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Attitudes towards artificial intelligence and their association with innovative behaviour among diploma nursing students in selected state nursing training schools in Sri Lanka: a cross-sectional study

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Abstract

Background

Artificial intelligence (AI) is increasingly embedded in healthcare and education. Nursing students will enter AI-enabled clinical environments, yet evidence from Sri Lanka on their attitudes towards AI and how these relate to innovative behaviour is limited. This study assessed AI attitudes and innovative behaviour and examined their association among diploma nursing students in selected state nursing training schools in Sri Lanka.

Methods

A descriptive cross-sectional study was conducted among 282 diploma nursing students from Kalutara and Galle Nursing Training Schools using systematic random sampling. Data were collected using an expert-reviewed and pretested self-administered questionnaire comprising sociodemographic items, the 13-item Artificial Intelligence Attitude Scale, and the 10-item Innovative Work Behaviour Scale. Descriptive statistics and tests of normality were performed in IBM SPSS Statistics version 27. Because the total scores were not normally distributed, Spearman's rank-order correlation was used to examine the association between AI attitudes and innovative behaviour. Statistical significance was set at $p < 0.05$.

Results

Among 282 participants, 228 (80.9%) were female and 260 (92.2%) were third-year students. The mean AI attitude score was 44.32 (SD 4.65), and the mean innovative behaviour score was 35.73 (SD 4.79). AI attitude scores showed a weak but statistically significant positive correlation with innovative behaviour scores (Spearman's rho = 0.203, $p < 0.001$).

Conclusions

More favourable AI attitudes were associated with slightly higher innovative behaviour among diploma nursing students, although the association was weak and does not establish causality. The findings support consideration of structured, responsible AI literacy and innovation-focused learning activities in nursing education. Larger multi-site and longitudinal studies are needed to identify additional factors that shape innovative behaviour.

Background

Artificial intelligence (AI) is increasingly embedded in healthcare, with applications that can support clinical decision-making, administrative processes, patient engagement, and data-driven care [1, 2]. Its

growing role creates a need for future nurses to understand the capabilities and limitations of AI-enabled systems while maintaining critical thinking, professional judgement, and person-centred care. Evidence across medical, dental, and nursing education also indicates growing interest in AI and highlights the need for structured educational preparation [8].

Innovative behaviour refers to the intentional generation, promotion, and implementation of novel and useful ideas within a role, group, or organisation. In nursing and healthcare, innovative behaviour can contribute to improvements in learning, workflow, service delivery, and patient care. The Innovative Work Behaviour Scale developed by De Jong and Den Hartog conceptualises innovative work behaviour across opportunity exploration, idea generation, idea championing, and idea application [3].

Attitudes towards AI may be related to innovative behaviour because perceptions of emerging technologies can influence willingness to explore and apply new approaches. The Artificial Intelligence Attitude Scale developed by Aktay and colleagues assesses perceived benefits, risks, and use of AI [4]. Previous studies have reported links between AI-related perceptions, readiness, and innovation-related outcomes among nurses and nursing students [5–7].

The relationship between AI attitudes and innovative behaviour is likely to be complex. Human-AI collaboration depends on appropriate task delegation, awareness of system limitations, and effective interaction with AI tools [9, 10]. Innovative behaviour is also influenced by psychological resources, access to supportive job or learning resources, feedback, and social networks [11–13]. In healthcare education, responsible AI use additionally requires attention to safety, transparency, privacy, bias, and professional accountability [14, 15].

Evidence examining AI attitudes and innovative behaviour among diploma nursing students in Sri Lanka remains limited. This is important because these students will enter a healthcare workforce in which digital technologies are increasingly prominent. Understanding whether AI attitudes are associated with innovative behaviour may inform curriculum development and responsible AI literacy initiatives. Therefore, this study aimed to assess AI attitudes, assess innovative behaviour, and determine the association between AI attitudes and innovative behaviour among diploma nursing students in selected state nursing training schools in Sri Lanka.

Methods

Study design, setting and reporting

A descriptive cross-sectional study was conducted from August to December 2025 among diploma nursing students at Kalutara Nursing Training School and Galle Nursing Training School in Sri Lanka. The manuscript is reported in accordance with the Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) statement [16].

Participants and sampling

Diploma nursing students enrolled at the selected schools were eligible if they were willing to provide written informed consent. Male and female students were eligible; students who did not consent or withdrew were excluded. Systematic random sampling was used to select participants from student enrolment lists. The study protocol estimated a minimum sample of 384 using a single-proportion calculation with a 95% confidence level, 5% margin of error, and an assumed proportion of 50%; allowing 10% for non-response produced a target of 423 (Lwanga and Lemeshow, 1991). A total of 282 students were included in the final analysis(Table 1).

