace that includes style, values and impact. It's what an individual is trying to show, to offer and what others to see. These are what it shapes the identity. Professional identity for nurses is critical for ensuring high-quality patient care while fostering ethical standards and professional autonomy. However, the artificial intelligence-based technologies bring a paradigm shift that may redefine the scope of nursing roles, especially when making clinical decisions. Meanwhile, the adoption of artificial intelligence in the clinical practice offers opportunities and challenges for clinical nurses. Indeed, the AI can enhance clinical effectiveness, reduce work overload and positively impact patient's results. On the other hand, it may cause role ambiguity, diminished autonomy, and concern regarding the possibility of being replaced by AI technology (Buchanan *et al.*, 2020a) ^[4]. This concern is relevant due to nursing connections where nursing identity is closely tied to interpersonal relations, critical thinking and comprehensive care. Consequently, the integration of AI may create tension between technological reliance and professional self-concept.

Nurse perceptions and acceptance of AI technologies are influenced by various issues such as tech readiness, perceived usefulness, organizational support, and previous experience with these technologies (Venkatesh *et al.*, 2023). Studies have indicated other people demonstrated unwillingness towards AI due to fear of deskilling and loss of professional relevance (Shinners *et al.*, 2021) ^[29]. Despite the growing studies with the use of AI technologies, there is a lack of knowledge exists especially how adopting AI influence professional identity of clinical nurses. Many studies have focus on technological acceptance or its effects on patient with less emphasis on professional dimension of AI integration. This existing gap underscores the importance of conducting this study. Thus, it is crucial to examine not only the AI adoptions but its implications on nursing professional identity.

1.1. Aim

This study aims to examine the level of artificial intelligence adoption and its influence to professional identity among clinical nurses.

1.2. Hypotheses

H1: Artificial intelligence adoption is not significantly associated with the professional identity of clinical nurses.

H2: Artificial intelligence adoption and professional identity do not differ significantly among clinical nurses when grouped according to their demographic characteristics.

2. Materials and Methods

2.1. Study design

This study employed a quantitative descriptive cross-sectional research design as it seeks to determine the level of artificial intelligence adoption and professional identity of the clinical nurse. This type of research design provides a snapshot about the characteristics or outcomes within the designated population at a single period of time. It serves as an observation tool for the researcher to capture the relationship (CASP, 2024). This method is the most appropriate in identifying relationships given that the current study was looking on the association between AI adoption and nurse professional identity.

2.2. Data collection methods

This study focused on artificial intelligence adoption and professional identity of clinical nurses. Data was gathered using structured, self-constructed questionnaire. The research tool composed of three sections. The first section identifies the demographic characteristics (age, gender, years of clinical experience, educational background, area of assignment) of the study participants. The second section measures the level of artificial intelligence (AI) adoption. This was divided into four categories including frequency of use, perceived usefulness, ease of use, and integration in daily practice. Each category has five statements with a total of 20 statements. This was constructed based on the Unified theory of Acceptance and use of technology (UTAUT) by Venkatesh *et al.*, (2003). The third section assesses the level of professional identity which has 20 statements under four categories such as self-perception, professional values, role clarity, and autonomy. This study uses a 5-point Likert scales which allow the study participants to indicate their level of agreement with each statement. In terms of scoring classification, the computed mean scores used to interpret as: 1.00–2.33 (Low), 2.34–3.66 (Moderate), and 3.67–5.00 (High). Greater AI adoption and stronger professional identity will be identified when they reach higher mean scores.

2.3. Validity and Reliability

In terms of the quality of the instrument to be used, this research ensures the measurement of validity and reliability. As for validity, the structured questionnaire was sent to three experts in the field such as IT experts, nurse professionals and Administrators for clarity, and appropriateness. Once the expert review was established by the researchers, the face and content validity was secured.

A pilot test was conducted using a group of clinical nurses which will be not be art of the actual study in order to assess the reliability or internal consistency of the research tool. The data gathered was analyzed using Cronbach's alpha coefficient. The research instrument internal consistency after evaluation was 0.751 representing the acceptability of the instrument. The acceptable values of the Cronbach alpha are ranging from 0.70 to 0.95 (DeVillis, 2003). Having the

lowest value of the Cronbach alpha is due to low number of questions, poor relatedness between items or construct (Tavakol et.al.2011)^[31].

2.4. Sampling characteristics

The RN clinical nurses were the target population of this study. Those clinical nurses are working in selected hospitals in Riyadh, Saudi Arabia. The researchers selected four hospitals which will be the research setting from which the study participants of this study they will be selected. Furthermore, a convenience sampling technique will be utilized by the researchers due to the accessibility of the respondents within the clinical setting.

2.5. Eligibility Criteria

This study utilized an eligibility criterion which was the basis in selected study participants. Inclusion criteria include: (1) RN working in the clinical area, (2) regularly employed in the hospital, (3) minimum of 6 months' work experience. This ensures that the participants exposed at least 6 months in the nursing practice where AI is integrated in their system. However, those participants who are reluctant in participating the study and who answer the questionnaire incomplete were the exclusion criteria of this study.

2.6. Sample size

The researchers used four hospitals in Riyadh City as their source of clinical nurses. With a 1000 population, the 95% confidence level and 5% margin of error, the study arrived at 278 participants. These 278 clinical nurses represent the total sample size of this study.

