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Perceptions of artificial intelligence among nursing students: an exploratory study comparing full-time and part-time students

Postrzeganie sztucznej inteligencji przez studentów pielęgniarstwa: badanie eksploracyjne porównujące studentów studiów stacjonarnych i niestacjonarnych

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STRESZCZENIE

POSTRZEGANIE SZTUCZNEJ INTELIGENCJI PRZEZ STUDENTÓW PIELĘGNIARSTWA: BADANIE EKSPLORACYJNE PORÓWNUJĄCE STUDENTÓW STUDIÓW STACJONARNYCH I NIESTACJONARNYCH

Cel pracy. Celem badania było zbadanie postrzegania sztucznej inteligencji (AI) przez słoweńskich studentów pielęgniarstwa oraz porównanie różnic między studentami studiów stacjonarnych i niestacjonarnych.

Materiał i metody. W okresie od 4 października do 12 grudnia 2024 r. przeprowadzono przekrojową ankietę internetową wśród 95 studentów pierwszego roku pielęgniarstwa na Uniwersytecie Primorska w Słowenii. Postrzeganie sztucznej inteligencji mierzono za pomocą udoskonalonej i zweryfikowanej słoweńskiej wersji kwestionariusza Shinners Artificial Intelligence Perception (SHAIP).

Wyniki. Ogólna średnia punktacja w skali SHAIP wskazywała na neutralny stosunek do sztucznej inteligencji (M = 3,23 na 5, SD = 0,69). Nie stwierdzono istotnych różnic w ogólnej średniej punktacji między studentami studiów stacjonarnych a niestacjonarnych (p = 0,095) ani między płciami (p = 0,258). Jednak studenci studiów stacjonarnych uzyskali istotnie wyższy wynik w zakresie czynnika „Postrzeganie wpływu na środowisko zawodowe" (p = 0,031).

Wnioski. Studenci pielęgniarstwa w Słowenii mają ogólnie neutralny stosunek do sztucznej inteligencji. Różnice między studentami studiów stacjonarnych a niestacjonarnych wskazują, że ci drudzy mogą być mniej świadomi wpływu sztucznej inteligencji na ich zawód, co podkreśla potrzebę przeprowadzenia ukierunkowanych szkoleń. Udoskonalona słoweńska wersja narzędzia SHAIP wykazała odpowiednią trafność i rzetelność.

Słowa kluczowe: edukacja, postrzeganie, studenci pielęgniarstwa, sztuczna inteligencja, SHAIP

ABSTRACT

PERCEPTIONS OF ARTIFICIAL INTELLIGENCE AMONG NURSING STUDENTS: AN EXPLORATORY STUDY COMPARING FULL-TIME AND PART-TIME STUDENTS

Aim. The study aimed to explore Slovenian nursing students' perceptions of Artificial Intelligence (AI) and to compare differences between full-time and part-time students.

Material and methods. A cross-sectional online survey was conducted between 4 October and 12 December 2024 among 95 first-year nursing students at the University of Primorska, Slovenia. Perceptions were measured using a refined and validated Slovenian version of the Shinners Artificial Intelligence Perception (SHAIP) questionnaire.

Results. The overall mean SHAIP score indicated a neutral perception of AI (M = 3.23 out of 5, SD = 0.69). No significant differences in the overall mean score were found between full-time and part-time students (p = 0.095), or between genders (p = 0.258). However, full-time students scored significantly higher on the Perception of Professional Impact factor (p = 0.031).

Conclusions. Nursing students in Slovenia generally hold a neutral perception of Artificial Inteligence. Differences between full-time and part-time students suggest that the latter may be less aware of the professional impact of AI, which highlights the need for targeted training. The refined Slovenian version of the SHAIP instrument demonstrated adequate validity and reliability.

Key words: education, perception, nursing students, artificial intelligence, SHAIP

INTRODUCTION

Artificial intelligence (AI) is becoming indispensable in modern healthcare systems and has the potential to fundamentally transform nursing practice [1]. The use of AI – ranging from automation of administrative tasks to supporting clinical decisions – is significantly contributing to greater efficiency of healthcare organisations and improved treatment outcomes [2]. Healthcare professionals, including nurses as key providers of healthcare services, are increasingly required to use new information and communication technologies (ICT) in clinical practice. This demands additional knowledge, digital competences and the ability to critically evaluate the results provided by AI systems [3].