N = population

n = Initial sample size

n_{adj} = Adjusted sample size

Z = Critical value of the normal distribution at α/2 or the z value for the desired confidence level = 95% (1.96)

P = Previous proportion(unknown) = 0.50

d = Acceptable margin of error at 5% = 0.05

Step 1:

Sample size (n) = $Z^2 \times P (1- P)/ d^2$

n = $(1.96)^2 \times 0.5(1 - 0.5)/ (0.05)^2$

= 384.16

Including 10% non-respondent rate;

n = 384.16 + 38.41

n ≈ 423

Step 2:

As the population is finite (N = 766), the sample size was adjusted (n_{adj}) using the finite population correction (FPC) formula (Naing, Winn & Rusli 2006).

Accordingly, adjusted sample size;

n_{adj} = n/ 1+[(n-1)/ N]

= 423/ 1+ [(384.16 -1)/766]

= 282

Table 1
Participant sampling

Name of the Nursing School	Number of all diploma nursing students	Number of nursing students included in the study
1. School of Nursing, Kandana	550	212
2. School of Nursing, Kalutara	216	80
Total number	766	282

Study instrument

Data were collected using a self-administered questionnaire with three sections. Section A collected sociodemographic information. Section B used the 13-item Artificial Intelligence Attitude Scale developed by Aktay et al. [4], including items on perceived benefits, risks, and use of AI; negatively worded items 4–7 were reverse scored. Section C used the 10-item Innovative Work Behaviour Scale developed by De Jong and Den Hartog [3], covering opportunity exploration, idea generation, idea championing, and idea application. Both scales were administered using five-point Likert-type response options, as specified in the study protocol, with higher total scores representing more favourable AI attitudes and greater innovative behaviour, respectively.

The questionnaire was prepared in English and translated into Sinhala and Tamil, followed by back-translation into English to assess consistency. Content and wording were reviewed by nursing experts for suitability to the local context. The questionnaire was pretested among 30 diploma nursing students who were not included in the final analysis.

Data collection

Following ethical approval and institutional permission, eligible students were informed about the study purpose and procedures and invited to participate voluntarily. Written informed consent was obtained before questionnaire administration. Participants completed the questionnaire in their preferred language (Sinhala, Tamil, or English). Completed questionnaires were collected by the research team, checked for completeness, anonymised, and stored securely in accordance with the study protocol.

Statistical analysis

Data were coded and analysed using IBM SPSS Statistics version 27. Sociodemographic characteristics were summarised using frequencies and percentages. Total AI attitude and innovative behaviour scores

were summarised using means, standard deviations, and medians. Distributional assumptions were assessed using Kolmogorov-Smirnov and Shapiro-Wilk tests. Both total score distributions showed statistically significant departures from normality; therefore, Spearman's rank-order correlation was used to examine the association between AI attitude and innovative behaviour scores. All reported analyses used 282 complete cases. Statistical significance was set at a two-sided $p < 0.05$.

Use of generative AI in manuscript preparation

ChatGPT (OpenAI) was used for language editing, organisation, and formatting of manuscript text based on the authors' study materials. It was not used to generate or analyse study data. The authors reviewed the resulting manuscript and take responsibility for the accuracy, integrity, references, interpretations, and declarations in the final submitted version.

Results

Participant characteristics

A total of 282 participants were included in the analysis. Most participants were female (n = 228, 80.9%), while 54 (19.1%) were male. The sample was predominantly composed of third-year students (n = 260, 92.2%), with 22 (7.8%) in the second year. Of the participants, 192 (68.1%) were from Kalutara Nursing Training School and 90 (31.9%) were from Galle Nursing Training School (Table 2).

Table 2
Participant characteristics

Characteristic	Category	n	%
Gender	Male	54	19.1
	Female	228	80.9
Academic year	Second year	22	7.8
	Third year	260	92.2
Nursing training school	Kalutara	192	68.1
	Galle	90	31.9

AI attitudes and innovative behaviour

The mean total AI attitude score was 44.32 (SD 4.65), with a median of 45.00. The mean innovative behaviour score was 35.73 (SD 4.79), with a median of 36.00. Kolmogorov-Smirnov and Shapiro-Wilk tests were statistically significant for both total scores, indicating departures from normality and supporting use of a non-parametric correlation analysis (Table 3).

Table 3
Distribution of study scores

Measure	Mean (SD)	Median	Kolmogorov-Smirnov p	Shapiro-Wilk p
AI attitude total score	44.32 (4.65)	45.00	< 0.001	0.004
Innovative behaviour total score	35.73 (4.79)	36.00	< 0.001	< 0.001

Association between AI attitudes and innovative behaviour

Spearman's rank-order correlation showed a weak but statistically significant positive association between AI attitude and innovative behaviour scores (rho = 0.203, p < 0.001; n = 282). Thus, more favourable AI attitudes were associated with slightly higher innovative behaviour scores, although the magnitude of the association was small (Table 4).

Table 4
Correlation between AI attitudes and innovative behaviour

Variables	Spearman's rho	p value	n
AI attitude score vs innovative behaviour score	0.203	< 0.001	282

Discussion

This study examined AI attitudes and innovative behaviour among diploma nursing students in selected state nursing training schools in Sri Lanka. The principal finding was a weak but statistically significant positive association between AI attitude and innovative behaviour scores. The small correlation indicates that AI attitudes are related to, but account for only a limited proportion of, differences in innovative behaviour. Because the study was cross-sectional, the direction of this relationship cannot be established.