2.7. Survey administration

Prior to gathering of the data, the permission letter was obtained by the researchers from all four selected hospitals. The questionnaire was in English and Arabic language so that understanding was assured and that answering of the questionnaire was comprehended. The research tool was distributed via Google link. It was distributed to eligible clinical nurses in coordination with their nursing supervisors. The clinical nurses were brief with clear instruction and the purpose of the study in order to meet the allotted completion of the questionnaire. This study was conducted from May 1, 2026 to July 30, 2026. A multiple follow up of the study was conducted to achieve a high response rate. Meanwhile, to prevent multiple participation of clinical nurses in this study, a single time email login was applied on the Google settings. Through this way, the error in data entry was minimized. To maintain the integrity of the data, the data was stored in a password proof storage so that only the researchers have access to the data collected. It is

essential to maintain data integrity as to ensure the credibility and trustworthiness of the study findings.

2.8. Study Preparation

Prior to data collection, the researchers performed several measures essential in establishing organized approach to the study investigation of AI adoption and its influence to professional identity. Initially, the researchers were trained in the ethical standards compliance and how it was prepared. All the necessary documents were at hand before data gathering. Lastly, the researchers attended to their supervisor meeting regarding logistical arrangement such as data collection schedule, coordinating the chosen hospital nurse supervisors, electronic copies of the questionnaire. All these ensure a smooth data collection and maintain the integrity and ethical standards of this research study.

2.9. Statistical Methods

Data analysis was performed by the researchers using Statistical Package for Social Sciences (SPSS) version 23.0. This statistical software utilized descriptive and inferential statistics to address the research objectives of this study. For the descriptive statistics, this study employed frequency, percentage, mean and standard deviation. These summarize the demographic background of the clinical nurses, level of artificial intelligence adoption and the nursing professional identity.

For inferential statistics, this study employed Pearson r correlation coefficient to determine the relationship between AI adoption and professional identity. In examining difference the male and female, the independent t test was used. In assessing differences among more than two groups such as years of experience, age, educational background, area of assignment, this study used One-way Analysis of Variance (ANOVA). The $p < 0.05$ significance level was used to ascertain the study's statistical significance.

2.10. Ethical considerations

This study strictly adhered to ethical principles throughout the study. The researchers obtain approval from the institutional research board (IRB) of Riyadh Elm University prior to data collection. The researchers explain first the study purpose, risks and benefits of this study to the clinical nurses before securing informed consent. Apparently, this study maintains the confidentiality and anonymity of the information and participants in this study. All the data that was collected by this study were stored securely. This study also uses the principles of autonomy where the participants have the right to withdraw at any time without due consequences.

3. Results and Findings

Table 1: Frequency Distribution of the Demographic Characteristics of Clinical Nurses (N-278)

Variables	Categories	Frequency (n)	Percentage (%)
Age	21 – 25 years old	23	8.27%
	26 – 30 years old	52	18.71%
	31 – 35 years old	79	28.42%
	36 – 40 years old	57	20.50%
	41 – 45 years old	32	11.51%
	46 – 50 years old	24	8.63%
	51 years and above	11	3.96%
Gender	Male	54	19.42%
	Female	224	80.58%
Years of Clinical Experience	Less than 1 year	32	11.51%
	1 – 5 years	112	40.29%
	6 – 10 years	98	35.25%
	More than 10 years	34	12.23%
Educational Attainment	Diploma	18	6.47%
	Bachelor's degree	221	79.50%
	Master's degree	25	8.99%
	Doctorate degree	8	2.88%
Area of Assignment	Medical Unit	67	24.10%
	Surgical Unit	72	25.90%
	Intensive Care Unit	70	25.18%
	Emergency Dept.	69	24.82%

Note: The total study participants of the study = 278.

The table 1 outlines the frequency distribution of the study participants. Based on the results on the table, majority of the ages of the respondents is 31 – 35 years old which accounted for 28.42% or 79 of the 278 clinical nurses. This represents that most of them demonstrate a good clinical experience and openness to technology-driven model of nursing practice. The female clinical nurses dominated this study with 80.58% of the total sample while many of them were bachelor's degree (79.50%). They earned most 1-5 years of clinical

experience as nearly half of them (40.25%) reported to have it. The clinical nurses perceived that nearly equal proportions of the area of assignment were drawn which means that the artificial intelligence tools were used in the clinical context. The demographic would help the policy makers and planners regarding the AI adoption in order to assume readiness and preparedness of the clinical nurses in integrating to their nursing practice.

Table 2: Artificial Intelligence Adoption of Nurses in the Clinical Area (N-278)

Dimensions	Mean	SD	Interpretation
Frequency of Use	2.878	1.724	Moderate AI Adoption
Perceived Usefulness	3.442	1.866	High AI Adoption
Ease of Use	2.930	1.752	Moderate AI Adoption
Integration into Daily Practice	2.650	1.832	Moderate AI Adoption
Overall Average	2.975		Moderate AI Adoption

Note: 1.00-1.81 Very low, 1.81-2.60 Low, 2.61-3.40 Moderate, 3.41-4.20 High, 4.21-5.00 Very high

The table 2 reveals the level of artificial intelligence adoption of clinical nurses. It can be seen that nurses demonstrated a moderate level of artificial intelligence adoption ($M = 2.975$). Among the four dimensions of the AI adoption, the clinical nurses reported a strong perceived usefulness as high AI adoption obtaining a mean of 3.442; $SD=1.866$. This indicates that nurses believed that utilizing a system e.g., artificial intelligence improves performance and task success (emergentmind, 2026) ^[12]. This also serves as the foundation for technology acceptance and user evaluation (Davis, 1989) ^[9]. This was followed by the ease of use ($M = 2.930$; $SD=1.752$), frequency of use ($M = 2.878$; $SD=1.724$), and integration in daily practice ($M = 2.650$; $SD=1.832$). All of these subscales were moderate level which reflects the classical distinction of the system utilization into their daily practice. Shinnars et.al.,(2022) ^[30] study aims to prepare the health workers for the implementation of AI in the healthcare

setting. This provides considerable benefits to the healthcare workforce. Studies have shown that health professionals have willingness to learn artificial intelligence and view the value in enhancing their work (Lai et.al., 2020).