One of the most promising impacts of AI in health care is improved quality and accessibility of care [4]. Using big data analytics, AI can help identify clinical patterns more quickly, predict complications and optimise patient pathways. This not only reduces waiting times and administrative burdens, but also enables more targeted and personalised patient care [2]. In addition, AI has been successfully integrated into mental health care, virtual care and diagnostic support systems, thereby further augmenting the role of health professionals in interdisciplinary teams [5].

A significant number of nursing staff hold positive perceptions about the potential of AI, particularly in terms of improving diagnostics, planning treatment and streamlining administrative tasks [6]. Younger healthcare staff, especially those with stronger digital skills and AI experience, tend to demonstrate greater AI knowledge and confidence in the technology [7]. There is a strong correlation between the level of AI knowledge and a positive attitude towards its use [7].

However, the majority of nurses consider their AI knowledge to be limited and report a need for further training opportunities in this field [6]. Nurses often rely on informal sources of information, such as unverified websites and conversations with colleagues, which highlights the need for structured, accessible and professionally prepared training programmes [6].

While nurses are already experiencing the benefits and challenges of AI in practice, it is also crucial to consider how future generations of nurses will adapt to these changes. Therefore, examining the perceptions of nursing students, as future healthcare providers of the use of AI in nursing practice is essential for an effective introduction of AI into clinical practice [8]. Several studies have investigated nursing students' perceptions and attitudes towards AI [9-13]. In this context, only a few studies have employed validated, widely used instruments: e.g., the Shinners Artificial Intelligence Perception (SHAIP) tool, the Attitudes towards AI Technology Scale, and the General Attitudes towards Artificial Intelligence Scale – GAAIS [14-21].

The present study focuses on perception toward AI, rather than attitude, is based on the conceptual structure of the Technology Acceptance Model (TAM) [22]. According to Schorr, perception refers to users' cognitive interpretation and understanding of a technology - how they perceive its characteristics and implications, whereas attitude reflects a subsequent evaluative judgment towards using that technology [23]. Perception acts as the antecedent that determines the user's attitude [22]. Thus, the focus on perception is theoretically justified, as it captures the primary cognitive stage that shapes later evaluative and behavioural responses, rather than conflating this stage with attitude as a related but downstream construct.

Based on our literature review, no study has examined the differences in the perceptions of AI between full-time students and their older part-time counterparts. These differences are pedagogically significant because the two groups operate within distinct learning and temporal contexts, shaping their learning strategies, motivation, and how they relate course content to future professional practice [24]. Investigating and comparing the perceptions of these two groups of students is essential for designing effective formal and informal curricula and for understanding students' acceptance of AI. This exploratory study addresses this gap by assessing these differences using a validated instrument. Therefore, we pose the following research question:

What are the differences in the perception of AI between younger, full-time students and older, part-time students?

MATERIALS AND METHODS

Study design

A cross-sectional survey was conducted among nursing students using a convenience sample. Data were collected online using a validated questionnaire measuring perceptions of AI.

A total of 131 full-time and 39 part-time first-year Nursing students at the University of Primorska, Faculty of Health Sciences in Slovenia, were invited to complete the questionnaire at the beginning of the Informatics in Nursing course.

The required sample size was estimated using an a priori statistical power calculation for a two-tailed Wilcoxon–Mann–Whitney test (two independent groups). The calculation assumed a medium effect size (d = 0.5), an alpha level of 0.05, a power of 0.80, and an allocation ratio of 3.36 between the two groups. Using the GPower 3.1.9.7 software, we calculated that 44 participants were needed in group 1 and 146 in group 2, resulting in a total sample size of 190 [25]. However, as the study relied on a convenience sample that included all first-year Nursing students, it was not possible to reach the optimal sample size beyond the available population of 131 students. Despite several reminders and the voluntary nature of participation, the final sample consisted of 58 full-time and 37 part-time students, which is an important limitation of the study. The response rates were: a total of 55.9%, full-time students 44.3%, and part-time students 94.9%. We acknowledge that the achieved sample size did not meet the a priori estimate, which may reduce the statistical power and should be considered when interpreting the results. Participants' demographic characteristics are presented in Table 1. There was a statistically significant

difference in mean age between full-time and part-time students (t(43.57) = -3.68, p = 0.001), but no difference in gender distribution between the two groups ($\chi^2(1)=0.315$, p = 0.574). The gender distribution, characterized by a predominance of female participants, as well as the proportion of full-time students, reflects the actual enrolment structure of the institution and is consistent with that observed at other Slovenian public universities.

