Student nurses' attitudes, perceived utilization, and intention to adopt artificial intelligence (AI) technology in nursing practice: A cross-sectional study

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A B S T R A C T

Aim: The aim of this study was to investigate the attitudes and intentions of student nurses towards Artificial Intelligence (AI) in the context of nursing practice and to explore the relationship between their attitudes towards AI, their perceptions of AI utilization in nursing practice, and their intentions to adopt AI technology. The study hypothesized that perceived utilization of AI in nursing practice would positively influence the intention to use AI and that attitudes towards AI would mediate this relationship.

Background: AI has the potential to revolutionize various aspects of healthcare, including nursing practice. As AI technology continues to advance, it becomes increasingly important for nurse education to prepare student nurses to leverage AI technology and be willing to adopt it in their nursing practice.

Design: Cross-sectional design.

Methods: A total of 200 student nurses from two government-owned nursing schools participated in the study. Mediation testing was performed using Hayes' PROCESS macro in SPSS (Model 4).

Results: Perceived AI utilization in nursing practice had a significant positive effect on student nurses' attitudes towards AI ($\beta = 0.450$, $p < 0.001$) and their intention to adopt AI technology ($\beta = 0.458$, $p < 0.001$). Attitudes towards AI partially mediated the relationship between perceived AI utilization in nursing practice and the intention to adopt AI technology ($\beta = 0.255$).

Conclusion: The findings suggest that student nurses had favorable perceptions of AI utilization in nursing practice, expressed high intentions to adopt AI technology, and held positive attitudes towards AI. Furthermore, student nurses' perceptions of AI utilization in nursing practice influenced their attitudes towards AI, which, in turn, affected their intentions to adopt AI technology. Nursing education programs should incorporate AI-focused coursework, training, and experiential learning to further enhance students' readiness and proficiency in utilizing AI technology. Additionally, healthcare institutions should consider creating a supportive environment for nursing students to explore and embrace AI, ultimately preparing them for the evolving landscape of AI-enhanced healthcare practice.

Tweetable abstract: Student nurses' attitudes towards AI technology were influenced by their perceptions of AI utilization in nursing practice, which subsequently influenced their intentions to adopt AI technology.

1. Introduction

Artificial Intelligence (AI) is rapidly transforming healthcare and holds immense potential for revolutionizing the field of nursing. Empirical evidence has shown that AI is already influencing nursing practice, including nursing roles, clinical care, and the nurse-patient relationship (Abuzaid et al., 2022; Buchanan et al., 2020; Ng et al., 2022). As AI technology continues to advance, it becomes increasingly crucial for nurse education programs to prepare student nurses to leverage AI technology and be willing to adopt it in their nursing

practice. This preparedness is essential for keeping pace with technological advancements and ensuring that nurses can effectively utilize AI for the benefit of patients and the healthcare system.

In recent years, there has been a notable increase in research focused on AI in the field of nursing education. Available evidence has demonstrated a significant proportion of student nurses who exhibit a heightened interest in this emerging technology and demonstrate a higher level of confidence in their ability to utilize AI-powered tools (O'Connor, 2021). However, more efforts are needed to actively cultivate and nurture students' intentions to adopt and embrace AI in healthcare. Enhancing students' intention to adopt AI technology in nursing practice is essential for promoting innovation, increasing the efficiency of healthcare delivery, and ultimately improving patient outcomes (Guo et al., 2020). By embracing AI, nurses can contribute to the advancement of healthcare and enhance their own practice, ultimately benefiting patients and the healthcare system (VanDerSchaaf et al., 2021).

Previous research has identified various variables that significantly influence the adoption of technology, such as AI. For instance, Teo and Zhou (2014) found that having a positive attitude towards the use of technology can foster students' interest in its use and influence their intention to adopt it. Additionally, research has shown that increased experience with information technology, including AI, can alleviate fear and anxiety, leading to a better understanding of AI (Kim and Lee, 2020). Gado et al. (2022) discovered that students' inclination to embrace AI technology is boosted by their perception of it being easy to use, beneficial in terms of its usefulness, and their confidence in their own ability to use AI effectively. In nursing, a few studies have demonstrated that student nurses' attitudes towards AI play a crucial role in shaping their desire to use AI-based technology in healthcare. Kwak et al. (2022a) examined nursing students' attitudes towards AI and found that positive attitudes towards AI were related to increased acceptance and readiness for AI-based technologies integration in nursing practice. In a separate study (Kwak et al., 2022b), a favorable attitude toward AI and facilitating conditions predicted the intent to use AI-powered tools in healthcare. These studies suggested the use of interventions that promote the self-efficacy necessary to foster a positive attitude and subsequently the intent to adopt this technology in healthcare.