The positive association is broadly consistent with emerging evidence in nursing. Li et al. reported that medical explainable AI was associated with nurses' innovation behaviour [5], while Mohammed et al. identified relationships between nurses' perceptions of AI and innovative work behaviours [6]. Among nursing students, Kazanc et al. found a positive relationship between individual innovativeness and readiness for medical AI [7]. A systematic review and meta-analysis of medical, dental, and nursing students also found substantial interest in AI while identifying gaps in knowledge and educational preparation [8]. Although these studies used different populations and constructs, they support further investigation of the links between engagement with AI and innovation-related dispositions.

The findings should not be interpreted to mean that favourable AI attitudes alone will produce innovative practice. Effective human-AI collaboration requires appropriate delegation, understanding of system limitations, and interaction designs that support calibrated reliance [9, 10]. In healthcare, responsible AI

literacy should also include verification of AI-generated information and consideration of ethical issues such as safety, privacy, transparency, bias, and accountability [14, 15]. These competencies are particularly important for nursing students, who must integrate digital tools with evidence-based and person-centred clinical judgement.

The weak magnitude of the association is plausible because innovative behaviour is influenced by multiple personal and contextual factors. Psychological capital, including self-efficacy, hope, resilience, and optimism, can support innovative behaviour [11]. Access to supportive resources such as autonomy, feedback, and recognition may also influence whether new ideas are generated and implemented [12], while social networks can shape access to information and creative opportunities [13]. Future research should therefore use multivariable models that include digital competence, previous AI exposure, educational climate, mentorship, and other potential determinants.

The findings have practical implications for nursing education. Structured AI literacy can be paired with innovation-focused learning activities such as case analysis, simulation, problem-based learning, quality-improvement projects, and assignments requiring students to compare AI-generated suggestions with authoritative clinical evidence. Such approaches may help students move beyond passive AI use towards critical, creative, and professionally accountable engagement. These educational implications should be evaluated prospectively rather than interpreted as proven effects of AI exposure from the present cross-sectional findings.

Strengths and limitations

This study addresses an underexplored topic in Sri Lankan nursing education and used established instruments to examine AI attitudes and innovative behaviour. Use of a non-parametric correlation was appropriate for the observed score distributions. Several limitations should be considered. First, the cross-sectional design prevents causal or directional inference. Second, self-administered measures may be affected by social desirability and response bias. Third, participants were drawn from only two state nursing training schools, and the sample was heavily weighted towards third-year students and female participants, limiting generalisability. Fourth, the final analysed sample of 282 was below the protocol target of 422, which may have reduced precision. Finally, the analysis was bivariate and did not adjust for potential confounding factors such as academic year, prior digital training, or previous AI exposure.

Conclusions

AI attitudes were weakly but significantly associated with innovative behaviour among diploma nursing students in selected state nursing training schools in Sri Lanka. The modest association suggests that innovative behaviour is likely shaped by multiple factors beyond attitudes towards AI. Nursing education may benefit from integrating structured, responsible AI literacy with learning activities that promote critical thinking, clinical creativity, and innovation. Larger multi-site and longitudinal studies are needed

to examine causal pathways and identify educational and organisational factors that support innovative behaviour in technology-rich nursing environments.

Abbreviations

AI
Artificial intelligence
IWB
Innovative Work Behaviour
SPSS
Statistical Package for the Social Sciences
SAQ
Self-administered questionnaire

Declarations

Ethics approval and consent to participate

Ethical approval was obtained from the Ethics Review Committee, Faculty of Medicine, University of Colombo (Approval no.EC-25-149, approved on September 18, 2025). Written informed consent was obtained from all participants before data collection. The study was conducted in accordance with applicable institutional ethical requirements.

Consent for publication

Not applicable.

Competing interests

The authors declare that they have no competing interests.

Authors' information

GYCW, WILK and PATR are undergraduate nursing students at the Faculty of Nursing, University of Colombo. TA is affiliated with the Department of Fundamental Nursing, Faculty of Nursing, University of Colombo.

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Author Contribution

GYCW, WILK and PATR contributed to the conceptualisation and design of the study, participant recruitment and data collection, data management and analysis and interpretation of the findings. GYCW mainly prepared the original manuscript draft. TA supervised the study, contributed to the study methodology and interpretation of the findings, and critically reviewed and revised the manuscript for important intellectual content. All authors reviewed and approved the final manuscript and agreed to be accountable for the accuracy and integrity of the work.The initials correspond to:GYCW – Godage Yasasvi Chathurya WickramanayakeWILK – Isuru Lakshan KureraPATR – Ponnamperuma Arachchige Thisara RandikaTA – Thanuja Asurakkody

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Data Availability

The datasets generated and/or analysed during the current study are available from the corresponding author on reasonable request.

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