■ Tab. 1. Demographic data of the participants

Parameter	Type of study		Total
	Full-time (n = 58)	Part-time (n = 37)	
Gender n (%):			
• Male	12 (20.7%)	9 (24.3%)	21 (22.1%)
• Female	46 (79.3%)	26 (70.3%)	72 (75.8%)
• N/A	/	2 (5.4%)	2 (2.1%)
Age:			
• M (SD)	20.64 (5.05)	27.26 (9.76)	23.09 (7.80)

Instruments

The first part of the questionnaire consisted of demographic questions (e.g., full-time/part-time students, gender, age). The second part comprised a Slovenian version of the validated SHAIP questionnaire for measuring healthcare professionals' perceptions of AI [26]. This instrument was chosen as it is the only tool measuring perception rather than attitudes towards AI, it is adapted to healthcare professionals and has been translated and validated for use in Slovenian from the original English version [19]. Permission to use the instrument was obtained from the corresponding author of the translated version. The SHAIP questionnaire consists of ten items, presented in Table 2, measuring participants' current perceptions of AI. Students' responses were rated on a five-point Likert scale, with 1 representing complete disagreement and 5 representing complete agreement. In the present study we adopted the translation by Praprotnik, where in the first phase, three independent translators translated the questionnaire from English into Slovenian [26]. The translated versions were compared and merged into a single consolidated Slovenian version. This version was then back-translated into English by an independent translator and compared with the original version. Minor adjustments were made to synthesise the proposed changes. In the second phase, the final version was assessed for validity and reliability with 270 Slovenian nursing professionals [26]. Internal consistency was acceptable (Cronbach's $\alpha = 0.76$). Test–retest reliability, performed on a subsample of 48 respondents, showed no statistically significant differences between test and retest responses. Validity was supported in several ways. Content validity was high (S-CVI/Ave = 0.91). Concurrent validity was demonstrated by a significant correlation between the overall SHAIP score and attitudes toward the use of AI technology. Structural validity was confirmed using both exploratory (EFA) and confirmatory factor analyses (CFA), which showed a good model fit ($\chi^2(17) = 31$, p = 0.018; RMSEA = 0.062, 95% CI [0.025, 0.095]; GFI = 0.995; NFI = 0.991; CFI = 0.996). However, the mentioned study recommended to reconsider the items 9 and 10. In fact, these were excluded as the EFA revealed that no factors loaded on these two items [26]. Accordingly, we consulted two additional experts: one psychologist and one expert in questionnaire design. According to their recommendations, we slightly modified the two items. Appendix presents the refined Slovenian version of SHAIP, including the two modified items along with a description of their modifications. Two experts in the Slovenian language reviewed the translated items and confirmed their validity. Furthermore, a face validity was performed on six nursing professional who assessed the final instrument for clarity.

■ Tab. 2. Refined Slovenian version of SHAIP

Item		
No.	**English version**	**Slovenian version**
1	I believe that the use of AI in my specialty could improve the delivery of patient care.	Menim, da bi uporaba umetne inteligence v moji stroki lahko izboljšala oskrbo pacientov.
2	I believe that the use of AI in my specialty could improve clinical decision making.	Menim, da bi uporaba umetne inteligence v moji stroki lahko izboljšala klinično odločanje.
3	I believe that AI can improve population health outcomes.	Menim, da lahko uporaba umetne inteligence izboljša zdravstvene izide splošne populacije.
4	I believe that AI will change my role as a healthcare professional in the future.	Menim, da bo uporaba umetne inteligence v prihodnosti spremenila mojo vlogo zdravstvenega delavca.
5	I believe that the introduction of AI will reduce financial cost associated with my role.	Menim, da bo uvedba umetne inteligence zmanjšala finančne stroške, povezane z mojo vlogo.
6	I believe that overall healthcare professionals are prepared for the introduction of AI technology.	Menim, da so zdravstveni delavci na splošno pripravljeni na uvedbo tehnologije umetne inteligence.
7	I believe that one day AI may take over part of my role as a healthcare professional.	Menim, da bo umetna inteligenca nekega dne prevzela del moje vloge zdravstvenega delavca.
8	I believe that I have been adequately trained to use AI that is specific to my role.	Menim, da sem bil(a) ustrezno usposobljen(a) za uporabo umetne inteligence na svojem področju.
9	I believe there is an ethical framework in place for the use of AI technology in my workplace.	Menim, da bi moral obstajati etični okvir za uporabo tehnologije umetne inteligence na mojem delovnem mestu.*
10	I believe that should AI technology make an error; full responsibility lies with the healthcare professional.	Menim, da se mora zdravstveni delavec zavedati, da je končna odgovornost za uporabo rezultatov umetne inteligence v praksi izključno njegova.*