The clinical nurses recognize the importance of artificial intelligence being imbedded in the daily work routine. Although nurses should exercise caution in the utilization of AI tools, this impacts the organization to be responsible and use AI appropriately by implementing effective clinical decision making, enhance workflows and foster efficient use of organizational resources. In addition, the appropriate adoption of Artificial Intelligence may strengthen the clinical nurse's abilities in identifying problems, implementing innovative solutions and adjust to ever changing healthcare demands. The AI serves as a supportive tool for the clinical nurses rather than replacing their work in clinical sound decision making.

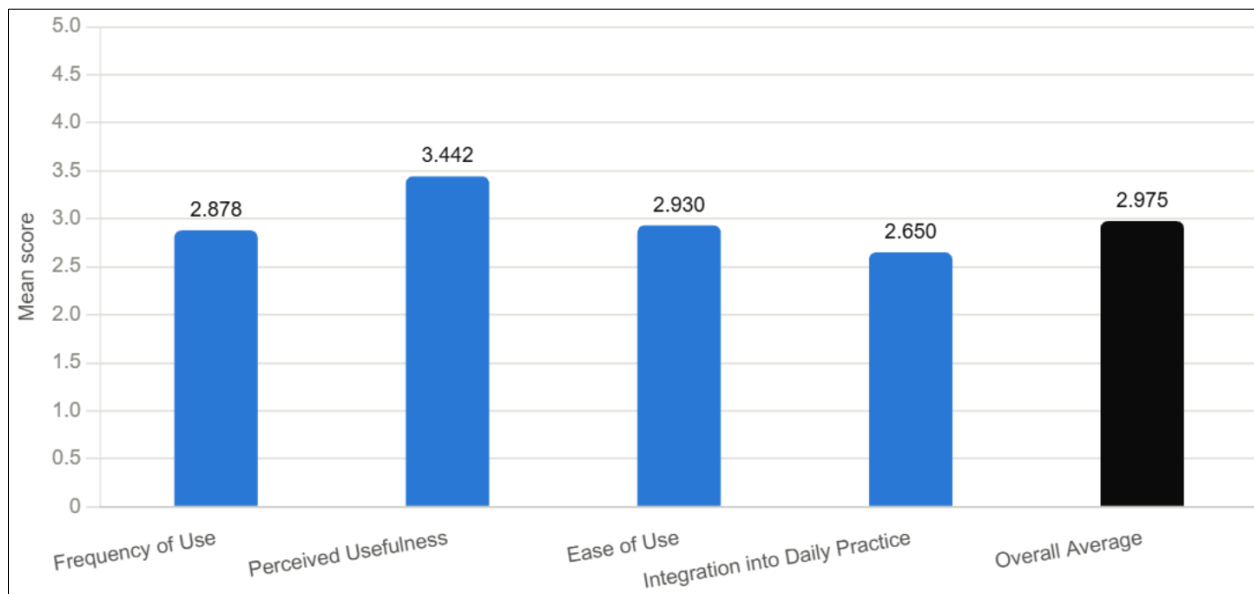


Fig 1: The Artificial Intelligence Integration of the Clinical Nurses

The figure 1 illustrates the artificial intelligence integration level of the nurses under study. Based on the graph, perceived usefulness appears to be the areas in the adoption of Artificial Intelligence. This suggests that nurses see the worth of using AI integrated to their work. Gong et.al.,(2019)^[15] elucidated that health workers behaviours were associated with the AI utilization showing enthusiasm. It is also reported the healthcare workers readiness on AI use

among medical students. However, just like in the results of the current study where clinical nurses obtained the lowest perception in the areas of integration into daily practice (M=2.650). Many health personnel have little exposure with regards to AI use. This align with the study of Comrey & Lee (2013)^[6] which reveals that health workers agree that the use of AI support the patient health and wellbeing but may have impact to organization.

Table 3: Item Level Analysis Artificial Intelligence Adoption of Nurses in the Clinical Area (N=278)

Statement/s	Mean	SD	Interpretation
I regularly utilize AI driven technologies in clinical nursing practice.	2.76	1.55	Neutral
I frequently interact with AI technologies when performing patient care.	3.00	1.97	Neutral
As part of nursing daily activities, AI tools are being applied.	3.22	1.64	Neutral
When performing nursing task in the clinical practice, I rely on AI technologies.	2.68	1.99	Neutral
In routine nursing documentation, I utilized AI-supported technologies	2.73	1.55	Neutral
AI technology improves the quality of patient care I provide.	3.41	1.68	Agree
AI technology enhances my clinical decision-making.	3.63	1.87	Agree
AI technology helps to complete tasks efficiently.	3.05	1.61	Neutral
AI technology improves patient safety in my practice.	3.44	1.69	Agree
AI technology positively contributes to the nurse work performance.	3.68	1.73	Agree
AI technologies in clinical practice are easy to learn.	2.75	1.99	Neutral
AI-supported tools are user-friendly in my workplace.	3.12	1.62	Neutral
I can use AI technologies without difficulty.	2.62	1.97	Neutral
Learning to operate AI technologies is simple for me.	3.00	1.60	Neutral
I am confident in navigating AI technologies.	3.16	1.63	Neutral
AI is effectively integrated into nurse daily routine.	2.48	1.49	Disagree
AI assists my nursing duties and responsibilities.	3.25	1.65	Neutral
AI aligns well with nursing procedures in the nursing workplace.	2.09	1.63	Disagree
AI is consistently used in patient care processes.	2.16	1.86	Disagree
AI is incorporated into my workflow in nursing	3.27	1.65	Neutral