An individual's perception of the usefulness of AI applications can profoundly influence their willingness and interest in adopting AI-based technology. When individuals perceive AI as a tool that complements and supports their practice, they are more likely to develop positive attitudes and, in turn, increase their desire to adopt AI in practice (Damerji and Salimi, 2021). Conversely, if they perceive AI as a threat to their professional autonomy or job security, their attitudes may be more negative, resulting in reduced interest in adopting AI technology. Reports from non-nursing disciplines have shown that when students perceive AI as effectively utilized in practice, they develop positive attitudes towards AI technology (Al Shamsi et al., 2022; Gado et al., 2022). In the healthcare context, a handful of evidence strongly associated health science students' perceptions of AI utilization in healthcare practice with a higher intention to adopt AI technology in their careers (Ahmed et al., 2022; Mousavi Baigi et al., 2023).

In summary, there is growing evidence exploring the attitudes and perceptions of healthcare professionals towards AI (Dos Santos et al., 2019; Sit et al., 2020), highlighting its potential benefits and challenges. However, limited research has specifically focused on student nurses' perspectives and intentions to adopt AI technology (Kwak et al., 2022a). Understanding student nurses' attitudes towards AI, their perceived use of AI in nursing practice, and their behavioral intentions to adopt AI technology is crucial for effectively incorporating AI into nurse education and preparing future nurses for the evolving healthcare landscape.

1.1. Study aim

This study examined student nurses' attitudes towards artificial intelligence (AI) in nurse education, their perceptions of AI utilization in nursing practice, and their intentions to adopt AI technology.

1.2. Hypotheses

Existing research in various fields has demonstrated the influence of perceived usefulness and relevance on individuals' intentions to adopt technology (Davis, 1989). In the context of healthcare, specifically nursing, studies have shown that perceived utility and positive perceptions of technology are linked to greater willingness to adopt new healthcare technologies (AlQudah et al., 2021; Teo and Zhou, 2014). Furthermore, a myriad of research in the field of information systems and education found that perceived ease of use and perceived usefulness significantly influenced users' intentions to adopt technology (Granić and Marangunić, 2019). Applying this principle to AI in nursing practice, it is reasonable to expect that:

Perceived utilization of AI in nursing practice could positively influence student nurses' intention to use AI in nursing practice (Hypothesis 1).

Previous studies have highlighted the pivotal role of attitudes in shaping individuals' intentions to adopt technology (Gado et al., 2020). In the healthcare domain, research by Cimperman et al. (2016) found that healthcare professionals' attitudes towards telemedicine significantly mediated the relationship between perceived usefulness and their intention to use telemedicine services. Similarly, a study by Tsai et al. (2019) in the healthcare context emphasized the importance of perceived ease of use and perceived usefulness in shaping attitudes, which, in turn, influenced users' intentions to adopt technology. Translating this to the context of AI in nursing, it is plausible to posit that:

Student nurses' attitudes towards AI could mediate the relationship between perceived AI utilization in nursing practice and the intention to adopt AI technology (Hypothesis 2).

1.3. Theoretical framework

The study was anchored on the Technology Acceptance Model (TAM) (Davis, 1989), a well-established framework that explains users' acceptance and adoption of new technologies. Among the different theoretical frameworks that may help explain our study, the TAM is particularly well-suited for our research because it specifically addresses individuals' attitudes and intentions towards technology adoption (Silva, 2015), making it highly relevant for investigating student nurses' attitudes and intentions regarding AI adoption in nursing practice. In the TAM framework, perceived usefulness (PU) directly influences individuals' intentions to use technology. In our context, student nurses' perceptions of the usefulness of AI in nursing practice align with the concept of PU in TAM. According to TAM, the more students perceive AI as useful in their nursing practice, the higher their intention to adopt it. Therefore, TAM supports Hypothesis 1 by emphasizing the role of perceived usefulness in shaping intentions. Additionally, in TAM, attitudes (ATT) are a critical component that influences technology adoption intentions. Attitudes in TAM refer to an individual's overall positive or negative feelings toward using technology. In our context, student nurses' attitudes towards AI align with ATT in TAM. TAM also posits that PU directly affects ATT. Therefore, TAM supports Hypothesis 2 by explaining that perceived usefulness of AI in nursing practice can influence student nurses' attitudes towards AI, which, in turn, mediate their intentions to adopt AI technology. By using TAM as a theoretical framework, a comprehensive understanding of student nurses' attitudes, perceptions, and intentions towards AI adoption in nursing practice can be gained.