Legend: * item was adapted according to the Praprotnik [26] recommendations, where item 9 was "*Menim, da obstaja etični okvir za uporabo tehnologije umetne inteligence na mojem delovnem mestu*" and item 10 "*Menim, da je v primeru napake tehnologije umetne inteligence, zanjo v celoti odgovoren zdravstveni delavec.*".

To test concurrent validity, four items measuring Attitude toward AI were adapted from the construct Attitude toward Technology and translated into Slovenian [26,27]. According to TAM, we expected a significant positive correlation between this construct and Perception toward AI, as measured by the SHAIP questionnaire [22]. Validity and reliability assessments of the refined Slovenian version of SHAIP are presented in the Results section.

Data collection

Data were collected between 4 October and 12 December 2024. The online questionnaire was distributed to the participants of the mentioned course via email. After one week and again after one month, participants were sent a reminder to complete the questionnaire. The questionnaire included optional questions, therefore not all participants responded to every item. Due to these missing values, all relevant results are presented together with the corresponding sample size. Potential sources of bias include the use of a convenience sample from a single institution and self-reported data, which may limit the generalizability of the findings.

Data analysis

First, a univariate analysis was conducted. Frequencies and relative frequencies were calculated for the descriptive variables, and the mean (M), standard deviation (SD), median (Me), first and third quartiles (Q1 and Q3) were calculated for the numerical variables. Due to significant deviation from normality in the variables associated with the ten SHAIP items, non-parametric statistics were used to assess the differences in AI perceptions between genders and between full-time and part-time students, specifically the Mann–Whitney U test. Effect size (ES) was calculated and interpreted according to [28]. The level of statistical significance was set at 0.05. For item-level comparisons, a Bonferroni correction for multiple testing was applied ($\alpha' = 0.05/10 = 0.005$). EFA (extraction method: maximum likelihood) and CFA were performed to assess the construct validity and Cronbach's alpha was calculated to evaluate internal consistency. The commonly recommended ratio of ten participants per item was applied to determine the minimum sample size for the EFA. Correlations were calculated by using Spearman signed rank coefficient.

Ethical considerations

The study was conducted in accordance with the Declaration of Helsinki and was approved by the Commission of the University of Primorska for Ethics in Human Subjects Research (Approval No./ 4264-19-6/23). Participation in the study was voluntary, and participants were informed of the right to withdraw from the study at any time without consequences. Before completing the questionnaire, participants were asked to read the aims and details of the study as well as relevant ethical considerations. Participants provided informed consent to participate in the study by checking a checkbox. None of the participants refused to participate. No financial support was received for the study.

RESULTS

Validity and reliability assessment

Exploratory factor analysis (EFA) revealed four factors (Table 3), explaining 63.3% of the variance. Bartlett's test of sphericity was statistically significant ($p < 0.001$), and the Kaiser-Meyer-Olkin measure of sampling adequacy was 0.727, indicating that the sample was adequate for the analysis. Other similar studies reported a two-factor structure instead of four-factor structure [19,29,30]. Despite the distinct difference in the number of factors, the substantive interpretation revealed clear conceptual convergence: factors 1 and 3 reflect the Perception of Professional Impact, while factors 2 and 4 relate to the Perception of Preparedness for AI (Table 2).