Note: 1.00-1.81 Strongly Disagree, 1.81-2.60 Disagree, 2.61-3.40 Neutral, 3.41-4.20 Agree, 4.21-5.00 Strongly Agree

The table above outlines the item level analysis of the artificial intelligence adoption of nurses in the clinical area. It can be seen on the table the 20 items analysis based on the perception of the study participants. The item shows that nurses agreed on the use of AI as it enhance their clinical decisions garnering mean of 3.63. It was followed by AI improves work performance with a mean of 3.68 and

improves patient safety with mean of 3.44. This study implies that AI has remarkable benefits in healthcare. It affects not just the clinical decisions including work performance and patient safety. Consequently, study of Khosravi et.al., (2024)^[21] concluded that AI tools applications to healthcare decision making improve the quality, efficiency and effectiveness of healthcare services as AI provide

accuracy and personalized support to decision-making. They demonstrated that AI assists healthcare professionals in their diagnosis and prognosis as it gives personalized and customized information.

Meanwhile, the reveals that nurses disagreed with the effective integration in their daily routine with mean of 2.48 and aligns well with nursing procedures ($M = 2.09$), or is consistently used in patient care processes ($M = 2.16$). These three items obtained the lowest score in terms of AI adoption. This means that the use of Artificial Intelligence was not often utilized in their daily practice. But a nursing.com

reports that AI need to address the patient safety, privacy, bias, and accountability which prompt the health institution to create ethical guidance. They found that near three fourth of the (73%) employer does not yet invested in AI innovations. Evidently, the nurses working on some health setting have no exposure to AI tools. Only 30% in rehabilitations, 34% remained uncertain about AI's importance (nurse.com). This relates with the current results that the AI usage is not uniformly occurring across health settings.

Table 4: The Professional Identity as perceived by Clinical Nurses (N=278)

Dimensions	Mean	SD	Interpretation
Self-perception	3.846	1.87	High
Role Clarity	3.506	1.67	Moderate
Professional Values	3.704	1.74	High
Perceived Autonomy	3.996	1.80	High
Overall Average	3.763		High

Note: 1.00–2.33 (Low), 2.34–3.66 (Moderate), and 3.67–5.00 (High).

The table 4 presents the professional identity of the clinical nurses. Based on the overall responses of the study participants, they possess a high level of professional identity. This means that clinical nurses work authentically on their workplace as they feel about their belongings. Wilson (2026)^[33] explained that professional identity forms when someone absorb, adopt the professional values which can include anyone in the profession. Perceived autonomy, on the other hand, garnered the highest level ($M=3.996$) among all the dimensions of professional identity. This was followed by self-perception ($M = 3.846$) and professional values ($M = 3.704$). This aligns with the concept analysis of Halverson et.al. (2022)^[16] which findings reveal that sense of self, perceived from the nursing role, engagement, self-

perception, and self-certainty to the role were the attributes of professional identity. This supports the Ford et.al. (2021)^[13] which characterize those professional identity internal manifestations were the professional values and interest shaping ones decision making, and awareness on what matters most in practice.

Meanwhile, only the role clarity obtained the moderate level with mean of 3.506. This implies that the role clarity has been lagged among the subscale of the professional identity. The nurse's professional identity remains stable even if there is availability of new technologies. As for Buchanan et.al.,(2020b)^[5] explicated that health workers have a shared responsibility in ensuring the practice while taking the nursing core values in the adoption of AI in nursing practice.

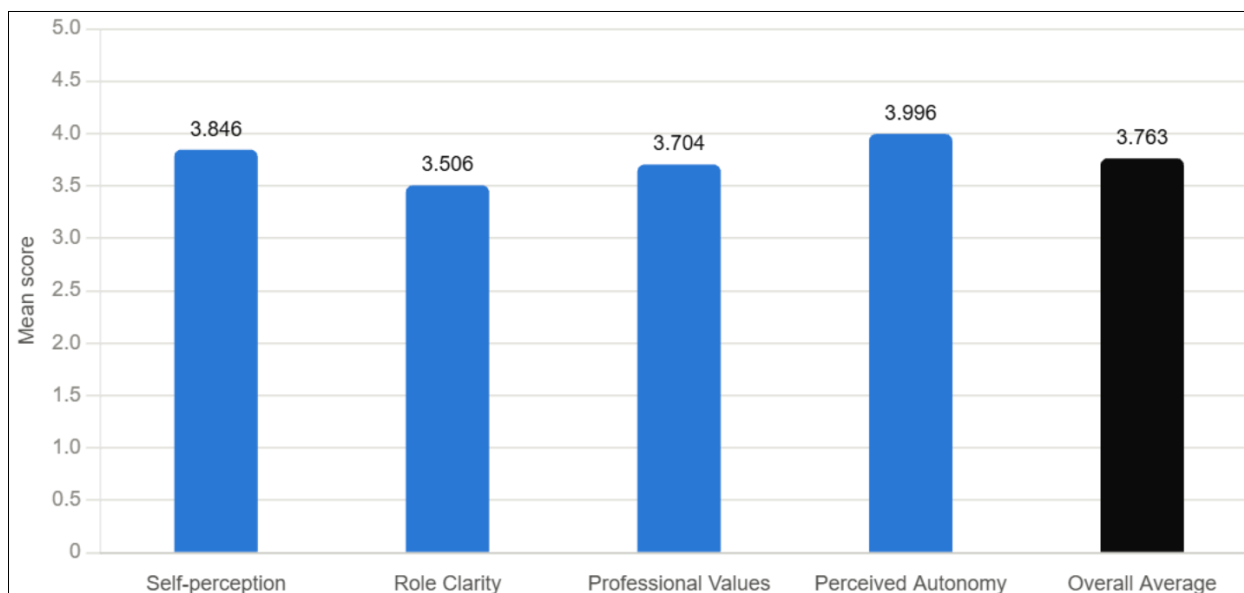


Fig 2: The Professional Identity of Clinical Nurses Integrating Artificial Intelligence

The graph above illustrates the professional identity of clinical nurses integrating artificial intelligence. This indicates that nurses as felt confidence in doing professional independence in making decisions in their nursing practice. They demonstrate a strong sense of values in nursing.

However, the role clarity is generally a dimension that needs to be strengthened. Thus, the results reveal that nurses have a well-developed professional identity marked by perceived autonomy, positive self-perception, awareness to self-perception and role certainty.

Table 5: Item Level Analysis of the Professional Identify as Perceived by the Clinical Nurses (N-278)

Statement/s	Mean	SD	Interpretation
I have a strong sense of identity as a nurse.	4.10	1.82	Agree
I am confident in my professional role.	4.00	1.80	Agree
I am proud of being a nurse.	3.52	1.70	Agree
I consider myself as a competent nursing professional.	4.00	1.79	Agree
I value my self-identity as a nurse.	3.61	1.72	Agree
I clearly understand my nursing role and duties	4.05	1.81	Agree
My patient care responsibilities are clearly defined.	3.42	1.68	Agree
I understand my scope of nursing practice.	3.68	1.74	Agree
My work expectations as a nurse are clearly communicated.	3.22	1.64	Neutral
I have clarity on nursing professional duties in my workplace	3.16	1.63	Neutral
I uphold the ethical principles of nursing.	3.67	1.73	Agree
I believe nursing is a highly respected profession.	3.60	1.74	Agree
I am dedicated to perform a compassionate patient care.	3.65	1.73	Agree
I follow nursing professional values in clinical practice.	3.60	1.72	Agree
I believe nursing contributes significantly to healthcare.	4.00	1.84	Agree
I can make independent decisions in clinical setting.	3.88	1.77	Agree
I feel trusted in my clinical judgment.	3.90	1.78	Agree
I have autonomy in my clinical nursing practice.	4.02	1.87	Agree
I can utilize my professional knowledge independently.	3.78	1.86	Agree
I am allowed to think critically when caring for patients.	4.40	1.88	Strongly Agree

Note: 1.00-1.81 Strongly Disagree, 1.81-2.60 Disagree, 2.61-3.40 Neutral, 3.41-4.20 Agree, 4.21-5.00 Strongly Agree

The table above shows the item level analysis of the professional identify as perceived by the clinical nurses consisting of the 20 items. Based on the items results, nurses freely think critically when caring for patients ($M=4.40$; Strongly agree), and shows a clear personal identity as a nurse ($M=4.10$; Agree). They were also reported as confident on their role as a nurse ($M=4.00$ Agree). This implies that the nurses perform their clinical judgment into their work. According to Almutairi et.al., (2024) ^[1], the thinking critically provides nurses a cues and clues on the complications and collaborate with multidisciplinary team

for patient treatment. The nursing education and training are commonly concerned with the analytical reasoning. However, the items “my work expectations as a nurse are clearly communicated” ($M=3.22$; neutral) and “I have clarity on nursing professional duties in my workplace” ($M=3.16$; Neutral) both under role clarity obtained the lowest means. This indicates that the healthcare institution was weaker in communicating their nursing roles and job expectations. Thus, attaining change can be achieve with the well-use of AI in the system.

Table 6: Association between Artificial intelligence adoption and the professional identity of clinical nurses.

Variables	Test Statistics	r value	p-value	Decision	Interpretation
AI Adoption x Professional Identity	Pearson r	0.5168	0.001	Reject the H_0	Strong Moderate Correlation

Note: Significant Threshold $p < 0.001$

The table 6 shows the relationship between artificial intelligence adoption and professional identity of the clinical nurses. Based on the Pearson r correlation, there is a moderate strong positive correlation between AI adoption and professional identity ($r = 0.5168$, $p = 0.001$) which resulted to rejection of the null hypothesis. This implies that nurses with greater exposure to AI-technology driven technologies, they tend to demonstrate a strong sense of professional identity. This is a meaningful breakthrough that

AI technologies contribute to the nursing practice towards quality patient safety. However, Rong et.al., (2020) ^[28] explained that the AI application is at its early stage, the development and deeper integration is expanding in healthcare. Just like nursing.com, the AI adoption needs Interprofessional collaboration. This shows the need evaluate the readiness of the healthcare professionals in order to implement AI integration effectively.