Tab. 3. EFA (rotated solution)

No.	Item	Factors			
		1	2	3	4
1	I believe that the use of AI in my specialty could improve the delivery of patient care.	0.836			
2	I believe that the use of AI in my specialty could improve clinical decision making.	0.908			
3	I believe that AI can improve population health outcomes.	0.854			
4	I believe that AI will change my role as a healthcare professional in the future.			0.718	
5	I believe that the introduction of AI will reduce financial cost associated with my role.	0.463		0.509	0.397
7	I believe that one day AI may take over part of my role as a healthcare professional.			0.511	
6	I believe that overall healthcare professionals are prepared for the introduction of AI technology.				0.572
8	I believe that I have been adequately trained to use AI that is specific to my role.				0.727
9	I believe there is an ethical framework in place for the use of AI technology in my workplace.		0.980		
10	I believe that should AI technology make an error; full responsibility lies with the healthcare professional.		0.531		
Eigenvalue		2.579	2.579	1.203	1.177
% of variance explained		25.8%	13.7%	12.0%	11.8%

Extraction method: Maximum likelihood, item loadings < 0.4 were suppressed

The CFA was conducted based on the EFA results. The final measurement model demonstrated good fit indices ($\chi^2/df = 1.783$; CFI = 0.94 > 0.90, SRMR = 0.0611 < 0.08, and RMSEA = 0.094 < 0.10). Factor loadings were satisfactory (> 0.5), except for the item 7, which was slightly below 0.5. Overall, the model showed adequate construct reliability and validity, ensuring a robust measurement structure (Table 4).

Tab. 4. CFA and internal consistency analysis results

Factor	Item	Loading	SE	Z	p	Cronbach α
Factor 1	3	1.000				0.924
	1	0.901	0.0779	11.58	< .001	
	2	0.961	0.0704	13.65	< .001	
Factor 2	9	1.000				0.684
	10	0.810	0.3692	2.19	0.028	
Factor 3	5	1.000				0.686
	4	0.598	0.1364	4.39	< .001	
	7	0.401	0.1434	2.80	0.005	
Factor 4	8	1.000				0.581
	6	0.793	0.3048	2.60	0.009	

α fixed parameter

Based on these results, we decided to retain a two-factor structure to allow the comparability with other studies. These subfactors are discussed further in the manuscript. The Cronbach's alpha coefficient for the items measuring Perception of Professional Impact (items 1-5 and 7) was 0.852, indicating excellent internal consistency. For items measuring Perception of Preparedness for AI (items 6, 8-10), the coefficient was 0.563, which, according to Pallant, can still be considered acceptable in exploratory research, reflecting a moderate level of reliability [31]. The overall Cronbach's alpha including all ten items was 0.804.

Spearman's rank correlations between the construct Attitude toward AI and the SHAIP questionnaire scores showed significant positive associations, supporting the expected theoretical relationship and providing evidence of acceptable concurrent validity. The correlations were as follows: overall mean score: rs = 0.532, n = 85, p < 0.001, Perception of Professional Impact: rs = 0.476, n = 85, p < 0.001, and Perception of Preparedness for AI: rs = 0.403, n = 92, p < 0.001. Although these correlations support concurrent validity, they do not represent comparison with a gold-standard instrument, as no fully validated measure of Perception towards AI currently exists in Slovenian language.

Differences in the perception of AI

The overall mean score of the SHAIP questionnaire was M = 3.23 (SD = 0.69, Me = 3.20, Q1 = 2.90, Q3 = 3.65), indicating a neutral perception of the use of AI in nursing students. The results of the Mann–Whitney U test showed no statistically significant differences in the overall mean scores, between full-time and part-time students (Table 5, p = 0.095), nor between genders (Table 5, p = 0.258). No significant correlation was identified between participants' age and the overall mean SHAIP score (rs = -0.055, n = 87, p = 0.611).

The mean scores of individual factors were as follows: Perception of Professional Impact (items 1-5 and 7) with M = 3.24 (SD = 0.84, Me = 3.33, Q1 = 2.83, Q3 = 3.83), and Perception of Preparedness for AI (items 6, 8-10) with M = 3.22 (SD = 0.70, Me = 3.25, Q1 = 3.00, Q3 = 3.50). Statistically significant differences were found in the mean rank scores for Perception of Professional Impact (Table 5, p = 0.031), where Me, Q1 and Q3 were higher for full-time than part-time students, ES was 0.233, indicating small to medium effect. This suggests that full-time students perceive the impact of AI on the nursing profession more positively than their part-time counterparts, while perceptions of preparedness for AI remain comparable between the two groups. Regarding gender differences, no statistically significant differences were identified in the mean score of the individual factors (Table 5). The overlapping interquartile ranges further indicate substantial similarity in AI perceptions between male and female students.

The correlation between age and both SHAIP factors were not statistically significant (Perception of Professional Impact: rs = -0.082, n = 87, p = 0.457, Perception of Preparedness for AI: rs = 0.054, n = 84, p = 0.623). A detailed analysis of individual items showed no statistically significant differences in the perception of AI between full-time and part-time students, nor between genders. Overall, this indicates that nursing students' perceptions of AI is largely homogeneous across demographic groups, with the exception of professional impact perceptions differing by study status.

Tab. 5. Differences in AI perceptions of full-time and part-time students and genders

Comparison	SHAIP overall mean score		Perception of Professional Impact (items 1-5 and 7)		Perception of Preparedness for AI (items 6, 8-10)	
	n	Me (Q1, Q3)	n	Me (Q1, Q3)	n	Me (Q1, Q3)
Full-/part- time students						
Full-time	58	3.30 (3.00, 3.70)	58	3.33 (3.00, 3.83)	57	3.25 (3.00, 3.50)
Part-time	31	3.10 (2.56, 3.60)	31	3.00 (2.33, 3.50)	29	3.25 (3.00, 3.50)
Mann-Whitney U test	U = 705.5 p = 0.095		U = 649.0 p = 0.031*		U = 808.5 p = 0.868	
Gender						
Male	20	3.60 (2.80, 3.85)	20	3.58 (2.50, 4.17)	17	3.50 (3.25, 3.75)
Female	67	3.20 (2.90, 3.60)	67	3.17 (2.83, 3.50)	67	3.25 (3.00, 3.50)
Mann-Whitney U test	U = 558.0 p = 0.258		U = 558.0 p = 0.257		U = 418.0 p = 0.087	

Legend: Me – Median, Q1 – Quartile 1, Q3 – Quartile 3
Note: The statistically significant difference is indicated by an asterisk (*).

DISCUSSION

The present study examined Slovenian nursing students' perceptions of AI, comparing full-time (younger) students with part-time (older) students.

As presented in the Results section, the overall mean score of the SHAIP questionnaire was approximately at the midpoint of the scale (M = 3.23), with a relatively low SD of 0.69, indicating a generally consistent neutral attitude towards AI. This finding is consistent with the results of an earlier study conducted among Slovenian nurses, where the mean score was precisely at the midpoint of the scale (M = 3.00) with a similarly low standard deviation (SD = 0.61) [26]. As these are the only two Slovenian studies based on the SHAIP tool, it can be assumed that this neutral stance reflects the current perception of AI in the Slovenian nursing context. Interestingly, no differences in the mean score were identified between full-time and part-time nursing students. A neutral overall SHAIP score may indicate that students have not yet integrated AI into coherent beliefs about how learning, assessment, and clinical or professional roles may evolve. This may be partly explained by time constraints, which, according to MacCann, can limit exploratory engagement with new tools that is essential for such integration [32].

The mean score for the Perception of Professional Impact factor (M = 3.24) is consistent with the study conducted among healthcare professionals in Australia (M = 3.66), mental health professionals in Saudi Arabia

(M = 3.63), and nurse leaders in Saudi Arabia (M = 3.72) [19,29,30]. The mean score for the Preparedness for AI factor (M = 3.22) was similar to both Saudi Arabian studies: M = 3.32, M = 3.38; and considerably higher than the mean score in the Australian study M = 2.67 [19,29,30]. It should be noted that the two Saudi Arabian studies, published three years after the Australian study, suggest a shift towards greater AI preparedness, likely reflecting changes in practices and education in this field over that period.