Table 7: Significant differences on the Artificial intelligence adoption across demographic characteristics

Demographic Characteristics	Category	Mean $\pm$ SD	Test Statistic	p value	Decision	Interpretation
Age	21-25 years	3.18 $\pm$ 1.73	F-test	0.033	Reject the H ₀	Statistically Significant
	26-30 years	3.68 $\pm$ 1.90				
	31-35 years	4.21 $\pm$ 1.84				
	36-40 years	4.15 $\pm$ 1.73				
	41-45 years	3.28 $\pm$ 1.65				
	46-50 years	3.38 $\pm$ 1.87				
	51 years above	3.37 $\pm$ 1.63				
Gender	Male	3.28 $\pm$ 1.75	T test	0.216	Accept the H ₀	Not Statistically Significant
	Female	3.59 $\pm$ 1.98				
Years of Clinical Experience	Less than 1 year	3.13 $\pm$ 1.78	F test	0.009	Reject the H ₀	Statistically Significant
	1-5 years	3.42 $\pm$ 1.83				
	6-10 years	3.17 $\pm$ 1.80				
	More than 10 years	3.20 $\pm$ 1.75				
Educational Attainment	Diploma	3.16 $\pm$ 1.76	F test	0.074	Accept the H ₀	Not Statistically Significant
	Bachelor's Degree	4.17 $\pm$ 1.89				
	Master's Degree	3.82 $\pm$ 1.70				
	Doctorate degree	3.16 $\pm$ 1.76				
Area of Assignment	Medical Unit	3.60 $\pm$ 1.72	F test	0.001	Reject the H ₀	Statistically Significant
	Surgical Unit	3.37 $\pm$ 1.87				
	Intensive Care Unit	4.24 $\pm$ 1.84				
	Emergency Dept	3.15 $\pm$ 1.82				

Note: Significance level 0.05

The table 7 summarizes the significant differences on the level of artificial intelligence adoption among clinical nurses across demographic characteristics. The results indicate that age, years of clinical experience, and area of assignment were significant factors affecting the AI adoption while the gender and educational attainment show no statistical difference at significance level of 0.05.

In terms of age, it was found a significant differences on AI integration among age groups ($p = .033$). According to the results, those nurses within e 31-35 years of age garnered the highest mean AI adoption score ($M = 4.21$, $SD = 1.84$). This was followed by the 36-40 years of age ($M = 4.15$, $SD = 1.73$). Meanwhile, the nurse with age ranging from 21-25 years old obtained the lowest score ($M = 3.18$, $SD = 1.73$). The significant difference based on the study findings suggest that age should be consider in AI driven technology integration as nurses have different experiences. Hence, those nurses will less experience with AI driven technologies needs structured orientation and continuous training.

In terms of gender, it was found that no significant difference between male and female ($p = .216$). It was found that female nurses ($M = 3.59$, $SD = 1.98$) have slightly higher mean as compared to male ($M = 3.28$, $SD = 1.75$) which means a substantially difference between gender. This suggests that the training and evaluation of AI utilization should be designed for nurses.

As for years of clinical experience, it was found a significant differences ($p = .009$). Results have shown that nurses with 1-5 clinical experiences have higher mean ($M = 3.42$, $SD = 0.183$), whereas those with less than one year of experience had a mean of 3.13 ($SD = 1.78$). This means that professional exposure influences the willingness of the nurses in using AI technologies. This should not focus on AI training per se but

on how the AI can be integrated in the real actual work.

As for educational qualification, it was found that there are no significant differences ($p=0.074$). Despite the highest mean garnered by the nurses holding bachelor's degree ($M=4.17$; $SD=1.89$), followed by nurses with master's degree ($M=3.82$; $SD=1.70$), these differences show no significant differences. This indicates that having an educational qualification does not guarantee on the level of AI adoption in nursing. Healthcare and Technology are different fields which may integrated to each other, but opportunities for training, perceived usefulness and institutional support may be an important factor.

Lastly, the area of assignment reveals a significant difference in AI adoption ($p=0.001$). Those nurses working in Intensive Care Unit (ICU) obtained the highest mean of $M = 4.24$, $SD = 1.84$ while the lowest was garnered by those working in Emergency Room with a mean of 3.15, $SD = 1.82$. This implies that greater utilization of technology was observed in ICU due to the importance of technology that is technology-dependent nature as needed by critical patients. Nurses working in these areas manipulate sophisticated technologies that provide them the necessary monitoring system, coordination and documentation. These shows that AI driven technologies serve as a supporting tool that guides nurse's clinical decisions.

Collectively, the study variables were not all uniform across demographics. The age, clinical experience and area of assignment were relevant determinants in the artificial intelligence integration as perceived by the clinical nurses. The healthcare organization should take into consideration the unit specific structured training program, age appropriate and their experience level with emphasis to ethical safeguards, privacy, and critical appraisal.

Table 8: Significant differences on the Professional Identity across demographic characteristics

Demographic Characteristics	Category	Mean±SD	Test Statistic	p value	Decision	Interpretation
Age	21-25 years	2.95±1.87	F test	0.005	Reject the H ₀	Statistically Significant
	26-30 years	3.64±1.95				
	31-35 years	3.37±1.88				
	36-40 years	3.54±1.82				
	41-45 years	3.60±1.90				
	46-50 years	3.03±1.77				
	51 years above	2.62±1.63				
Gender	Male	3.12±1.68	T test	0.318	Accept the H ₀	Not Statistically Significant
	Female	3.67±1.92				
Years of Clinical Experience	Less than 1 year	3.15±1.79	F test	0.001	Reject the H ₀	Statistically Significant
	1-5 years	3.33±1.96				
	6-10 years	3.36±1.82				
	More than 10 years	3.20±1.87				
Educational Attainment	Diploma	3.10±1.74	F test	0.512	Accept the H ₀	Not Statistically Significant
	Bachelor's Degree	3.74±1.87				
	Master's Degree	3.33±1.84				
	Doctorate degree	3.06±1.80				
Area of Assignment	Medical Unit	2.88±1.75	F test	0.010	Reject the H ₀	Statistically Significant
	Surgical Unit	3.57±1.91				
	Intensive Care Unit	3.49±1.89				
	Emergency Dept	3.42±1.82				

Note: Significance level 0.05

The table 8 shows the significant differences on the professional identity of clinical nurses across demographic background. Based on the results, it indicates that age, years of clinical experience, and area of assignment demonstrate significant differences. This study reveals that those are relevant factors in the professional identity of the clinical nurses who adopt artificial intelligence in their work. In contrast, there are no significant differences among gender and educational qualification.

In terms of age, it was found a significant difference among various ages ($p = .005$). Among the various ages, the 26- 30 years old garnered the highest mean of 3.64 SD = 1.95, this was followed by age ranging from 41 to 45 years old ($M = 3.60$, SD = 1.90), and nurses with age ranging from 36–40 years ($M = 3.54$, SD = 1.82). These findings indicate the professional identity of nurse's change across different stages of lives on their career. This identity was influence by relevant factors such as nursing experience, role expectations, and personal development. While the aging 51 years old got the lowest mean among all ages. This means that experience nurse may benefit in taking a lead role as for their expertise. As for gender, this study found a no significant differences ($p = .318$) between male and female. Even though the female got the higher mean ($M = 3.67$, SD = 1.92) as compared with male ($M = 3.12$, SD = 1.68), but the results shows no significant differences. This means that the professional identity do not differ between male and female. Hence, the professional identity develops in professional experience, duties and organizational culture.

As for years of clinical experiences, the findings shows a significant differences ($p = .001$). Based on the results, those nurses with 6- 10 years garnered the highest mean of $M = 3.36$, SD = 1.82. This was followed by nurses with 1- 5 years ($M = 3.33$, SD = 1.96). These findings imply as nurse gain more experience, they develop more core values of the profession and familiar with the role expectations.

In terms of educational attainment, this study reveals no significant differences among various educational qualifications ($p = .512$). Based on the results of different qualifications, nurses having bachelor's degree obtained the

highest mean ($M = 3.74$, SD = 1.87). This was followed by master's degree having a $M = 3.33$, SD = 1.84. Although there they garnered a highest mean on academic degree, it does not translate into statistical differences. This finding indicates that the professional identity for nurses should be strengthened in the healthcare setting which offers professional values for nurses.

Finally, it was found there is a significant difference among various areas of area of assignment ($p = .010$). The results shows that those nurses working in the Surgical Unit got the highest mean ($M = 3.57$, SD = 1.91). This was followed by those working in the ICU ($M = 3.49$, SD = 1.89) and Emergency Department ($M = 3.42$, SD = 1.82). The results show that clinical environment is a relevant factor that persuades nurses on their professional role. As to their professional identity, those nurses may have different workload, teamwork, clinical duties, and clinical decisions in every unit which can affect their identities.

Collectively, the results found that age, clinical experience and area of assignment were relevant factors as it is associated with professional identity. This means that the nurse's identity is linked to their career stage and clinical environment while gender and educational attainment are not closely connected. In the context on nursing education, the integration of AI is significant as it enhance clinical judgment, nurse reasoning and confidence in dealing with quality and safety.

4. Discussion

This study examined the relationship between artificial intelligence adoption and professional identity of clinical nurses. The nurses were predominantly in the early to mid-stages of the nursing career. Majority of them have BSN degree in nursing and working in surgical, medical, intensive care and emergency units. These findings about demographic background situates on the research study of Johnson et.al., (2012)^[20] that professional identities develop over their life. This start on entering the formal nursing education until clinical nursing experiences. Their professional identities accumulate from gaining knowledge, skills and attitude until

it works in the clinical setting as a nurse. The near-even number of nurses from several unit strengthened credibility of the responses since the professional identity suggest certain form of subjectivity which often associated with professional values (Knights & Willmott, 1992)^[22].

With the four dimensions of the artificial intelligence adoption of the clinical nurses, it was found an overall moderate level wherein perceived usefulness are the strongest and the AI-driven technologies integration to daily practices is the weakest. The current result indicates that the clinical nurses believe that AI innovations would enhance their job performance. Bolodeoku et.al, (2022)^[3] delineated perceived usefulness as the perception of the individuals on certain technology that improve the tasks or roles to achieve efficiency and effectiveness. However, not all clinical nurses would be comfortable with the change; some of them would be resistant. The organization should communicate in order to adopt it effectively to embed it on their daily routine. Naveena (2019)^[25] explained that communicating effectively helps the usefulness of the new system to improve the performance of the employee. The gap between the perceived usefulness and its daily integration to the work reflects the Shinnars et al.'s (2021)^[29] analysis that the health workers understand the value of artificial intelligence but lag its readiness on integrating to daily workflow, institutional infrastructure and hands on exposure.