Our results show no statistically significant differences in the overall mean score of the SHAIP questionnaire between full-time and part-time students. As no previous studies have compared these two populations, we can partially compare our results with the study by Omari et al., in which no significant correlation was identified between age and the aforementioned score [33]. However, we observed a significant difference in the mean score for the Perception of Professional Impact factor between full-time and part-time students (Table 5), with an effect size of 0.233, indicating a small to medium effect. Understanding AI's professional impact often requires additional time to explore workflows, redesign roles, and consider long-term employability implications, a curriculum that assumes additional discretionary time may inadvertently advantage full-time students in forming clearer professional impact judgments [32]. Similarly, Sharif et al. reported a significant difference in the mean score for this factor between different age groups [30]. In their study, the mean score for students under 20 years of age (M = 3.60) was slightly higher than for those aged 21–30 years (M = 3.41). Given that in our study the mean age was 20.64 for full-time students and 27.26 for part-time students (Table 1), we can assume that the results of our study (Table 5) and those of Sharif et al. show a similar pattern, namely a negative difference in the Perception of Professional Impact between younger and older students [30]. These results are in contrast with the findings of Shinners et al., where age was not a significant predictor of the Perception of Professional Impact [34]. Our results show no statistically significant correlation between age and the Perception of Professional Impact. This suggests the need for a more detailed study to clarify the underlying reasons for the differences observed between full-time and part-time students, which may not be attributable to age alone. Furthermore, a comparison of the Perception of Professional Impact between genders (Table 5) revealed no significant differences, which is consistent with the results of the Saudi Arabian study and the Australian study by Shinners et al. [30,34].

Finally, our results show that the mean rank for the Perception of Preparedness for AI factor did not differ significantly between full-time and part-time students, nor between genders (Table 5). This is consistent with the results of previous studies, where neither age nor gender proved to be a significant predictor of the factor [30,34].

Another important contribution of this study is the refinement of the Slovenian SHAIP instrument, whose validity and reliability were confirmed by improvements to the earlier version by Praprotnik [26]. However, the factor analysis revealed four factors instead of two [19,34]. Factor analyses in Tables 3 and 4 show that the items comprising the Perception of Professional Impact loaded on factor 1, with items 1–3 representing the impact of AI on healthcare outcomes, and on factor 3, with items 4, 5, and 7 representing the impact of AI on nurses' professional role. In addition, items encompassing the Perception of Preparedness for AI loaded onto factor 2, with items 6 and 8 reflecting competences in AI use, and onto factor 4, which relates to legal and ethical concerns about the use of AI. However, the results of the internal consistency analysis indicate that the four factors can be combined into two, as in previous studies.

Several methodological limitations should be considered when interpreting the findings of this study. Firstly, a cross-sectional design was employed, providing only a snapshot of the phenomena at a single point in time and thus limiting the ability to infer temporal relationships or causality. A longitudinal study involving cohorts of nursing students and professionals would likely provide additional insights into changes in perceptions of AI in nursing over time. Secondly, this study relied on convenience sampling from a single Slovenian university, which inherently limits the generalisability of the findings. Institutional, organisational, and cultural characteristics specific to this setting may have shaped participants' responses and contributed to the observed patterns. Consequently, the results should be interpreted with caution and understood as exploratory rather than confirmatory. Although students from different regions of Slovenia participated in the study, future research should be conducted on larger, probability-based, and multi-institutional samples to enhance external validity and support broader generalisation. Thirdly, the use of self-report instruments may lead to response bias. Self-selection bias is possible, as participants who chose to take part in the study may differ systematically from non-participants, potentially affecting the representativeness of the sample. In addition, social desirability bias may have influenced responses, as participants may have reported behaviours or attitudes perceived as socially acceptable. Therefore, the findings should be interpreted with caution. Future studies could reduce these biases by incorporating additional data sources or alternative measurement approaches.

CONCLUSIONS

This exploratory study highlights differences in the perceptions of AI between full-time and part-time nursing students. Overall, students expressed a neutral stance towards the use of AI in nursing and its potential applications in health care. However, the two groups of students also showed notable differences in their perception of Professional Impact, which was higher among full-time than part-time students. Nursing curricula should consider tailored interventions to address the needs of both groups and foster critical thinking about AI applications. Potential directions include integrating structured AI literacy modules, ethical and legal case-based learning, and hands-on exposure to clinical AI applications, with tailored approaches that address the differing time availability,

professional experience, and learning contexts of full--time and part-time nursing students. By preparing future nurses to effectively use emerging technologies, healthcare systems can better leverage AI to improve patient outcomes, streamline workflows, and support safe and ethical healthcare delivery.

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