The clinical nurses demonstrated a strong sense of professional identity as a result of this study. The most attributed dimension was the perceived autonomy and followed by self-perception, and professional values. The last is the role clarity which was trailed among the three dimensions of professional identity. This result paralleled with Bhattacharyya (2008)^[2] who explained that identity construction is a lifelong process that the individual face throughout their lives in developing their professional identity. This is developed with the influence of various elements in the person life such as education, interaction and socialization. Meanwhile, the perceived autonomy in the nursing perception relates with their independence in doing their decision making towards patient centered care. As defined by Hsu et al., (2022)^[17], the professional autonomy is the authority to make decisions and act based on professional knowledge and judgment; thus, nurses make clinical decisions based on their nursing scope of practice. Mrayyan et al.'s (2024)^[24] explained that this professional autonomy serves as a core marker towards a mature nursing identity. Since the role clarity garnered the weakest among the entire dimension, it points to an addressable gap that clinical nurse's work within their capacity and independently but less certain on their communication with their formal duties in the institution.

Finally, this study found a moderate strong relationship between artificial intelligence adoption and professional identity. This indicates that those clinical nurses who expose with AI-driven technologies tend to demonstrate a strong sense of professional identity. According to Jo (2024), despite the advancement and intelligence of AI, it will never replace the aspects of nursing. Nursing care necessitates human emotions and judgment where the AI cannot provide. The artificial intelligence lacks ability to embrace philosophy of nursing and cannot be answerable to all its actions in humans. Consequently, the role ambiguity affects the established care models and impacts the nurse clinical decisions. This means that without explicit framework, a

structural friction would be face by nurses which may adhere anxiety professionally Jo (2024). This infers with El Arab et al. (2025)^[11] who concluded that AI integration is grounded in moderate literacy while readiness is a relevant factor affected by ethical, innovation, and instructional barriers. AI literacy and prior training are markers of professional competence for a better nursing growth.

The age group, years of experience, and clinical unit of assignment yielded a significant differences on the artificial intelligence integration and professional identity of the clinical nurses. These suggest that those three meaningful variables were relevant factors that shaped nurses in the clinical context. Conversely, their attitude, willingness and readiness offer a deepening support to various variables to cultivate a stronger nurse professional identity. Cornett et.al, (2023)^[7] cited that professional identity impacts the health workers personal, interpersonal and professional level. This is consistent with the findings of this study that professional identity is an on-going process throughout their career stages. Yet, the role clarity as the weakest suggest that while positive relationship exist, the current alignment between technology adoption and professional identity may not persist evenly across all nurses, particularly the newer or less technologically exposed ones identified in the demographic comparisons.

5. Conclusion

This study has revealed that clinical nurses were engaging to AI driven technologies on their workplace at a moderate level. This AI were valued by the nurses as it's contributes to their clinical decision making and better patient outcomes in spite of the not-so-high integration into their daily workflow. The nurses were found to demonstrate a strong sense of professional identity deeply connected with perceived autonomy and self-perception while role clarity emerged as the weakest dimension.

There is a moderate strong positive relationship between artificial intelligence adoption and professional identity of clinical nurses. This indicates that the higher the exposure with artificial intelligence, the stronger the sense of professional identity. The age, years of clinical experience and unit of assignment differ significantly but not between gender and educational attainment pointing that professional identity develops through life and clinical exposure as relevance to the variables.

Taken collectively, this study addresses the gap identified implying the integrating AI does not erode the sense of identity for nurses as it supports their clinical decision. The AI integration does not serve as a threat in the nursing professional growth and competence. Clear role communication prevents role ambiguity without compromising the nursing self-concept towards a quality, safe, ethical patient care.

6. Recommendation

Based on the study findings, the following recommendations were proposed:

1. Healthcare administrators should create a structure training program regarding AI to cultivate awareness and competency to integrate it effectively with the daily workflows, decision-making and documentation system making them ready in daily practice.
2. Onboarding programs should be established considering the career stage of nurses, unit of assignment and the

years of clinical experiences. This structure orientation would offer opportunities to mentor peers on adopting artificial intelligence into clinical reasoning.

3. The nursing administrators should explicitly communicate their updated job responsibilities, SOP and clarifies the role and duties expectation in their work.
4. The nursing service should include AI literacy as part of the professional identity development for nurses. They should strengthen governance on the AI utilization to ensure clear guidance on privacy, accountability, ethics and patient safety.
5. Replication studies should be conducted using a large number of hospitals to adopt longitudinal designs capable of tracking how AI adoption and professional identity co-evolve over time.

7. Limitation of the Study

This study has several limitations. First, this study employed cross-sectional research design which snapshot the AI adoption and professional identity of clinical nurses at a single point in time. This design allows only to determine the association between variables without taking the causal inferences. Second, this utilized four hospitals only in Riyadh using the convenience sampling. Given with easy access, less constraint and limits the generalizability, the other regions of the country should be included. Third, using a self-reported questionnaire in the data collection still remains the susceptibility to social desirability bias including the subjective nature of the assessment. Fourth, statistical power issues were available due to some uneven groups on demographic profiles. Lastly, as AI-driven technologies and their integration into clinical settings are evolving rapidly, the study's findings reflect a specific moment in this evolution and may not fully capture nurses' experiences as AI tools become more deeply embedded in practice. Future researches should consider this limitation to achieve generalizability.

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